

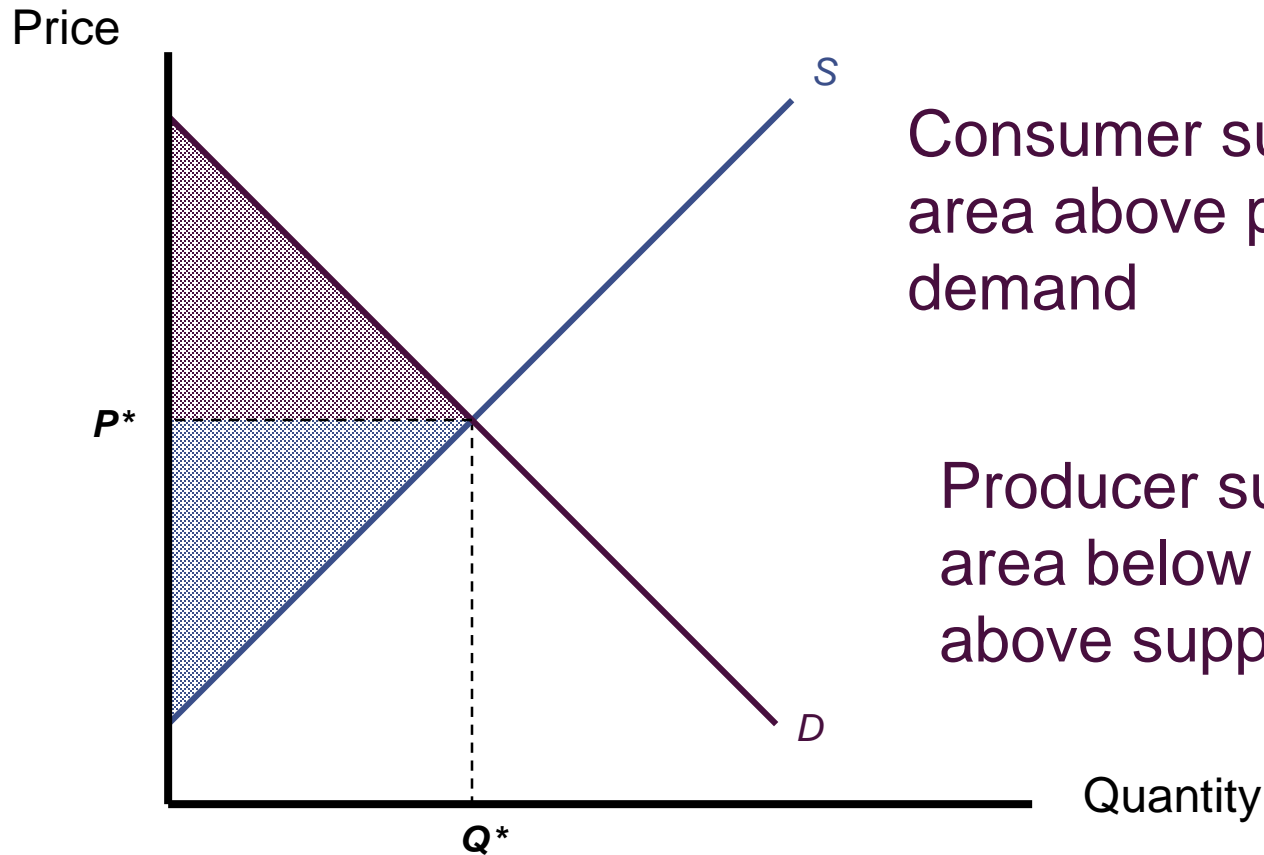
Chapter 11

APPLIED COMPETITIVE ANALYSIS

Economic Efficiency and Welfare Analysis

- The area between the demand and the supply curve represents the sum of consumer and producer surplus
 - measures the total additional value obtained by market participants by being able to make market transactions
- This area is maximized at the competitive market equilibrium

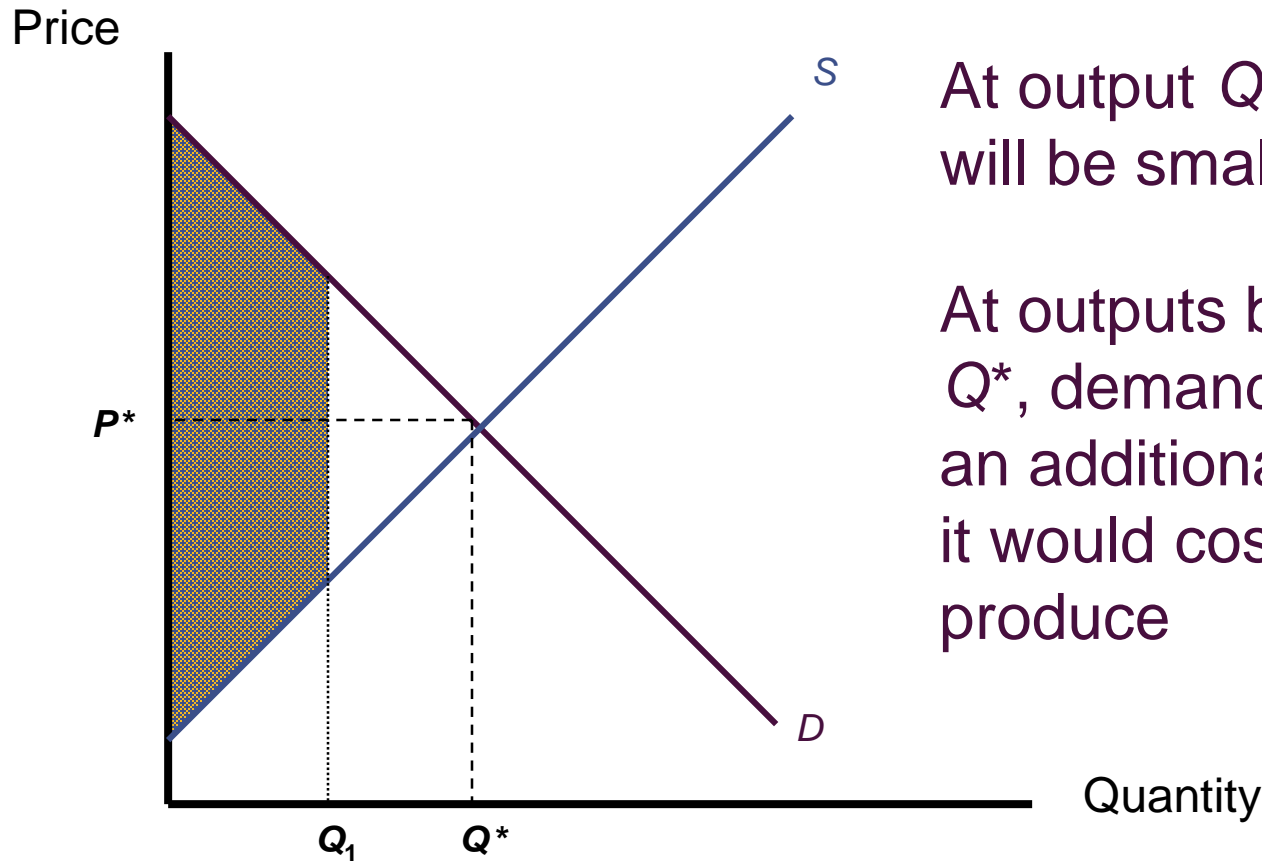
Economic Efficiency and Welfare Analysis



