

Chapter

# 7

**This is Microeconomics**

## **The Supply Curve and the Behavior of Firms (Businesses)**

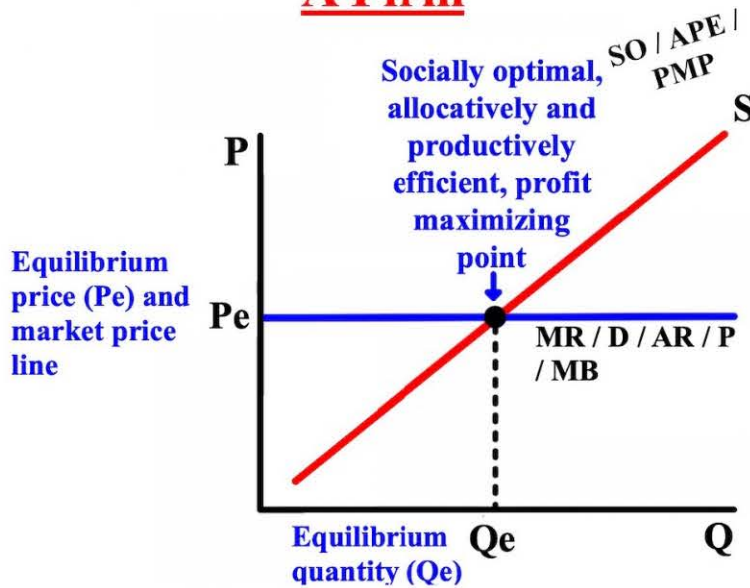
**review for  
the exam**

1. in this chapter we'll talk about the behavior of firms who supply the goods that people consume/demand

## A Firm as a Price-Taker in a Competitive Market

1. the behavior of firms/businesses can be visually described by the supply (S) curve
2. notice that with individual firms, the demand (D) curve is perfectly elastic because competitive firms are price-takers

### A Firm



## A Firm as a Price-Taker in a Competitive Market (cont.)

1. the type of firm/business we'll talk about is typical of many small and large firms: the firm is one with a single product and two factors of production, the price of land and the price of labor
2. one of the factors of production, land, cannot be changed in the short-run because the rent was already paid
  - A. this makes land a **fixed factor**
3. the other factor, labor, can be varied in the short-run because you can choose to hire more or less workers
  - A. this makes labor a **variable factor**
4. each firm in the market is a **price-taker** because the firm must use the market's equilibrium price ( $P_e$ ) as the price to charge customers for a good
  - A. this type of market is called a **competitive market** because a single firm cannot choose or affect the market price; it is competitive for all of the firms in the market
  - B. all of the firms as a whole eventually determine the market's equilibrium price and equilibrium quantity ( $Q_e$ )

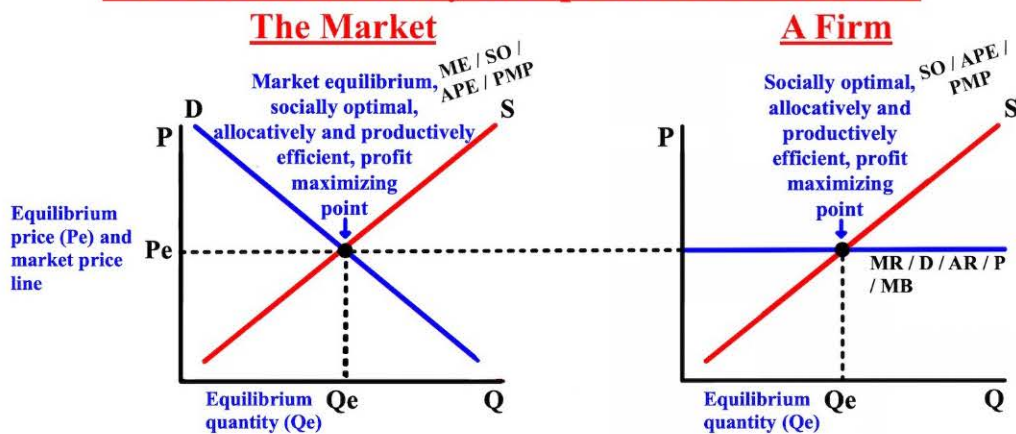
*draw side-by-side graphs of a firm in a perfectly competitive market in short-run equilibrium*

## A Firm as a Price-Taker in a Competitive Market (cont.)

1. a **perfectly competitive/pure market** is a specific and mostly fictional market structure

A. in it 1) all firms sell an identical product, 2) all firms are price-takers, 3) buyers have complete information about the product being sold and the prices charged by each firm, 4) the industry is characterized by freedom of entry and exit by firms, 5) no long-run (LR) profits exist, and 6) the market is efficient

### A Firm in a Perfectly Competitive/Pure Market



## The 4 Market Structures

### Perfect/Pure Competition

1. profit max. and Q:  $P=MC$  and  $MR=MC$
2. P is constant
3. no DWL or excess costs/capacity
4. one product/many close substitutes
5. many producers
6. no barriers to entry/exit
7. no market power/price taker
8. perfectly elastic D curve
9. no LR profit
10. example: stock market

