Practice Questions and Answers from Lesson I-6: The Market Strikes Back

The following questions practice these skills:

- Identify the effective and ineffective price ceilings and floors.
- Compute the shortage and reduced supply from a price ceiling.
- Identify the inefficiencies from a price ceiling:
  1. loss from lowered quantity as some previous consumers no longer consume and some previous sellers no longer sell,
  2. an inefficient allocation to consumers (some with higher willingness to pay do not consume while others with lower willingness to pay consume),
  3. wasted resources from consumers competing to buy,
  4. inefficiently low quality.
- Compute the surplus and reduced demand from a price floor.
- Identify the inefficiencies from a price floor:
  1. loss from lowered quantity as some previous consumers no longer consume and some previous sellers no longer sell,
  2. an inefficient allocation to producers (some with higher costs produce while others with lower costs do not produce),
  3. wasted resources from producers competing to sell,
  4. inefficiently high quality.
- Compute the deadweight loss of a quota.
- Compute the quota rent, as the value of the right to sell under the quota.

Question: Suppose it is decided that rent control in New York City will be abolished and that market rents will now prevail. Assume that all rental units are identical and so are offered at the same rent. To address the plight of residents who may be unable to pay the market rent, an income supplement will be paid to all low-income households equal to the difference between the old controlled rent and the new market rent.

a. Use a diagram to show the effect on the rental market of the elimination of rent control. What will happen to the quality and quantity of rental housing supplied?

b. Use a second diagram to show the additional effect of the income-supplement policy on the market. What effect does it have on the market rent and quantity of rental housing supplied in comparison to your answers to part a?

c. Are tenants better or worse off as a result of these policies? Are landlords better or worse off? Is society as a whole better or worse off?

Answer to Question:

a. With a price ceiling at $P_C$, the quantity bought and sold is $Q_C$, indicated by point $A$. The ceiling at $P_C$ is eliminated and the rent returns to the market equilibrium $E_1$, with an equilibrium rent of $P_1$. The quantity supplied increases from $Q_C$ to the equilibrium quantity $Q_1$. At the same time, you should expect the quality of rental housing to improve. One of the inefficiencies caused by price ceilings is inefficiently low quality. For example, an improvement for which the renter would be willing to pay $10 is not done even if the cost to the landlord is $2, since the landlord cannot pass along the cost to the renter. As the rent returns to the equilibrium rent, landlords again have the incentive to invest in the
quality of their apartments in order to increase rents.

b. The income-supplement policy causes a rightward shift of the demand curve from $D_1$ to $D_2$. This results in an increase in the equilibrium rent, from $P_1$ to $P_2$, and an increase in the equilibrium quantity, from $Q_1$ to $Q_2$, as the equilibrium changes from $E_1$ to $E_2$.

c. Landlords are clearly better off as a result of these two policies: more landlords rent out apartments, and at a higher monthly rent. It is not clear whether tenants are better or worse off. Some tenants who previously could not get apartments can now do so, but at a higher rent. In particular, those tenants who do not receive the income supplement and who used to rent cheap apartments under the price ceiling are now worse off. Society as a whole is better off because the deadweight loss caused by a price ceiling has been eliminated: there are now no missed gains from trade.

**Question:** In order to ingratiate himself with voters, the mayor of Gotham City decides to lower the price of taxi rides. Assume, for simplicity, that all taxi rides are the same distance and therefore cost the same. The accompanying table shows the demand and supply schedules for taxi rides.

<table>
<thead>
<tr>
<th>Fare (per ride)</th>
<th>Quantity of Rides Demanded</th>
<th>Quantity of Rides Supplied</th>
</tr>
</thead>
<tbody>
<tr>
<td>$7.00</td>
<td>10</td>
<td>12</td>
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</table>
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<table>
<thead>
<tr>
<th>Fare (per ride)</th>
<th>Quantity of rides (millions per year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$6.50</td>
<td>11</td>
</tr>
<tr>
<td>$6.00</td>
<td>12</td>
</tr>
<tr>
<td>$5.50</td>
<td>13</td>
</tr>
<tr>
<td>$5.00</td>
<td>14</td>
</tr>
<tr>
<td>$4.50</td>
<td>15</td>
</tr>
</tbody>
</table>

a. Assume that there are no restrictions on the number of taxi rides that can be supplied (there is no medallion system). Find the equilibrium price and quantity.

b. Suppose that the mayor sets a price ceiling at $5.50. How large is the shortage of rides? Illustrate with a diagram. Who loses and who benefits from this policy?

c. Suppose that the stock market crashes and, as a result, people in Gotham City are poorer. This reduces the quantity of taxi rides demanded by 6 million rides per year at any given price. What effect will the mayor’s new policy have now? Illustrate with a diagram.