Consumer surplus is the area above price and below demand

Producer surplus is the area below price and above supply

Economic Efficiency and Welfare Analysis



At output Q_1 , total surplus will be smaller

At outputs between Q_1 and Q^* , demanders would value an additional unit more than it would cost suppliers to produce

Economic Efficiency and Welfare Analysis

- Mathematically, we wish to maximize
consumer surplus + producer surplus =

$$[U(Q) - PQ] + [PQ - \int_0^Q P(Q)dQ] = U(Q) - \int_0^Q P(Q)dQ$$

- In long-run equilibria along the long-run supply curve, $P(Q) = AC = MC$

Economic Efficiency and Welfare Analysis

- Maximizing total surplus with respect to Q yields

$$U'(Q) = P(Q) = AC = MC$$

- maximization occurs where the marginal value of Q to the representative consumer is equal to market price
 - the market equilibrium

Welfare Loss Computations

- Use of consumer and producer surplus notions makes possible the explicit calculation of welfare losses caused by restrictions on voluntary transactions
 - in the case of linear demand and supply curves, the calculation is simple because the areas of loss are often triangular

Welfare Loss Computations

- Suppose that the demand is given by

$$Q_D = 10 - P$$

and supply is given by

$$Q_S = P - 2$$

- Market equilibrium occurs where $P^* = 6$
and $Q^* = 4$

Welfare Loss Computations

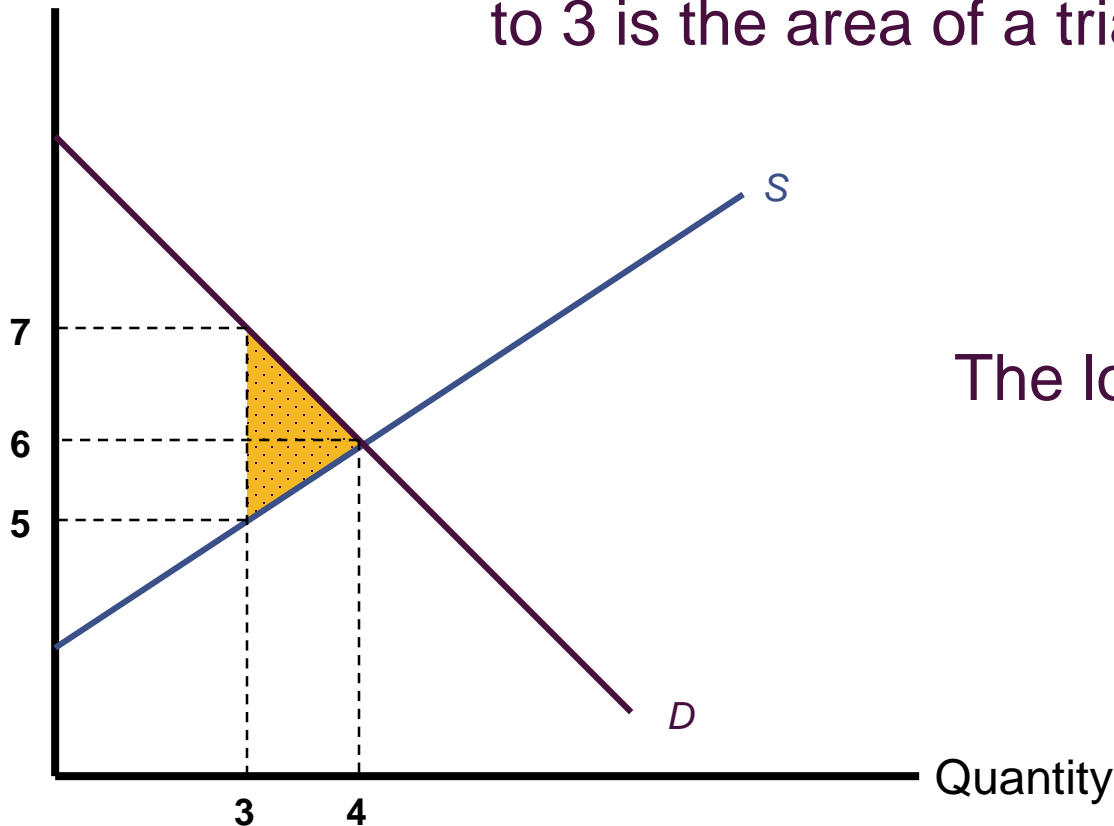
- Restriction of output to $Q_0 = 3$ would create a gap between what demanders are willing to pay (P_D) and what suppliers require (P_S)

$$P_D = 10 - 3 = 7$$

$$P_S = 2 + 3 = 5$$

Welfare Loss Computations

Price



The welfare loss from restricting output to 3 is the area of a triangle

$$\text{The loss} = (0.5)(2)(1) = 1$$

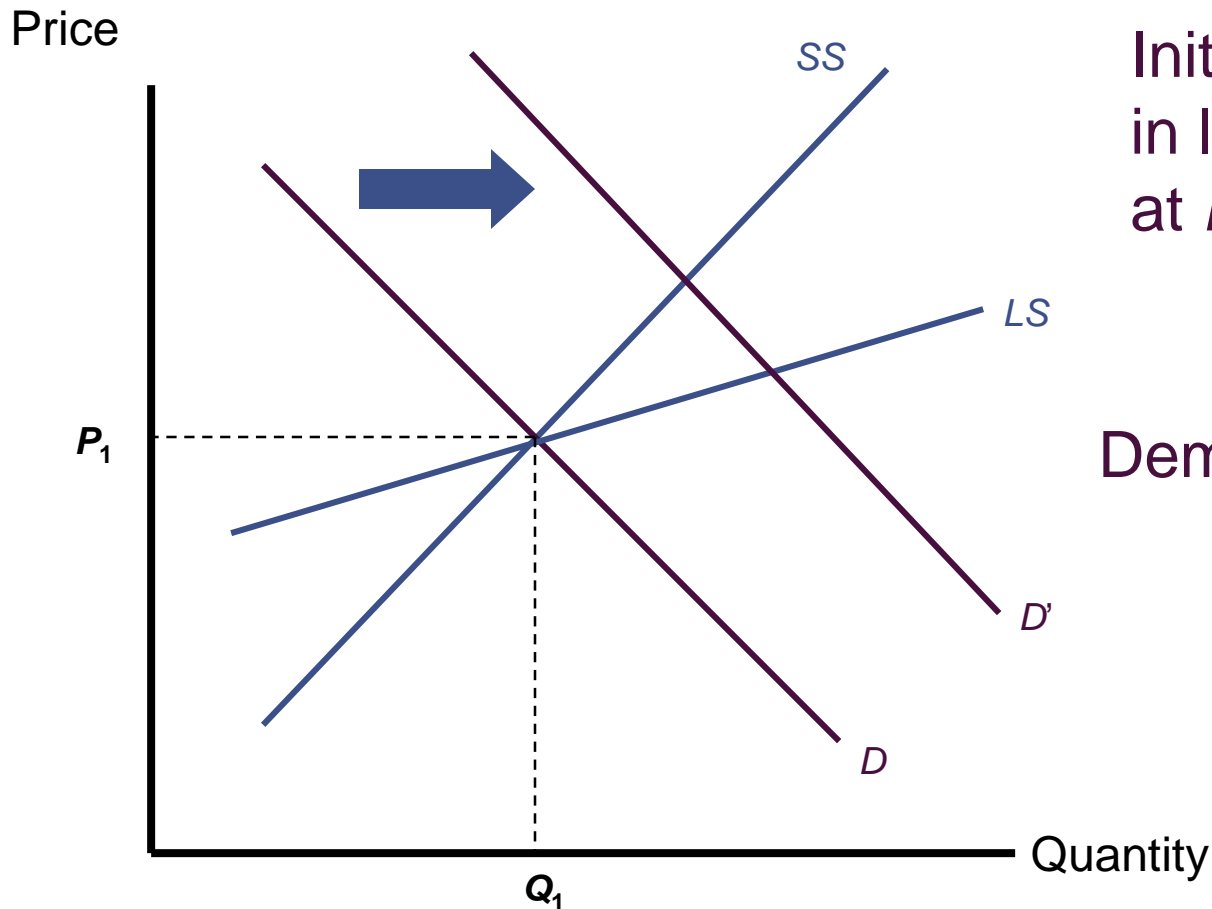
Welfare Loss Computations

- The welfare loss will be shared by producers and consumers
- In general, it will depend on the price elasticity of demand and the price elasticity of supply to determine who bears the larger portion of the loss
 - the side of the market with the smallest price elasticity (in absolute value)