### Oligopoly (imperfect competition)

1. profit max. determined by strategic beh.
2. P decreases,  $P>MC$ , &  $MR<P$
3. DWL and excess costs/capacity
4. standardized/differentiated products
5. a few big producers
6. barriers to entry/exit
7. market power/price maker
8. sloping D curve
9. LR profit
10. example: sneaker market

### Monopolistic Competition (imperfect)

1. profit max. and Q:  $MC=MR$
2. P decreases,  $P>MC$ , &  $MR<P$
3. DWL & excess costs/capacity
4. differentiated products
5. many producers
6. no barriers to entry/exit
7. market power/price maker
8. sloping D curve
9. no LR profit
10. example: cereal market

### Monopoly (imperfect competition)

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5. one big producer
6. barriers to entry/exit
7. market power/price maker
8. sloping D curve
9. LR profit with economies of scales
10. example: US Steel/FPL (nat. mono.)

## A Firms's Total Revenue and Profits

1. **total revenue** (TR) is the total number of dollars a firm receives from people who buy its product(s)

*micro.  
formulas  
#8 & #9*

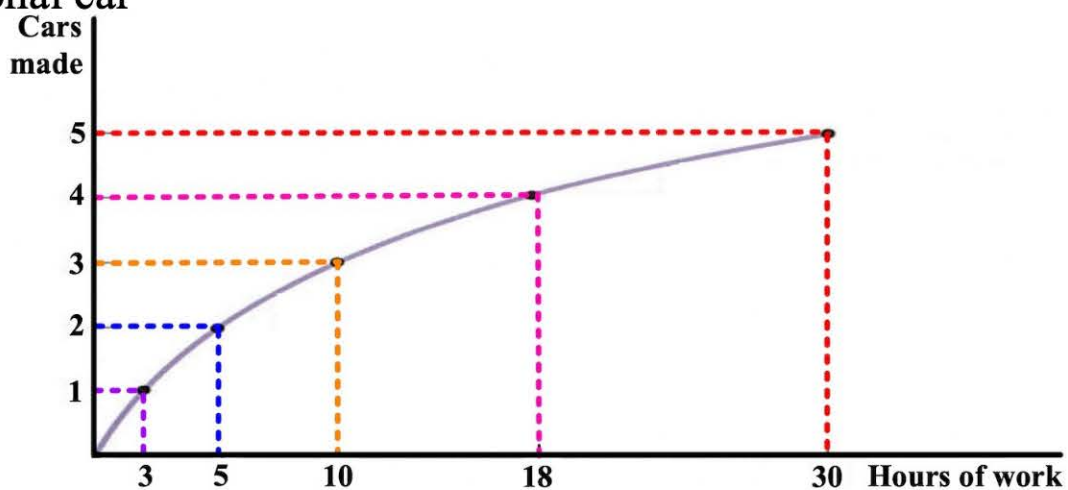
*and*

$$\begin{array}{l} \$5 \qquad \qquad \qquad 10 \qquad \qquad \qquad \$50 \\ \text{price (P) x quantity (Q) = total revenue} \\ \$50 \qquad \qquad \qquad \$30 \qquad \qquad \qquad \$20 \\ \text{total revenue (P x Q) - total costs (TC) = profit} \end{array}$$

2. **profit** is the total revenue (TR) (the total number of dollars a firm receives) received from selling a product minus the total costs (TC) of producing the product