Answer to Question:

a. The equilibrium in the market for taxi rides is shown by $E_1$ in the accompanying diagram. The equilibrium price is $6.50; at that price, the quantity demanded equals the quantity supplied—11 million taxi rides per year. The demand and supply curves ($D_1$ and $S$) illustrate this initial situation.

b. With a price ceiling of $5.50, the quantity supplied is 9 million taxi rides and the quantity demanded is 13 million. So the shortage is $13 - 9 = 4$ million. Taxi drivers clearly lose out: there are fewer taxi rides supplied than before, and at a lower price. The impact on consumers is unclear: fewer people now manage to get rides, but those who do, get them at a lower price.

c. The new demand curve is $D_2$. Now the price ceiling has no effect: the equilibrium is point $E_2$ and the market price settles at $5$, which is below the mandated price ceiling of $5.50$. There will be 8 million taxi rides supplied at this price.
rides demanded and supplied, at a price of $5 each.

Question: In the late eighteenth century, the price of bread in New York City was controlled, set at a predetermined price above the market price.

a. Draw a diagram showing the effect of the policy. Did the policy act as a price ceiling or a price floor?
b. What kinds of inefficiencies were likely to have arisen when the controlled price of bread was above the market price? Explain in detail.

One year during this period, a poor wheat harvest caused a leftward shift in the supply of bread and therefore an increase in its market price. New York bakers found that the controlled price of bread in New York was below the market price.

c. Draw a diagram showing the effect of the price control on the market for bread during this one-year period. Did the policy act as a price ceiling or a price floor?
d. What kinds of inefficiencies do you think occurred during this period? Explain in detail.

Answer to Question:

a. Panel (a) of the accompanying diagram illustrates the effect of this policy. Since the price is set above the market equilibrium price, this policy acts as a price floor: it raises the price artificially above the equilibrium. As a result, too much bread is produced: there is a surplus.

b. As with all price floors above the equilibrium price, there are several associated inefficiencies. First, there is deadweight loss from inefficiently low quantity. Some transactions that would have occurred at the unregulated market price no longer occur. Second, there is inefficient allocation of sales among bakers. Some bakers who have higher cost get to operate, while some who have lower cost do not. Third, there are wasted resources from surplus production of bread that must be given or thrown away. Fourth, there is inefficiently high quality as bakers produce bread of higher quality than consumers want. Consumers would instead prefer a lower price.
c. Panel (b) illustrates the effect of the fixed price if the market equilibrium is above that price. The set price now acts like a price ceiling, preventing the price from rising to the equilibrium. There is a shortage, as occurs with every price ceiling below the equilibrium price.

d. As with all price ceilings below the equilibrium price, there are several associated inefficiencies. First, there is deadweight loss from inefficiently low quantity. There is a persistent shortage of bread, and some transactions that would have occurred at the equilibrium price no longer occur. Second, there is inefficient allocation to consumers, as some who want bread very much are not able to find any, while those who value bread less are able to purchase some. Third, there are wasted resources as consumers expend resources to find bread. Fourth, there is inefficiently low quality of bread that is offered for sale.

**Question:** The U.S. Department of Agriculture (USDA) administers the price floor for milk, set at $0.10 per pound of milk. (The price floor is officially set at $9.90 per hundredweight of milk. One hundredweight is 100 pounds.) At that price, according to data from the USDA, the quantity of milk produced in 2003 by U.S. producers was 170 billion pounds, and the quantity demanded was 169 billion pounds. To support the price of milk at the price floor, the USDA had to buy up 1 billion pounds of milk. The accompanying diagram shows supply and demand curves illustrating the market for milk.