Price Controls and Shortages (skipped)

- Sometimes governments may seek to control prices at below equilibrium levels
 - this will lead to a shortage
- We can look at the changes in producer and consumer surplus from this policy to analyze its impact on welfare

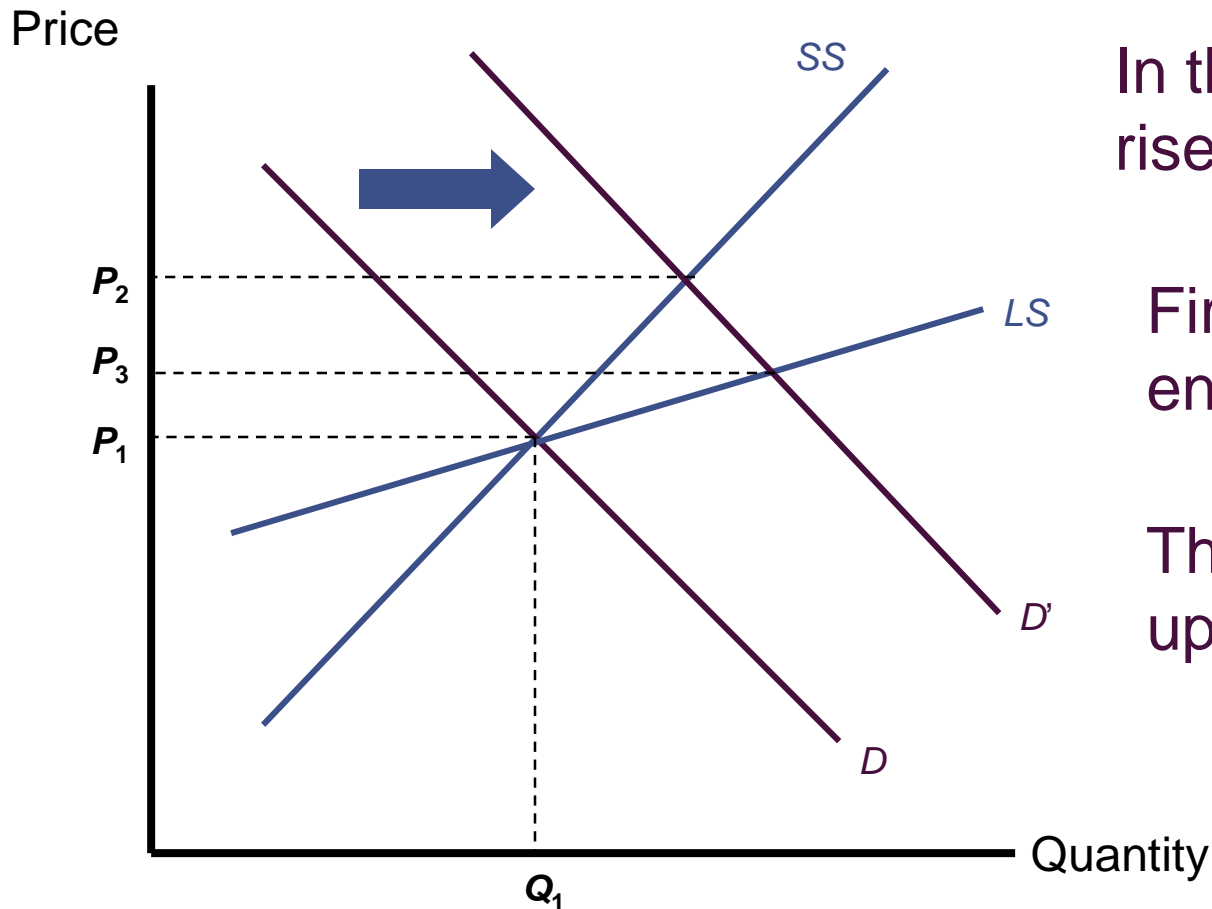
Price Controls and Shortages



Initially, the market is in long-run equilibrium at P_1, Q_1

Demand increases to D'