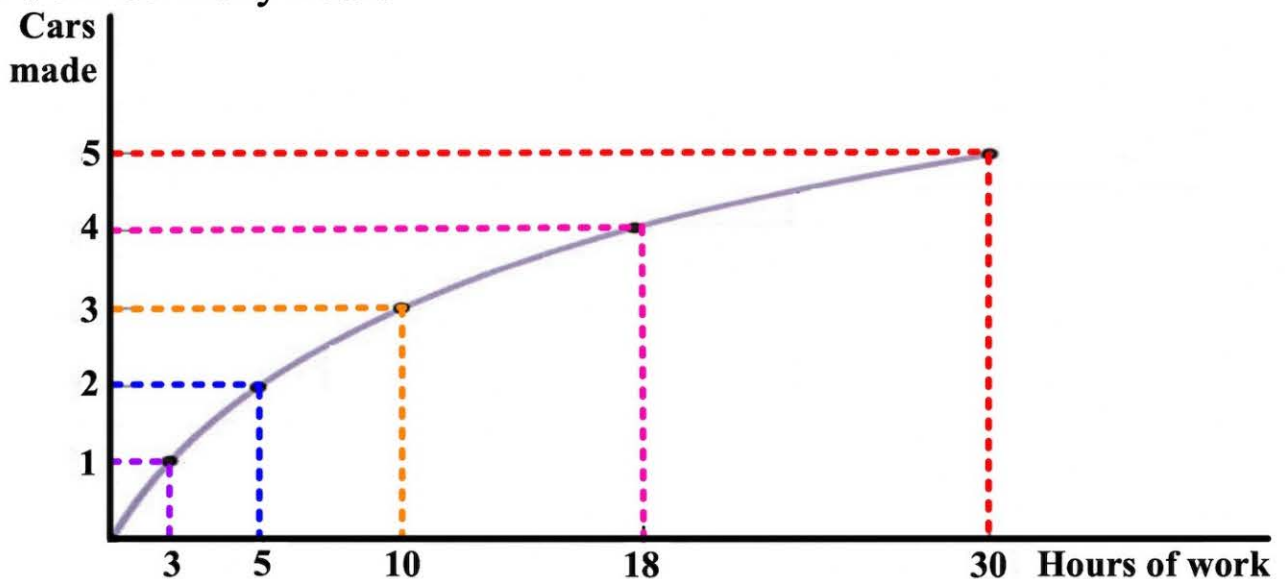
## Production and Costs

1. the **marginal product of labor** (MPL), also called marginal product (MP), is the increase in production of a good that comes from an additional unit of labor, either hours or workers
2. by working an additional five hours (from five to ten), an extra car is produced
  - A. compare this to the increase from eighteen to thirty hours to produce an additional car



## Production and Costs (cont.)

1. but at some point, the amount of workers or hours worked doesn't produce as much and is not worth adding is called **diminishing returns to labor**
2. if an additional labor input, either one more worker or one more hour of work, costs more than is beneficial, the worker won't be hired or a worker won't work so many hours





## Production and Costs (cont.)

- variable costs (VC)** are costs that vary according to how much is produced; the more workers or hours the more the cost
  - this is why you don't hire more workers or have workers work more hours than is beneficial to your firm
- fixed costs (FC)** are the part of the total cost that does not depend on how much is produced, like rent for a store paid in advance
- total costs** are what a firm has to incur financially in order to produce their product(s), the fixed costs (FC) and the variable costs (VC)

$$\text{variable costs (VC)} + \text{fixed costs (FC)} = \text{total cost (TC)}$$

micro.  
formula  
#10

Example of Costs for a Single Firm				
Quantity Produced (crates)	Hours of Labor Input	Variable Costs at \$10 Wage (dollars)	Fixed Costs (dollars)	Total Costs (dollars)
0	0	0	50	50
1	2	20	50	70
2	5	50	50	100
3	10	100	50	150
4	18	180	50	230
5	30	300	50	350

## Production and Costs (cont.)

1. **marginal cost** (MC) is the increase in total costs (TC) associated with making one more unit of production
  - A. the marginal cost below of increasing production from 1 to 2 is \$30 ( $\$100 - \$70 = \$30$ ), and the marginal cost of increasing production from 2 to 3 is \$50 ( $\$150 - \$100 = \$50$ )
2. you can see that because costs increase as a firm produces more, there will be a time when the cost of additional labor input (either workers or hours) will lead to no additional profit and will actually lose a firm money
  - A. the most important key condition for profit maximization and allocative efficiency for a firm in a competitive market: the firm should choose to produce a quantity (Q) such that **price (P) equals marginal cost (MC)**

<u>Quantity Produced</u>	<u>Total Cost</u>	<u>Marginal Cost</u>
0	50	0
1	70	20
2	100	30
3	150	50
4	230	80
5	350	120

## Profit Maximization

1. the table below shows how total costs (TC) increase with production
2. the last column shows that profits are negative at all production levels
3. it seem foolish, but you already paid \$50 for the use of something; it is a fixed cost (FC)
4. it is best to produce 2 and cut your losses at -\$30 instead of producing nothing and keeping your loss at -\$50

**If the price a product is \$35...**

<u>Quantity</u>	<u>Fixed Cost</u>	<u>Variable Costs</u>	<u>Total Cost</u>	<u>Marginal Cost</u>	<u>Total Revenue</u>	<u>Total Cost</u>	<u>Profit</u>
0	\$50	\$ 0	\$ 50	\$ 0	\$ 0	\$ 50	-\$ 50
1	\$50	\$ 20	\$ 70	\$ 20	\$ 35	\$ 70	-\$ 35
2	\$50	\$ 50	\$100	\$ 30	\$ 70	\$100	-\$ 30
3	\$50	\$100	\$150	\$ 50	\$105	\$150	-\$ 45
4	\$50	\$180	\$230	\$ 80	\$140	\$230	-\$ 90
5	\$50	\$300	\$350	\$120	\$175	\$350	-\$175

## Profit Maximization (cont.)

1. the extra revenue that results from producing and selling one more unit of an item is called **marginal revenue** (MR)
2. the price of each product is \$70, so the total revenue (TR) is higher then when the price was \$35
3. if you sell 1, total revenue is \$70 and profits are zero; if you sell 2, total costs are \$100 and total revenue is \$140
4. the profit-maximizing level of production is 3 because at 3, marginal revenue is still more than marginal costs (MC) (revenue is more than cost)