![Supply and Demand Diagram for Milk](image)

a. In the absence of a price floor, how much consumer surplus is created? How much producer surplus? What is the total surplus?

b. With the price floor at $0.10 per pound of milk, consumers buy 169 billion pounds of milk. How much consumer surplus is created now?

c. With the price floor at $0.10 per pound of milk, producers sell 170 billion pounds of milk (some to consumers and some to the USDA). How much producer surplus is created now?

d. How much money does the USDA spend on buying up surplus milk?

e. Taxes must be collected to pay for the purchases of surplus milk by the USDA. As a result, total surplus (producer plus consumer) is reduced by the amount the USDA spent on buying surplus milk. Using your answers for parts b—d, what is the total surplus when there is a price floor? How does this compare to the total surplus without a price floor from part a?

**Answer to Question:**

a. In the absence of any price floor, consumer surplus is the area below the demand curve but above the equilibrium price of $0.08: it is \( \frac{($0.14 - $0.08) \times 169.5 \text{ billion}}{2} = $5.085 \text{ billion} \). And producer surplus is the area above the supply curve but below the equilibrium price of $0.08: it is \( \frac{($0.08 - $0.02) \times 169.5 \text{ billion}}{2} = $5.085 \text{ billion} \). Total surplus therefore is $5.085 billion + $5.085 billion = $10.17 billion.
b. With the price floor at $0.10 per pound, consumer surplus is the area below the demand curve but above the price of $0.10: it is \((\$0.14 - \$0.10) \times 169 \text{ billion})/2 = \$3.38 \text{ billion}.

c. With the price floor at $0.10 per pound, producer surplus is the area above the supply curve but below the price of $0.10: it is \((\$0.10 - \$0.02) \times 170 \text{ billion})/2 = \$6.8 \text{ billion}.

d. The USDA buys 1 billion pounds of milk at a price of $0.10 per pound, for a total of $0.10 \times 1 \text{ billion} = \$0.1 \text{ billion}.

e. Total surplus when there is a price floor is consumer surplus plus producer surplus minus the money spent by the USDA. It is $3.38 \text{ billion} + \$6.8 \text{ billion} - \$0.1 \text{ billion} = \$10.08 \text{ billion}. This is less than the $10.17 \text{ billion} total surplus without any price support.

**Question:** The accompanying table shows hypothetical demand and supply schedules for milk per year. The U.S. government decides that the incomes of dairy farmers should be maintained at a level that allows the traditional family dairy farm to survive. So it implements a price floor of $1 per pint by buying surplus milk until the market price is $1 per pint.

<table>
<thead>
<tr>
<th>Price of milk (per pint)</th>
<th>Quantity of milk (millions of pints per year)</th>
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<tbody>
<tr>
<td></td>
<td>Quantity demanded</td>
</tr>
<tr>
<td>$1.20</td>
<td>550</td>
</tr>
<tr>
<td>1.10</td>
<td>600</td>
</tr>
<tr>
<td>1.00</td>
<td>650</td>
</tr>
<tr>
<td>0.90</td>
<td>700</td>
</tr>
<tr>
<td>0.80</td>
<td>750</td>
</tr>
</tbody>
</table>

a. In a diagram, show the deadweight loss from the inefficiently low quantity bought and sold.
b. How much surplus milk will be produced as a result of this policy?
c. What will be the cost to the government of this policy?
d. Since milk is an important source of protein and calcium, the government decides to provide the surplus milk it purchases to elementary schools at a price of only $0.60 per pint. Assume that schools will buy any amount of milk available at this low price. But parents now reduce their purchases of milk at any price by 50 million pints per year because they know their children are getting milk at school. How much will the dairy program now cost the government?
e. Explain how inefficiencies in the form of inefficient allocation to sellers and wasted resources arise from this policy.