Price Controls and Shortages

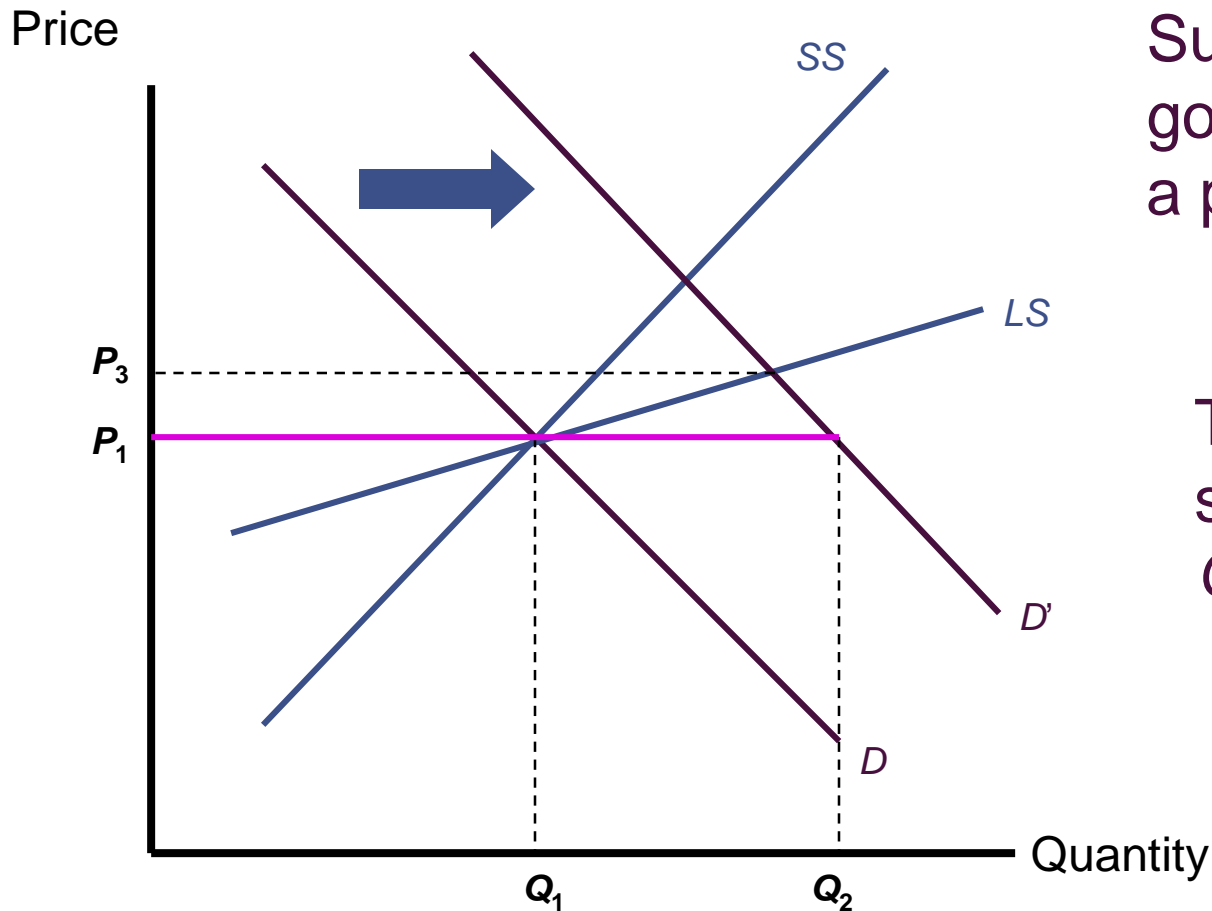


In the short run, price rises to P_2

Firms would begin to enter the industry

The price would end up at P_3

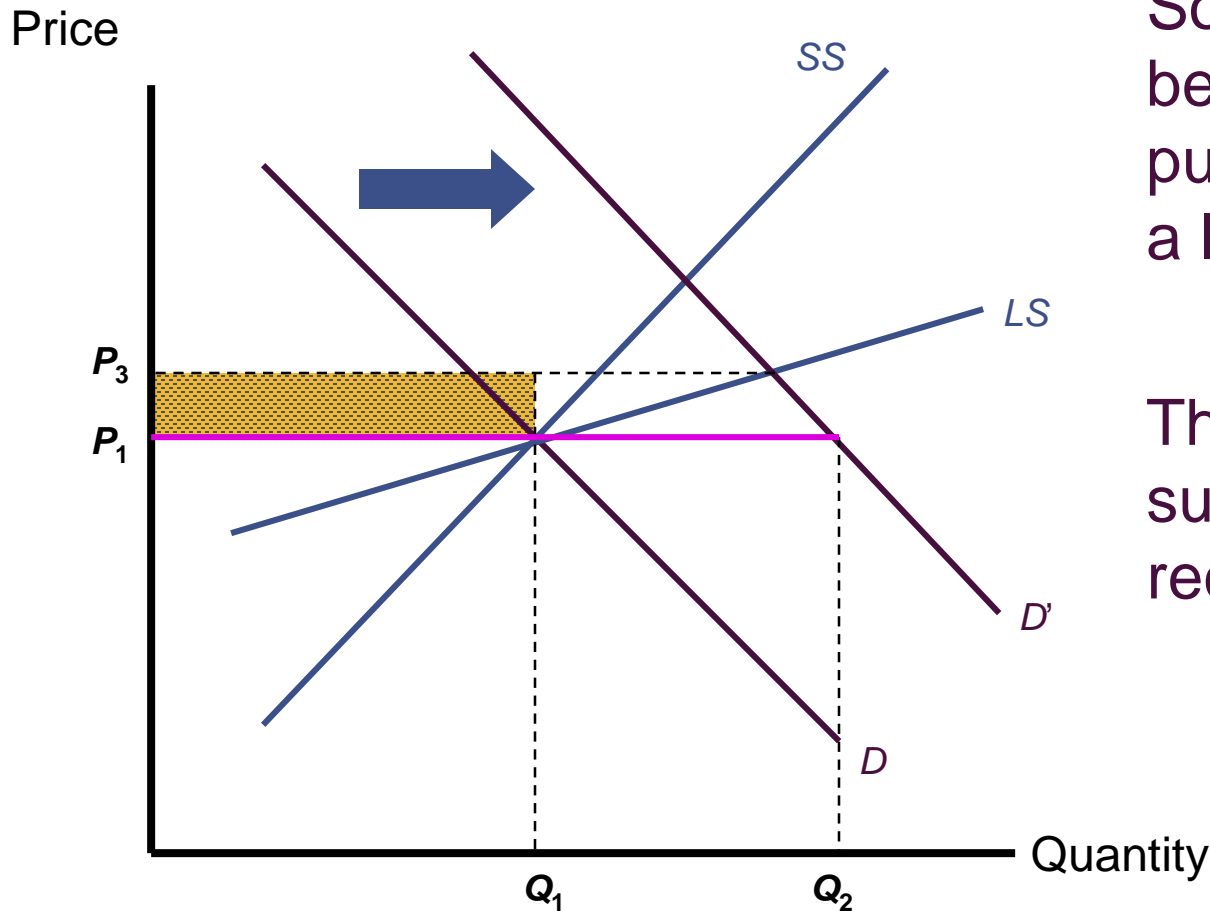
Price Controls and Shortages



Suppose that the government imposes a price ceiling at P_1

There will be a shortage equal to $Q_2 - Q_1$

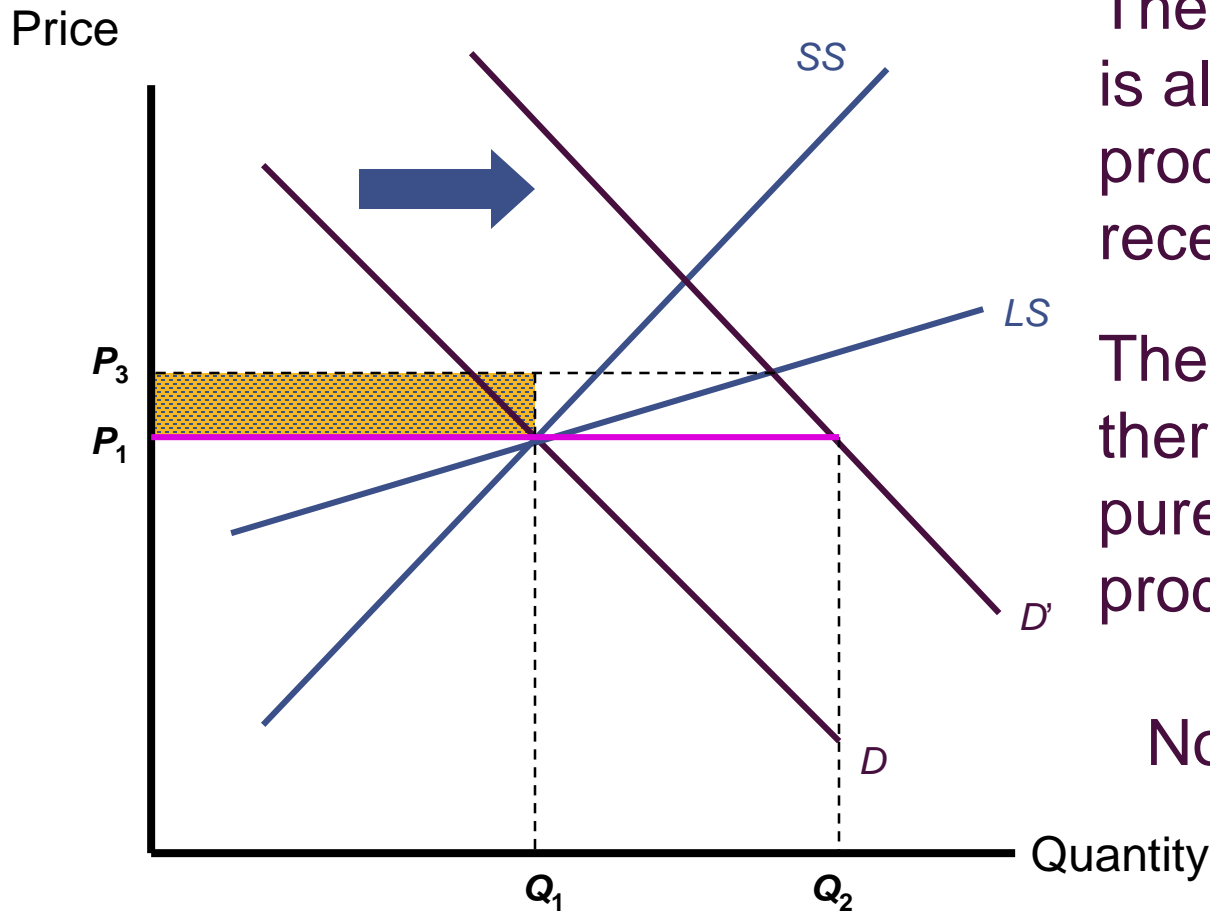