**If the price of a product is \$70...**

<u>Quantity</u>	<u>Total Cost</u>	<u>Marginal Cost</u>	<u>Total Revenue</u>	<u>Marginal Revenue</u>	<u>Profit</u>
0	\$ 50	\$ 0	\$ 0	\$ 0	-\$ 50
1	\$ 70	\$ 20	\$ 70	\$ 70	\$ 0
2	\$100	\$ 30	\$140	\$ 70	\$ 40
3	\$150	\$ 50	\$210	\$ 70	\$ 60
4	\$230	\$ 80	\$280	\$ 70	\$ 50
5	\$350	\$120	\$350	\$ 70	\$ 0

### **Profit Maximization (cont.)**

1. the marginal revenue (MR) should always be at least marginal cost (MC)
2. the **marginal revenue product of labor (MRP)**, or **marginal revenue product** (the amount of revenue gained from adding one more unit of labor), should always be at least the same as the **marginal revenue cost of labor (MRC)** (the cost to increase your labor force to produce one more item)

$$\text{MRP} = \text{MRC}$$

## Producer Surplus

- producer surplus** is the difference between the price (P) and the marginal cost (MC) of every item sold; you simply add up the differences if there is more than one
- if you sell 2 for \$70 each, your producer surplus would be \$90 ( $\$70 - \$20 + \$70 - \$30$ ); if you sell 3 for \$70 each, your producer surplus would be \$110 ( $\$70 - \$20 + \$70 - \$30 + \$70 - \$50$ )

*graph a market in equilibrium then label the consumer surplus CS and the producer surplus PS*

<u>Quantity</u>	<u>Price</u>	<u>Marginal Cost</u>	<u>Producer Surplus</u>	<u>Total Revenue</u>	<u>Total Cost</u>	<u>Profit</u>
0	= \$ 0	\$ 0	\$ 0	\$ 0	- \$ 50	= -\$50
1	= \$ 70	- \$ 20	= \$50	\$ 70	- \$ 70	= \$ 0
2	= \$ 70	- \$ 30	= \$40	\$140	- \$100	= \$40
3	= \$ 70	- \$ 50	= \$20	\$210	- \$150	= \$60
4	= \$ 70	- \$ 80	= -\$10	\$280	- \$230	= \$50
5	= \$ 70	- \$120	= -\$50	\$350	- \$350	= \$ 0

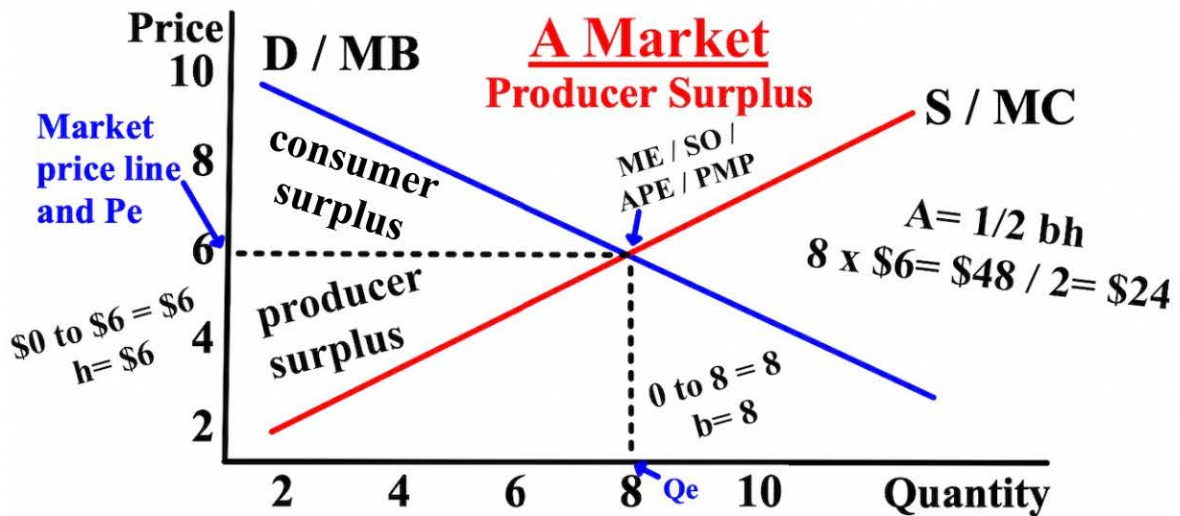
micro.  
formula  
#11

when  
selling



## Producer Surplus (cont.)

- producers often are able to sell their products at a cheaper price, but they don't have to
  - consumers are willing to pay the market or equilibrium price ( $P_e$ ), at the least
- the difference between the cost for the producer, the marginal cost (MC), and the price that consumers do pay, is called the **producer surplus (PS)**



## Producer Surplus (cont.)

1. the **total producer surplus** would be the price (P) of each product minus the marginal cost (MC) of each product added together
2. at \$70 per unit, the total producer surplus of selling 2 is \$90: \$70-\$20 + \$70-\$30
3. at \$70 per unit, the total producer surplus of selling 3 is \$110: \$70-\$20 + \$70-\$30 + \$70-\$50

micro.  
formula  
#12

when  
selling

<u>Quantity</u>	<u>Price</u>	<u>Marginal Cost</u>	<u>Producer Surplus</u>	<u>Total PS</u>
0	= \$ 0	\$ 0	\$ 0	\$ 0
1	= \$ 70	- \$ 20	= \$ 50	\$ 50
2	= \$ 70	- \$ 30	= \$ 40	\$ 90
3	= \$ 70	- \$ 50	= \$ 20	\$ 110
4	= \$ 70	- \$ 80	= -\$ 10	\$ 100
5	= \$ 70	- \$ 120	= -\$ 50	\$ 50



## Microeconomics Do-Now

**Please do this:**

**1.**

(b) Bananas are an input for muffins.