**Answer to Question:**
a. The deadweight loss is shown in the accompanying diagram by the shaded triangle.
b. With demand of \(D_1\) and supply of \(S\), the equilibrium would be at point \(E_1\) in the accompanying diagram. However, with a price floor at $1, the quantity supplied is 750 million pints and the quantity demanded is 650 million pints. So the policy causes a surplus of milk of 100 million pints per year.
c. In order to sustain this price floor (to prevent black market sales of surplus milk below the price floor), the government has to buy up the surplus of milk. Buying 100 million pints of milk at a price of $1 each costs the government $100 million.

d. As a result of sales of cheap milk to schools, the quantity demanded falls by 50 million pints per year at any price: the demand curve shifts leftward to the new demand curve $D_2$. Without the price floor, the equilibrium would now be at point $E_2$. However, with the price floor at $1, there is now a surplus of 150 million pints. In order to sustain the price floor of $1, the government must buy up 150 million pints at $1 each; that is, it must spend $150 million. It does, however, sell those 150 million pints to schools at $0.60 each (and from those sales makes $0.60 \times 150 \text{ million} = $90 \text{ million}), so that the policy costs the government $150 \text{ million} - $90 \text{ million} = $60 \text{ million}.

e. Some milk producers are inefficient: if the price were allowed to reach equilibrium, they would find it too costly to produce. In their absence, milk would be produced only by the most efficient producers. Furthermore, resources are being wasted: although no milk is poured away outright, the government spends significant amounts of money on purchases of milk. This is money that might be used more effectively for purposes other than providing cheap milk to schoolchildren, such as improving the quality of public schools.

Question: European governments tend to make greater use of price controls than does the U.S. government. For example, the French government sets minimum starting yearly wages for new hires who have completed le bac, certification roughly equivalent to a high school diploma. The demand schedule for new hires with le bac and the supply schedule for similarly credentialed new job seekers are given in the accompanying table. The price here—given in euros, the currency used in France—is the same as the yearly wage.

<table>
<thead>
<tr>
<th>Wage (per year)</th>
<th>Quantity demanded (new job offers per year)</th>
<th>Quantity supplied (new job seekers per year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>€45,000</td>
<td>200,000</td>
<td>325,000</td>
</tr>
<tr>
<td>40,000</td>
<td>220,000</td>
<td>320,000</td>
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<tr>
<td>35,000</td>
<td>250,000</td>
<td>310,000</td>
</tr>
<tr>
<td>30,000</td>
<td>290,000</td>
<td>290,000</td>
</tr>
<tr>
<td>25,000</td>
<td>370,000</td>
<td>200,000</td>
</tr>
</tbody>
</table>

a. In the absence of government interference, what are the equilibrium wage and number of graduates hired per year? Illustrate with a diagram. Will there be anyone seeking a job at the equilibrium wage who is unable to find one—that is, will there be anyone who is involuntarily unemployed?
b. Suppose the French government sets a minimum yearly wage of €35,000. Is there any involuntary unemployment at this wage? If so, how much? Illustrate with a diagram. What if the minimum wage is
set at €40,000? Also illustrate with a diagram.

c. Given your answer to part b and the information in the table, what do you think is the relationship between the level of involuntary unemployment and the level of the minimum wage? Who benefits from such a policy? Who loses? What is the missed opportunity here?

**Answer to Question:**

a. The equilibrium wage is €30,000, and 290,000 workers are hired. There is full employment: nobody is involuntarily unemployed. The equilibrium is at point $E$.

![Diagram showing wage and quantity of workers](image)

b. With a minimum wage of €35,000, there is a surplus of workers of 60,000 (the quantity supplied is 310,000 and the quantity demanded is 250,000). That is, there are 60,000 workers who are involuntarily unemployed. At a minimum wage of €40,000, there is a surplus of workers of 100,000: this is the number of involuntarily unemployed workers.

c. The higher the minimum wage, the larger the amount of involuntary unemployment. The people who benefit from this policy are those workers who succeed in getting hired: they now enjoy a higher wage. Those workers who do not get hired, however, lose: if the market were allowed to reach equilibrium, more workers would be employed. Employers also lose: fewer employers can now afford to hire workers, and they need to pay higher wages. The missed opportunity is that there are workers who want to work even at a wage lower than the minimum wage and firms that would willingly hire them at a lower wage; but because the wage is not allowed to fall below the minimum wage, these hires are not made.