Price Controls and Shortages



Some buyers will gain because they can purchase the good for a lower price

This gain in consumer surplus is the shaded rectangle

Price Controls and Shortages

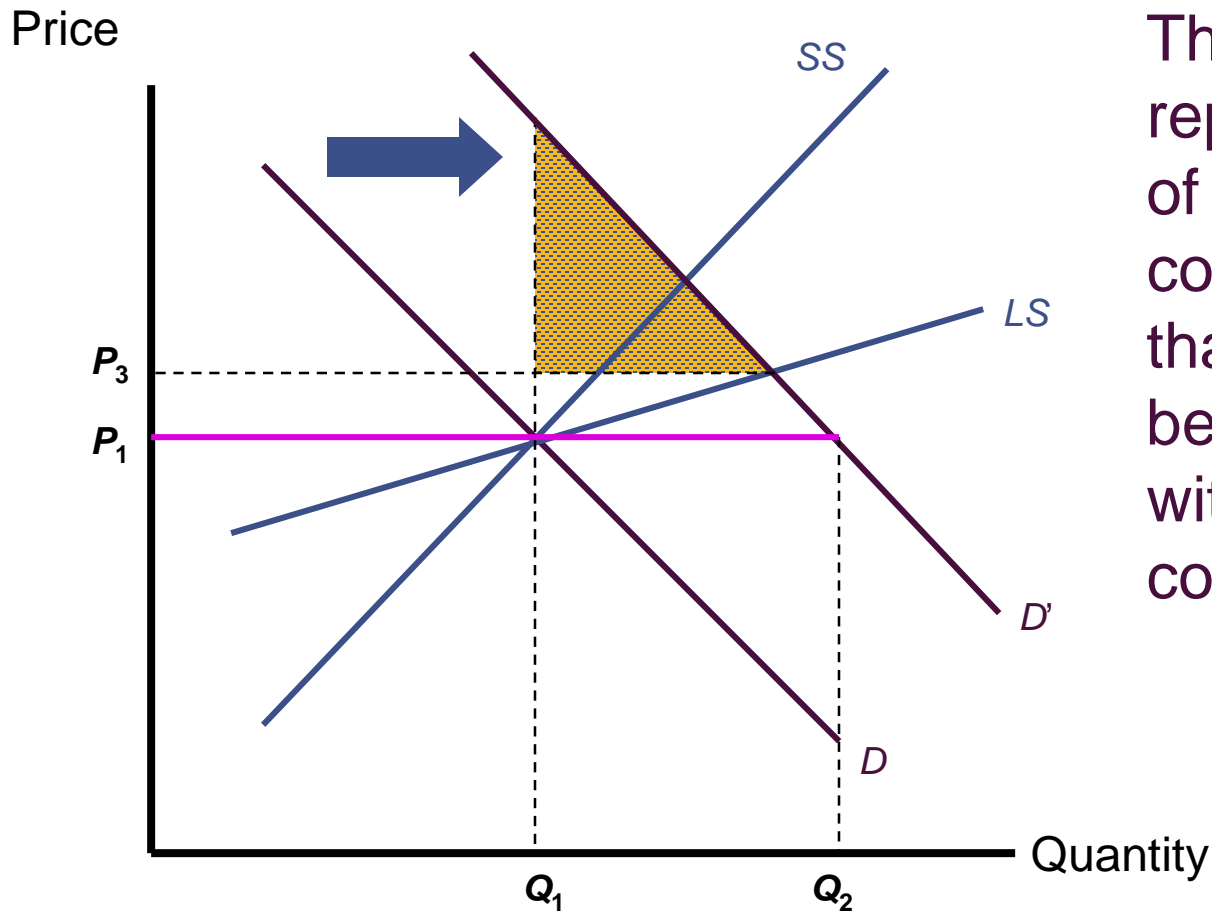


The gain to consumers is also a loss to producers who now receive a lower price

The shaded rectangle therefore represents a pure transfer from producers to consumers