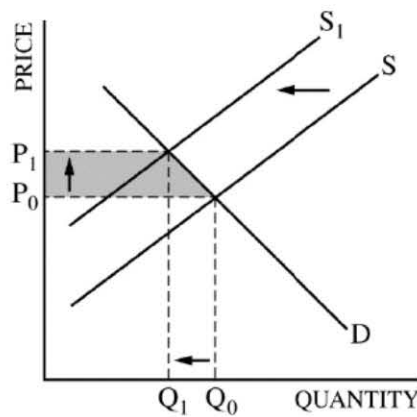
- (i) Draw a correctly labeled graph of the market for muffins indicating the equilibrium price and quantity, labeled  $P_0$  and  $Q_0$ , respectively.
- (ii) On the graph drawn in part (b)(i), show the impact of an increase in the price of bananas on the muffin market, labeling the new equilibrium price and quantity  $P_1$  and  $Q_1$ , respectively.
- (iii) On the same graph, completely shade the area that represents the change in the consumer surplus caused by the increase in the price of bananas.

## Microeconomics Do-Now

Please do this:

1.

3 points



- One point is earned for drawing a correctly labeled graph and for showing the equilibrium price and quantity, labeled  $P_0$  and  $Q_0$ , respectively.
- One point is earned for shifting the supply curve to the left and for showing the new equilibrium price and quantity, labeled  $P_1$  and  $Q_1$ , respectively.
- One point is earned for completely shading on the graph the area representing the change in consumer surplus.

# Chapter 8

**This is Microeconomics**

## **People and Firms in Markets**

1. this chapter is about the interaction of consumers and firms/businesses in competitive markets

## The 4 Market Structures

### Perfect/Pure Competition

1. profit max. and Q:  $P=MC$  and  $MR=MC$
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### Oligopoly (imperfect competition)

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### Monopoly (imperfect competition)

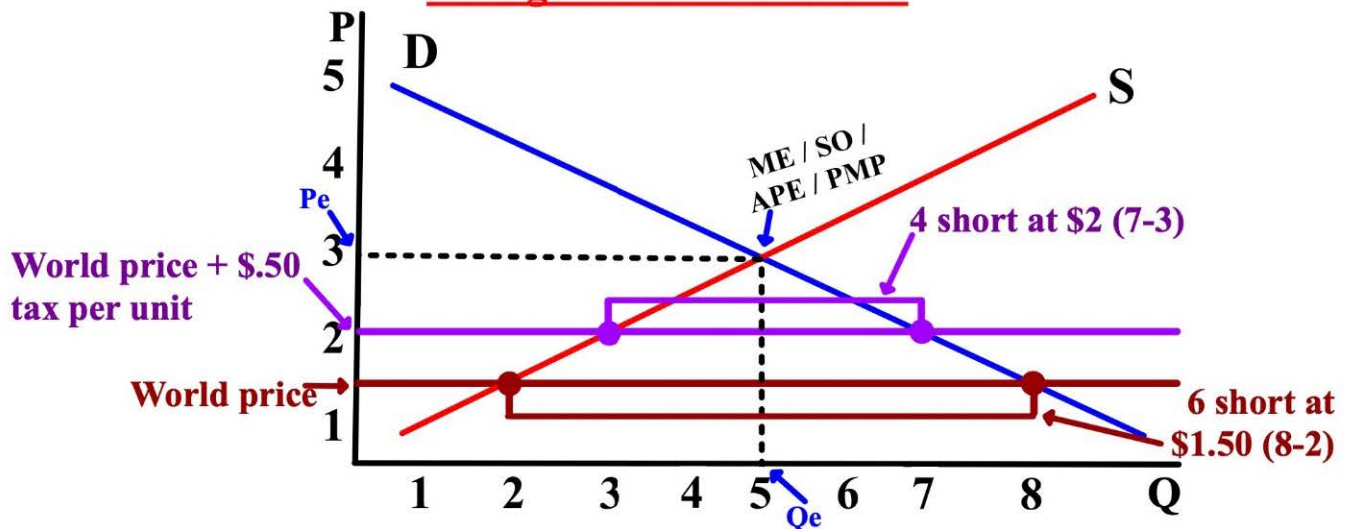
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8. sloping D curve
9. LR profit with economies of scales
10. example: US Steel/FPL (nat. mono.)