**Question:** Until recently, the standard number of hours worked per week for a full-time job in France was 39 hours, just as in the United States. But in response to social unrest over high levels of involuntary unemployment, the French government instituted a 35-hour workweek—a worker could not work more than 35 hours per week even if both the worker and employer wanted it. The motivation behind this policy was that if current employees worked fewer hours, employers would be forced to hire more new workers. Assume that it is costly for employers to train new workers. French employers were greatly opposed to this policy and threatened to move their operations to neighboring countries that did not have such employment restrictions. Can you explain their attitude? Give an example of both an inefficiency and an illegal activity that are likely to arise from this policy.

**Answer to Question:** The introduction of a quota limit—limiting the workweek to 35 hours, below the current equilibrium quantity—implies that there is quota rent earned by the suppliers of labor. So it should not come as a surprise that workers who expected to keep their jobs under the new policy were in favor of the policy. The demand price (the price paid by the demanders of labor, that is, firms), compared to what the wage had been before the introduction of the policy, had risen. Furthermore, since it is costly to train new workers, firms could not use new hires to completely make up for the
shortfall in the hours that their current employees were working. As a result, firms had to produce less output and earn lower revenue than before the policy. Like every quota that is below the equilibrium quantity, this quota introduced inefficiency: even if workers wanted to work longer hours and firms agreed to this arrangement, such trades were no longer legally possible. You should expect some black market activity to occur: workers working longer hours off the books.

**Question:** For the last 70 years the U.S. government has used price supports to provide income assistance to American farmers. To implement these price supports, at times the government has used price floors, which it maintains by buying up the surplus farm products. At other times, it has used target prices, a policy by which the government gives the farmer an amount equal to the difference between the market price and the target price for each unit sold. Consider the market for corn depicted in the accompanying diagram.

![Diagram of the corn market](image)

a. If the government sets a price floor of $5 per bushel, how many bushels of corn are produced? How many are purchased by consumers? By the government? How much does the program cost the government? How much revenue do corn farmers receive?

b. Suppose the government sets a target price of $5 per bushel for any quantity supplied up to 1,000 bushels. How many bushels of corn are purchased by consumers and at what price? By the government? How much does the program cost the government? How much revenue do corn farmers receive?

c. Which of these programs (in parts a and b) costs corn consumers more? Which program costs the government more? Explain.

**Answer to Question:**

a. With a price floor of $5, the quantity of corn supplied is 1,200 bushels. The quantity demanded is only 800 bushels: there is a surplus of 400 bushels. The government therefore has to buy up the surplus of 400 bushels, at a price of $5 each: the program costs the government $5 \times 400 = $2,000. Corn farmers sell 1,200 bushels (800 to consumers and 400 to the government) and therefore make $5 \times 1,200 = $6,000 in revenue.

b. If the government sets a target price of $5, the market reaches equilibrium at a price of $3 and a quantity of 1,000 bushels. There is no surplus (or shortage). The government does not buy any corn under this policy. For each bushel sold the government pays farmers $2 (to make up the difference between the market price of $3 and the target price of $5), so the government pays a total of $2 \times 1,000 = $2,000. Corn farmers sell 1,000 bushels and make $5 for each bushel ($3 come from consumers and $2 from the government), for a total of $5,000 of revenue.

c. The price-floor policy is more expensive for consumers: they pay $5 per bushel (compared to the $3 under the target-price policy). Both policies are equally expensive for the government.
Question: The waters off the North Atlantic coast were once teeming with fish. Now, due to overfishing by the commercial fishing industry, the stocks of fish are seriously depleted. In 1991, the National Marine Fishery Service of the U.S. government implemented a quota to allow fish stocks to recover. The quota limited the amount of swordfish caught per year by all U.S.-licensed fishing boats to 7 million pounds. As soon as the U.S. fishing fleet had met the quota limit, the swordfish catch was closed down for the rest of the year. The accompanying table gives the hypothetical demand and supply schedules for swordfish caught in the United States per year.

<table>
<thead>
<tr>
<th>Price of swordfish (per pound)</th>
<th>Quantity of swordfish (millions of pounds per year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>6</td>
</tr>
<tr>
<td>18</td>
<td>7</td>
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<tr>
<td>16</td>
<td>8</td>
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<td>14</td>
<td>9</td>
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<tr>
<td>12</td>
<td>10</td>
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</tbody>
</table>

a. Use a diagram to show the effect of the quota on the market for swordfish in 1991. In your diagram, illustrate the deadweight loss from inefficiently low quantity.

b. How do you think fishermen will change how they fish in response to this policy?