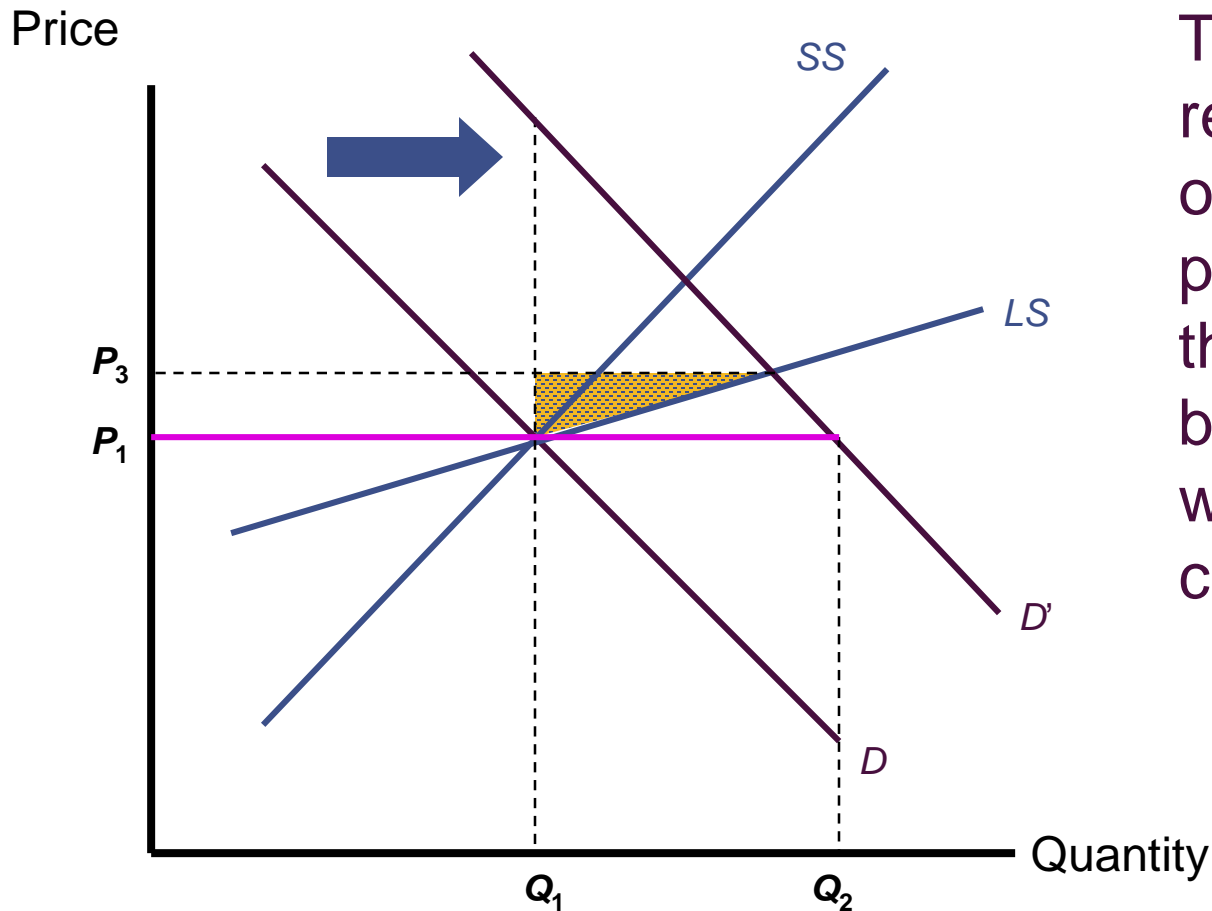
No welfare loss there

Price Controls and Shortages



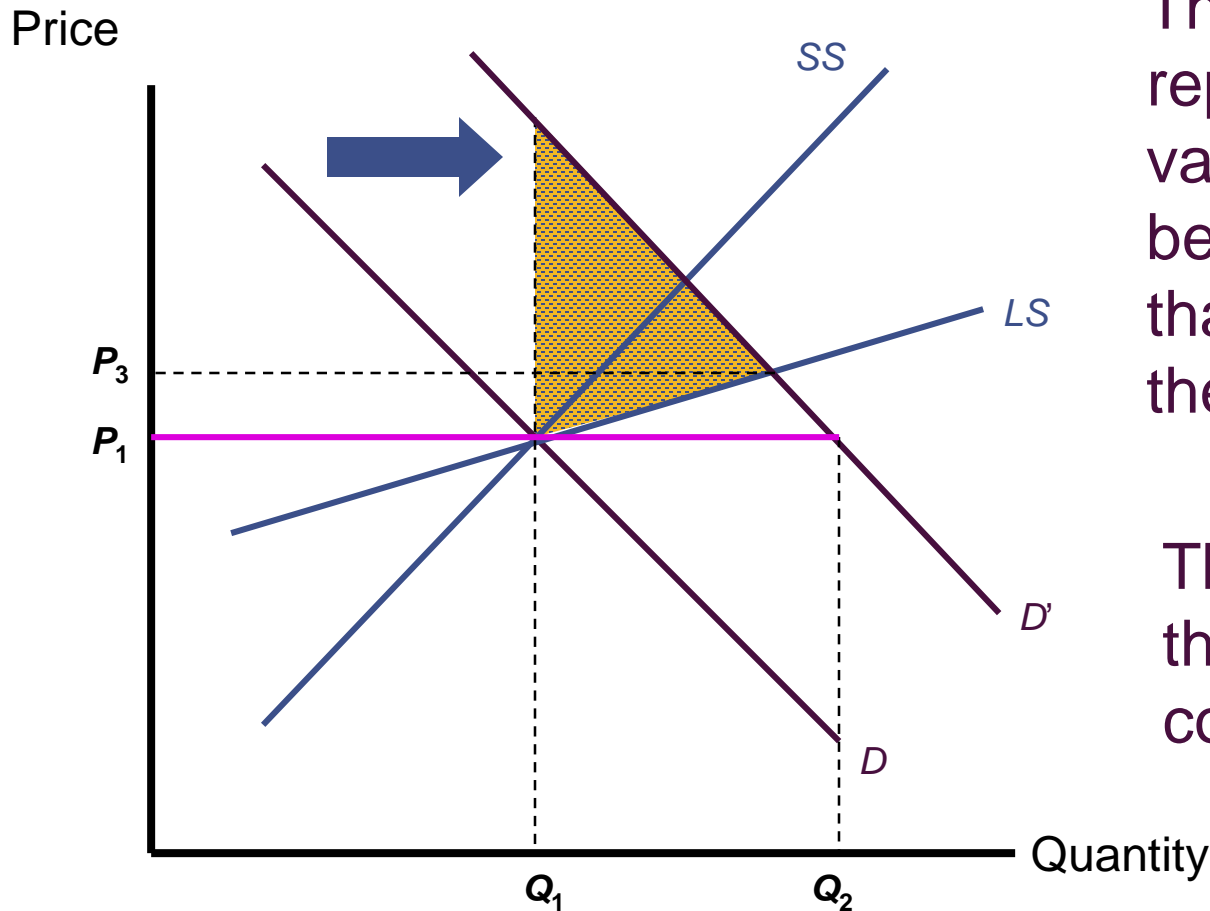
This shaded triangle represents the value of additional consumer surplus that would have been attained without the price control

Price Controls and Shortages



This shaded triangle represents the value of additional producer surplus that would have been attained without the price control

Price Controls and Shortages



This shaded area represents the total value of mutually beneficial transactions that are prevented by the government

This is a measure of the pure welfare costs of this policy

Disequilibrium Behavior

- Assuming that observed market outcomes are generated by

$$Q(P_1) = \min [Q_D(P_1), Q_S(P_1)],$$

suppliers will be content with the outcome but demanders will not

- This could lead to a black market

Tax Incidence(税收归宿)

- To discuss the effects of a per-unit tax (t), we need to make a distinction between the price paid by buyers (P_D) and the price received by sellers (P_S)

$$P_D - P_S = t$$

- In terms of small price changes, we wish to examine

$$dP_D - dP_S = dt$$

Tax Incidence

- Maintenance of equilibrium in the market requires

$$dQ_D = dQ_S$$

or

$$D_P dP_D = S_P dP_S$$

- Substituting, we get

$$D_P dP_D = S_P dP_S = S_P (dP_D - dt)$$

Tax Incidence

- We can now solve for the effect of the tax on P_D :