## Foreign Trade and Tariffs

1. to see how much a country will import of something at a certain price (P) to decrease a shortage, like when the quantity (Q) produced is at a set price or the world price instead of market equilibrium (Me), find the shortage before any imports are included

### A Market in Short- run Equilibrium

#### Foreign Trade and Tariffs

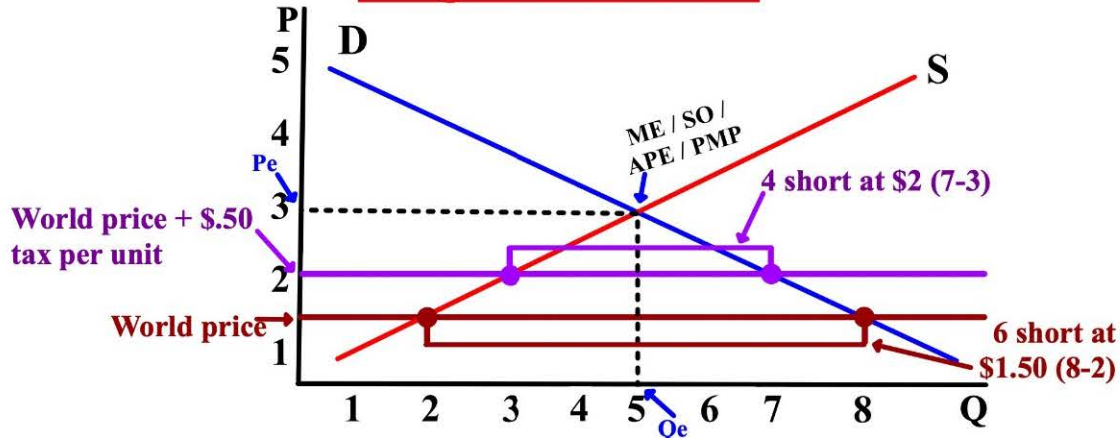


## Foreign Trade and Tariffs (cont.)

- at the world price of \$1.50, 8 are demanded but only 2 are supplied; 6 will be imported; if the **tariff** (a tax on imports) is \$10 per unit, then the tax collected by the country from the tariff would be \$60 (6 x \$10)
- at \$2 (the world price plus a tariff of \$.50), domestic production is now only 4 short (7-3); 4 will be imported and the tax collected by the country from the tariff would be \$40 (4 x \$10)

### A Market in Short-run Equilibrium

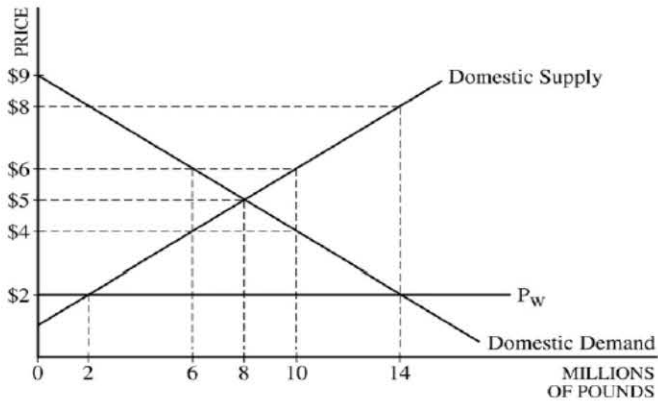
#### Foreign Trade and Tariffs



## Microeconomics Do-Now

### Please do this:

1. Sugar is freely traded in the world market. Assume that a country, Loriland, is a price taker in the world market for sugar. Some of the sugar consumed in Loriland is produced domestically while the rest is imported. The world price of sugar is \$2 per pound. The graph below shows Loriland's sugar market, and  $P_w$  represents the world price.



- (a) At the world price of \$2 per pound, how much sugar is Loriland importing?
- (b) Suppose that Loriland imposes a per-unit tariff on sugar imports and the new domestic price including the tariff is \$4.
- (i) Identify the new level of domestic production.
  - ~~(ii) Calculate the domestic consumer surplus for Loriland. You must show your work.~~
  - ~~(iii) Calculate the total tariff revenue collected by the government. You must show your work.~~
- (c) Given the world price of \$2, what per-unit tariff maximizes the sum of Loriland's domestic consumer surplus and producer surplus?

## Microeconomics Do-Now

1.

4 points (1 + 2 + 1)

(a) 1 point:

- One point is earned for stating that Loriland is importing 12 million pounds.

(b) 2 points:

- One point is earned for identifying the new level of domestic production as 6 million pounds.
- ~~One point is earned for calculating the domestic consumer surplus as \$25 million and showing the work:  $\frac{1}{2} [(\$9 - \$4) \times 10] = \$25$~~
- ~~One point is earned for calculating the revenue from the tariff as \$6 million and showing the work:  $(\$4 - \$2) (10 - 6) = \$8$ .~~

(c) 1 point:

- One point is earned for identifying the per-unit tariff that maximizes the sum of consumer and producer surplus as \$0.