Answer to Question:

a. The quantity sold is 7 million pounds, at a price of $18 per pound. On each pound of fish caught, each fisherman earns quota rent of $6, as shown in the accompanying diagram. The shaded triangle shows the deadweight loss.

b. Because each pound of swordfish gives a fisherman $6 quota rent, each fisherman will attempt to fish as much as possible as soon as the swordfish catch opens. You should therefore see fishermen scramble to fish right at the beginning of the season, and you should see the catch being closed down very soon thereafter. (Which is exactly what happens.)

Question: In Maine, you must have a license to harvest lobster commercially; these licenses are issued yearly. The state of Maine is concerned about the dwindling supplies of lobsters found off its coast. The state fishery department has decided to place a yearly quota of 80,000 pounds of lobsters harvested in all Maine waters. It has also decided to give licenses this year only to those fishermen who had licenses last year. The accompanying diagram shows the demand and supply curves for Maine lobsters.
a. In the absence of government restrictions, what are the equilibrium price and quantity?
b. What is the demand price at which consumers wish to purchase 80,000 pounds of lobsters?
c. What is the supply price at which suppliers are willing to supply 80,000 pounds of lobsters?
d. What is the quota rent per pound of lobster when 80,000 pounds are sold? Illustrate the quota rent and the deadweight loss on the diagram.
e. Explain a transaction that benefits both buyer and seller but is prevented by the quota restriction.

Answer to Question:
a. Without government restrictions, the equilibrium in the market for lobsters is at point \( E \). The equilibrium price for lobsters is $10 per pound. At that price, the quantity demanded and the quantity supplied are 120,000 pounds of lobsters.

b. The demand price of 80,000 pounds of lobsters is $14.
c. The supply price of 80,000 pounds of lobsters is $8.
d. The quota rent per pound of lobster is $14 − $8 = $6.
e. Under the quota policy, the producer and consumer of the 80,001st pound of lobster could both be better off: the producer would be willing to sell for just a little more than $8, and the consumer would be willing to buy for just a little less than $14. The quota, however, prevents this trade.

Question: The Venezuelan government has imposed a price ceiling on the retail price of roasted coffee beans. The accompanying diagram shows the market for coffee beans. In the absence of price controls, the equilibrium is at point \( E \), with an equilibrium price of \( P_E \) and an equilibrium quantity bought and sold of \( Q_E \).
a. Show the consumer and producer surplus before the introduction of the price ceiling. After the introduction of the price ceiling, the price falls to $P_C$ and the quantity bought and sold falls to $Q_C$.

b. Show the consumer surplus after the introduction of the price ceiling (assuming that the consumers with the highest willingness to pay get to buy the available coffee beans; that is, assuming that there is no inefficient allocation to consumers).

c. Show the producer surplus after the introduction of the price ceiling (assuming that the producers with the lowest cost get to sell their coffee beans; that is, assuming that there is no inefficient allocation of sales among producers).

d. Using the diagram, show how much of what was producer surplus before the introduction of the price ceiling has been transferred to consumers as a result of the price ceiling?

e. Using the diagram, show how much of what was total surplus before the introduction of the price ceiling has been lost? That is, how great is the deadweight loss?

**Answer to Question:**

a. Consumer surplus is the area labeled $CS_1$ and producer surplus is the area labeled $PS_1$ in the left panel of the accompanying diagram.

b. Consumer surplus after the introduction of the price ceiling is made up of the sum of the two areas labeled $CS_{2A}$ and $CS_{2B}$ in the right panel.

c. Producer surplus after the introduction of the price ceiling is the area labeled $PS_2$ in the right panel.

d. The amount of surplus transferred from producers to consumers as a result of the introduction of the price ceiling is the area labeled $CS_{2B}$ in the right panel.

e. The amount of total surplus lost as a result of the introduction of the price ceiling, the deadweight loss, is the area labeled deadweight loss in the right panel.