$$\frac{dP_D}{dt} = \frac{S_P}{S_P - D_P} = \frac{e_S}{e_S - e_D}$$

- Similarly,

$$\frac{dP_S}{dt} = \frac{D_P}{S_P - D_P} = \frac{e_D}{e_S - e_D}$$

Tax Incidence

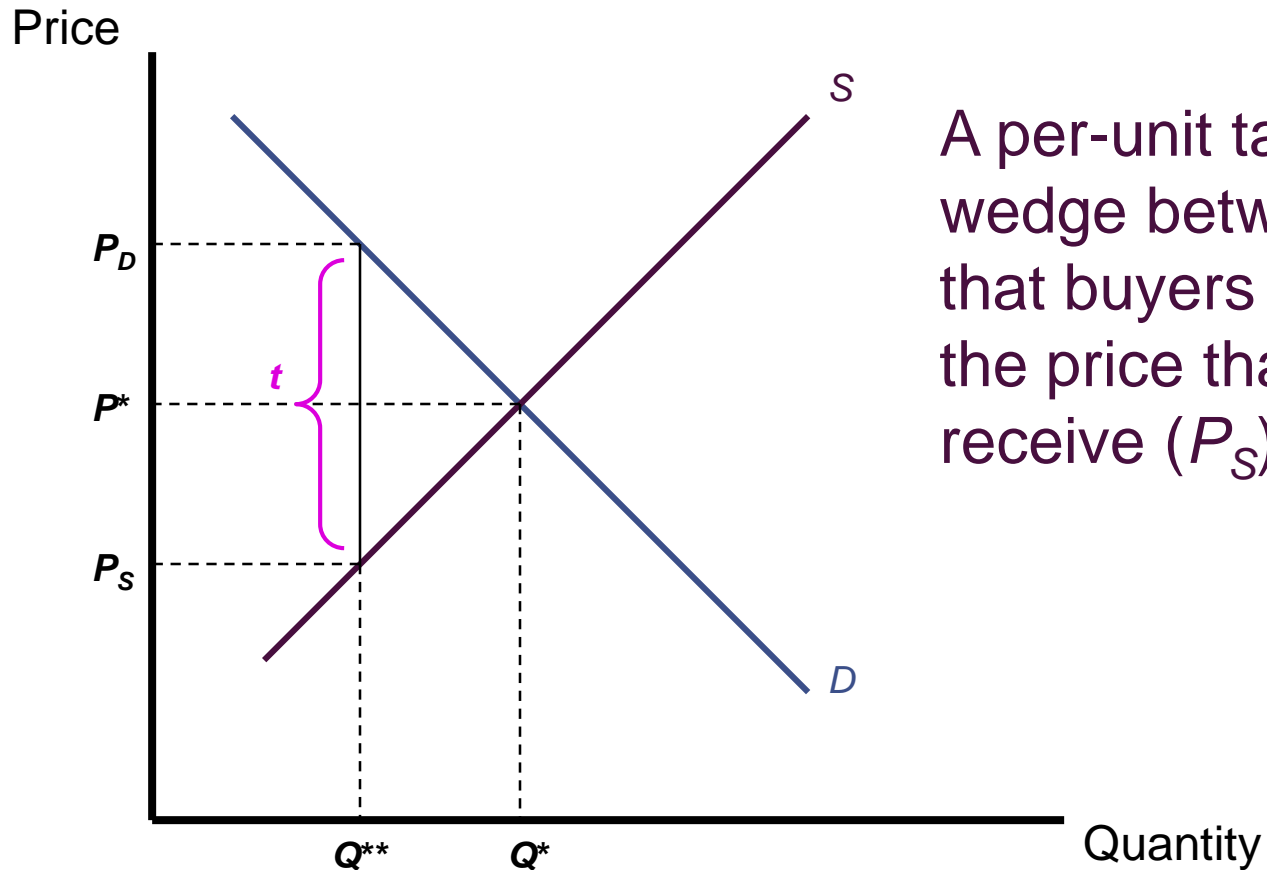
- Because $e_D \leq 0$ and $e_S \geq 0$, $dP_D/dt \geq 0$ and $dP_S/dt \leq 0$
- If demand is perfectly inelastic ($e_D = 0$), the per-unit tax is completely paid by demanders
- If demand is perfectly elastic ($e_D = \infty$), the per-unit tax is completely paid by suppliers

Tax Incidence

- In general, the actor with the less elastic responses (in absolute value) will experience most of the price change caused by the tax

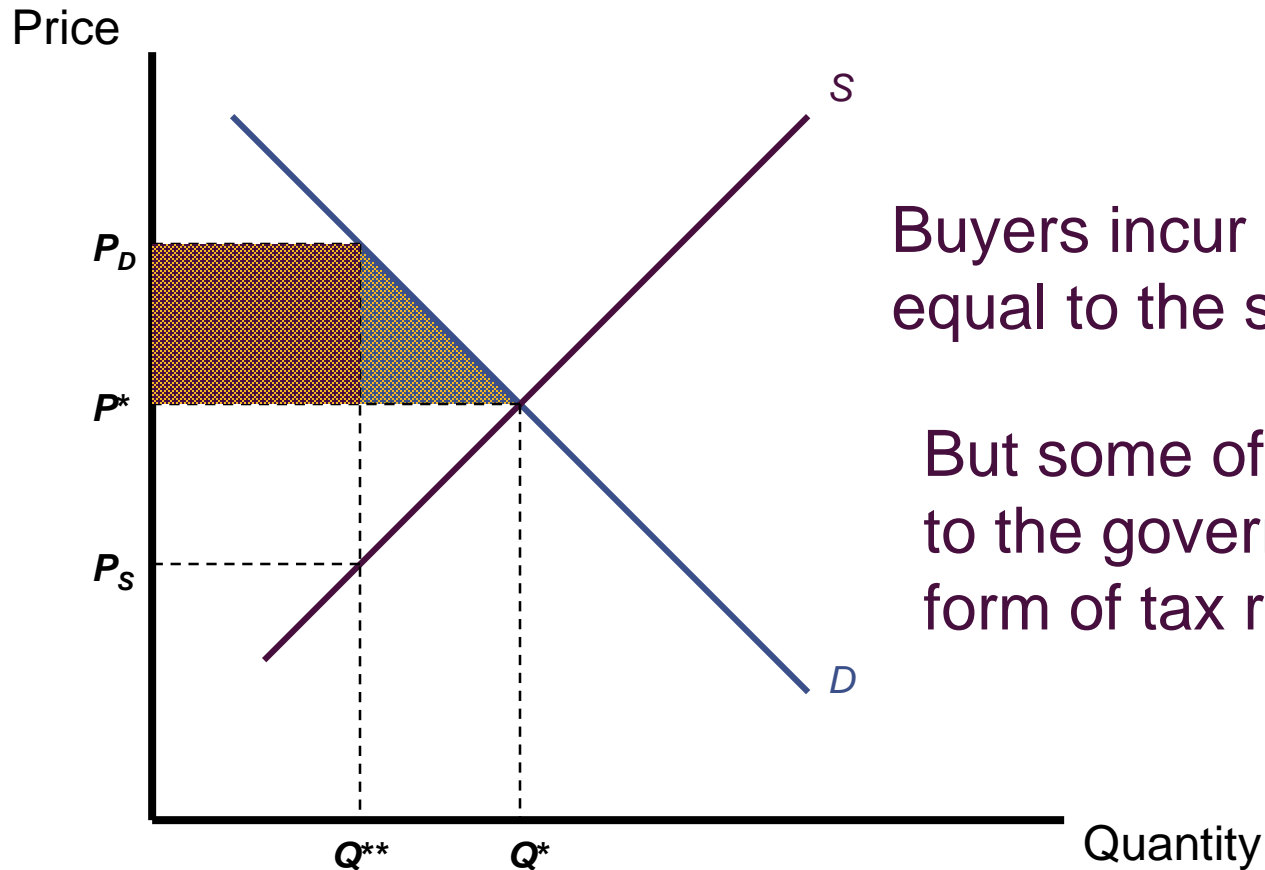
$$-\frac{dP_S / dt}{dP_D / dt} = -\frac{e_D}{e_S}$$

Tax Incidence



A per-unit tax creates a wedge between the price that buyers pay (P_D) and the price that sellers receive (P_S)