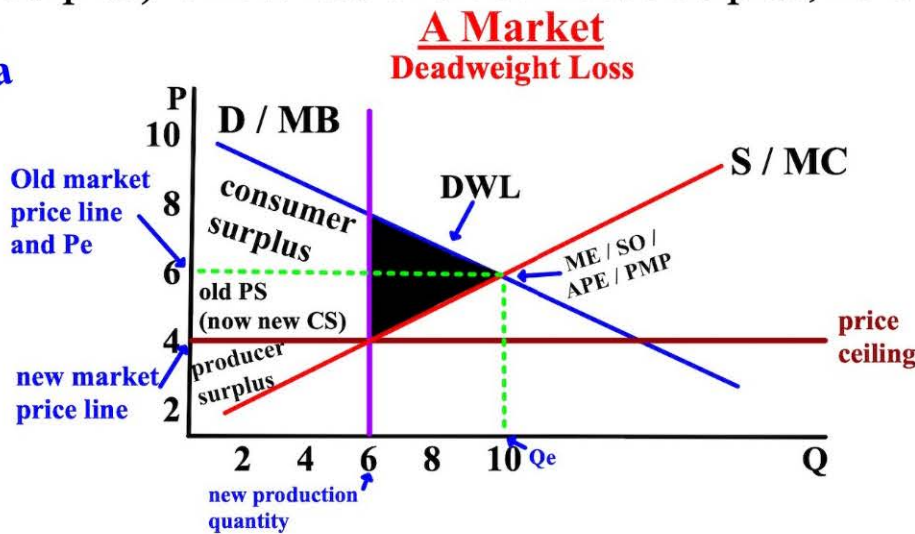
**graph a market in equilibrium then input a binding price ceiling; label the consumer surplus CS and the producer surplus PS and any lost CS or PS; also label the deadweight loss**



## Deadweight Loss

- deadweight loss** (DWL) is what happens to consumer surplus (CS) and producer surplus (PS) when the efficient level of production does not occur: when too little or too much is produced
  - deadweight loss is always a triangle in shape (base x height / 2)
- because of the price ceiling, the sum of consumer and producer surplus (total surplus) is now less and both loose surplus; no one gets it

micro.  
formula  
#13



total surplus  
was  
\$40 ( $8 \times \$10 / 2$ )

but...

DWL  
= \$8 ( $4 \times \$4 / 2$ )

so now...

total surplus  
= \$32 ( $\$40 - \$8$ )

## The Deadweight Loss from Taxation

1. a **tax** on sales is a payment that must be made to the government by the seller of a product, of which some part of it is always passed along to consumers
  - A. the tax may be a percentage of the dollar value spent on the products sold, in which case it is called an **ad valorem tax** or a **lump sum tax**, like a 6% state tax on purchases
  - B. the tax may be proportional to the number of items sold, a **per-unit tax**, in which case the tax is called a **specific tax** or an **excise tax**, like a tax on gasoline of \$.08 per gallon
2. when taxes are created, the tax benefit created for the government is the area from the current price (P) to the new price
3. if consumers (D) and firms (S) are equally elastic, the cost of a tax is split equally, and if one is more elastic than the other, the inelastic will pay more
4. the immediate impact of the tax is to add to the marginal cost (MC) of producing a product, and the supply (S) curve shifts to the left

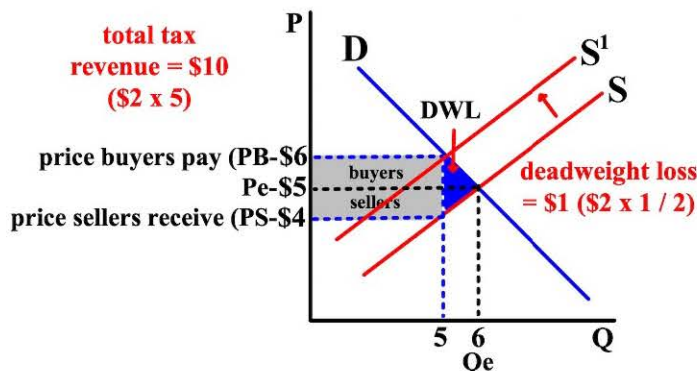
*graph a situation where a government creates a \$2 tax and both the buyers and sellers are equally elastic*

## The Deadweight Loss from Taxation (cont.)

1. the supply curve below has shifted to the left because of a \$2 tax
2. the \$4 tax can be determined: the new price buyers (PB) will pay is \$6 and the new price sellers (PS) will receive is \$4...  $\$6 - \$4 = \$2$  tax
3. the new price the seller will receive is the intersection of the old supply curve and the new quantity (Q) of 5
4. the total taxes paid are taken 50% from each, \$1 from consumers and \$1 from sellers because the gray rectangular box below is split evenly by the old price

### A Market

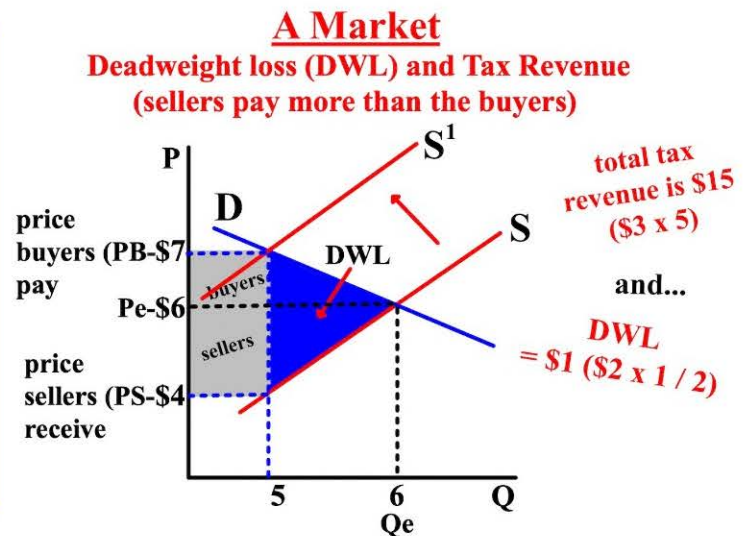
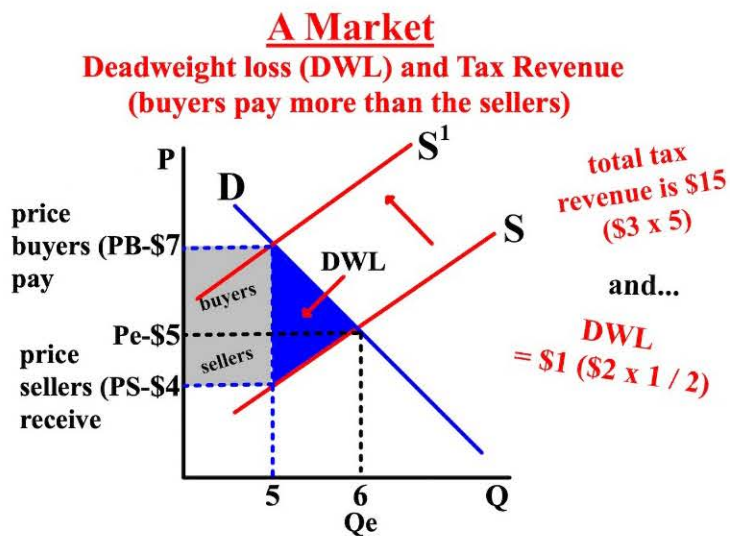
**Deadweight loss (DWL) and Tax Revenue**  
**(buyers and sellers pay the same amount of the tax: \$1)**



*graph a situation where a government creates a \$3 tax and the buyers are inelastic and the sellers are equally elastic*

## The Deadweight Loss from Taxation (cont.)

1. if either side was more elastic than the other, the sensitive party would pay a smaller portion of the taxes and the less sensitive a larger portion
2. the left graph shows buyers being more inelastic than sellers and buyers have/pay more of the gray area (the total tax); sellers are elastic and will pay less of the tax



## Microeconomics Do-Now

**Please do this:**

**1.**

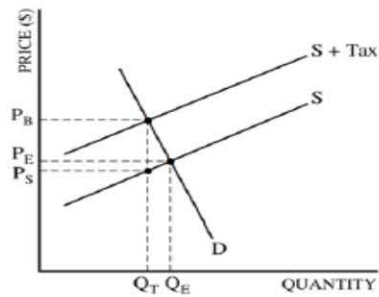
Assume that gasoline is sold in a competitive market in which demand is relatively inelastic and supply is relatively elastic.

- (a) Draw a correctly labeled graph of the gasoline market. On your graph show the equilibrium price and quantity of gasoline, labeled  $P_E$  and  $Q_E$ .
- (b) Suppose the government imposes a \$2 per unit tax on the producers of gasoline. On your graph from part (a), show each of the following after the tax is imposed.
  - (i) The price paid by buyers, labeled  $P_B$
  - (ii) The after-tax price received by sellers, labeled  $P_S$
  - (iii) The quantity, labeled  $Q_T$
- (c) Using the labeling on your graph, explain how to calculate the total tax revenue collected by the government.
- (d) Will the tax burden fall entirely on buyers, entirely on sellers, more on buyers and less on sellers, more on sellers and less on buyers, or equally on buyers and sellers? Explain.

## Microeconomics Do-Now

6 points (1 + 3 + 1 + 1)

1.



(a) 1 point:

- One point is earned for drawing a correctly labeled graph of the gasoline market showing the equilibrium price,  $P_E$ , and quantity,  $Q_E$ .

(b) 3 points:

- One point is earned for showing  $P_B$  above  $P_E$ , derived from the D curve at  $Q_T$ .
- One point is earned for showing  $P_S$  below  $P_E$ , derived from the S curve at  $Q_T$ .
- One point is earned for showing  $Q_T$  less than  $Q_E$ .

~~Note: It is not necessary to draw the S + Tax curve, a "tax wedge" approach is acceptable.~~

(c) 1 point:

- One point is earned for correctly calculating the total tax revenue based on the labeling of the graph.

All of the following are acceptable when  $P_B$  and  $P_S$  are correct:

- ~~•  $(P_E \times Q_T) - (P_S \times Q_T)$~~
- ~~•  $(P_E - P_S) \times Q_T$~~
- $2 \times Q_T$
- $\text{Tax} \times Q_T$

(d) 1 point:

- One point is earned for explaining that the tax burden will fall more on buyers and less on sellers because the demand curve is more inelastic than the supply curve.