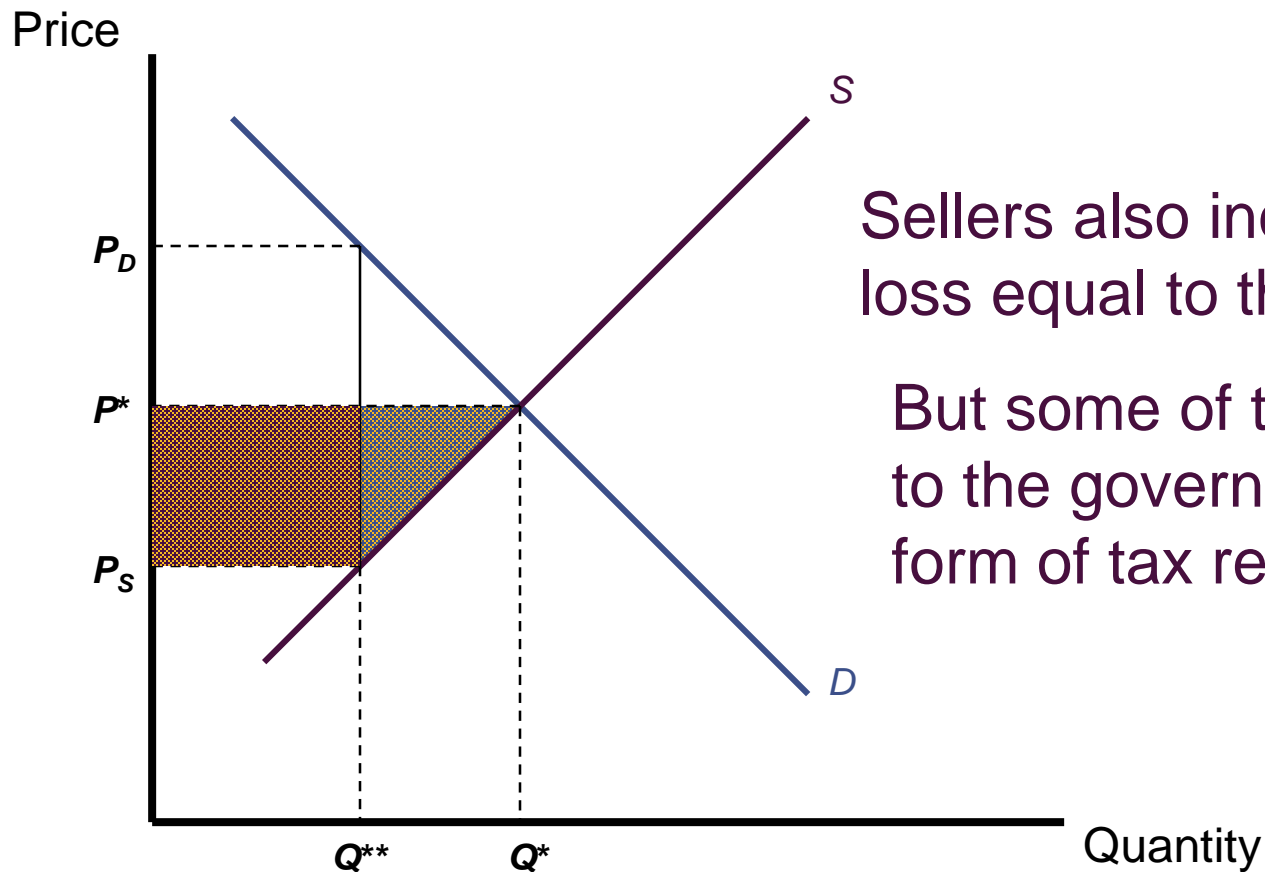
Tax Incidence



Buyers incur a welfare loss equal to the shaded area

But some of this loss goes to the government in the form of tax revenue

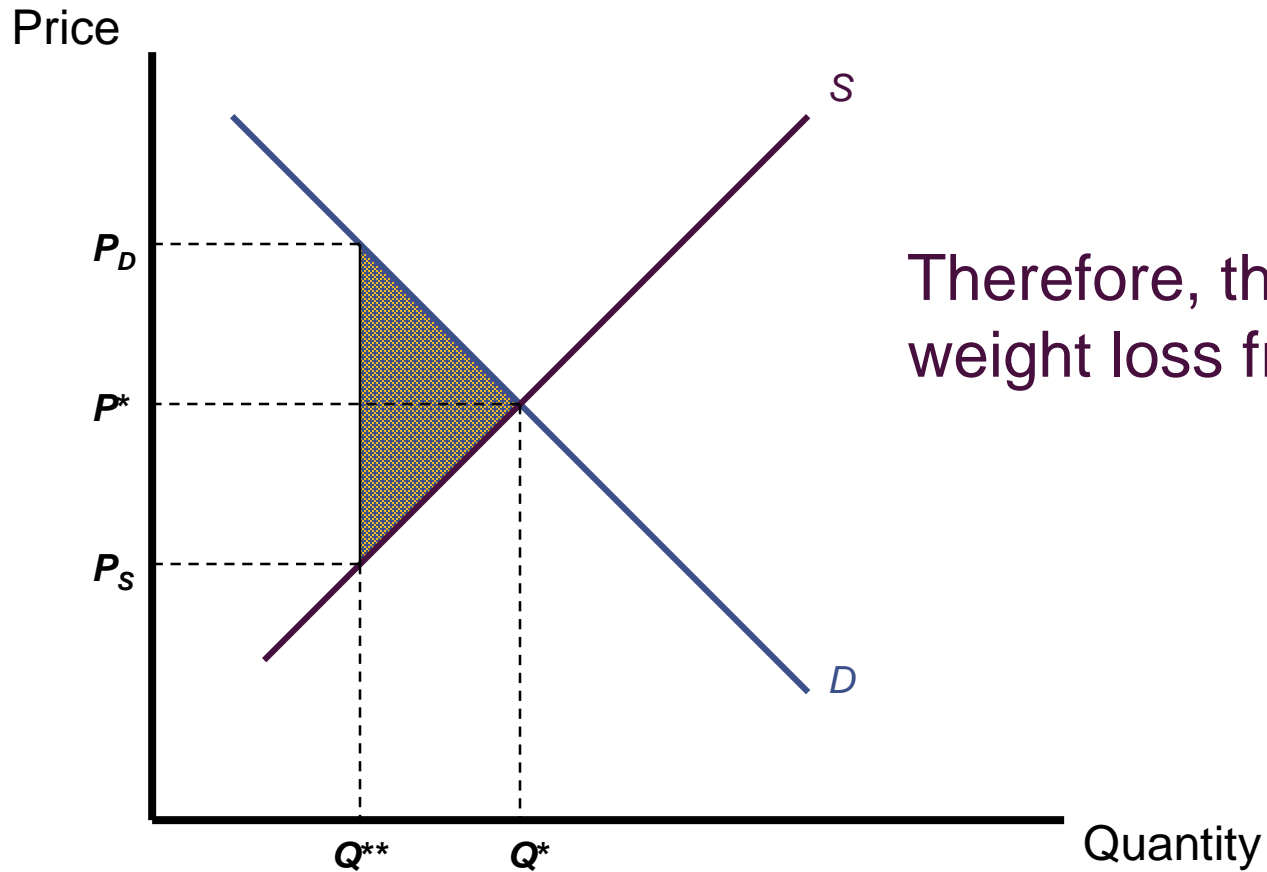
Tax Incidence



Sellers also incur a welfare loss equal to the shaded area

But some of this loss goes to the government in the form of tax revenue

Tax Incidence



Therefore, this is the deadweight loss from the tax

Deadweight Loss and Elasticity

- All nonlump-sum taxes involve deadweight losses
 - the size of the losses will depend on the elasticities of supply and demand
- A linear approximation to the deadweight loss accompanying a small tax, dt , is given by

$$DW = -0.5(dt)(dQ)$$

Deadweight Loss and Elasticity

- From the definition of elasticity, we know that

$$dQ = e_D dP_D \cdot Q_0/P_0$$

- This implies that

$$dQ = e_D [e_S / (e_S - e_D)] dt Q_0/P_0$$

- Substituting, we get

$$DW = -0.5 \left(\frac{dt}{P_0} \right)^2 [e_D e_S / (e_S - e_D)] P_0 Q_0$$

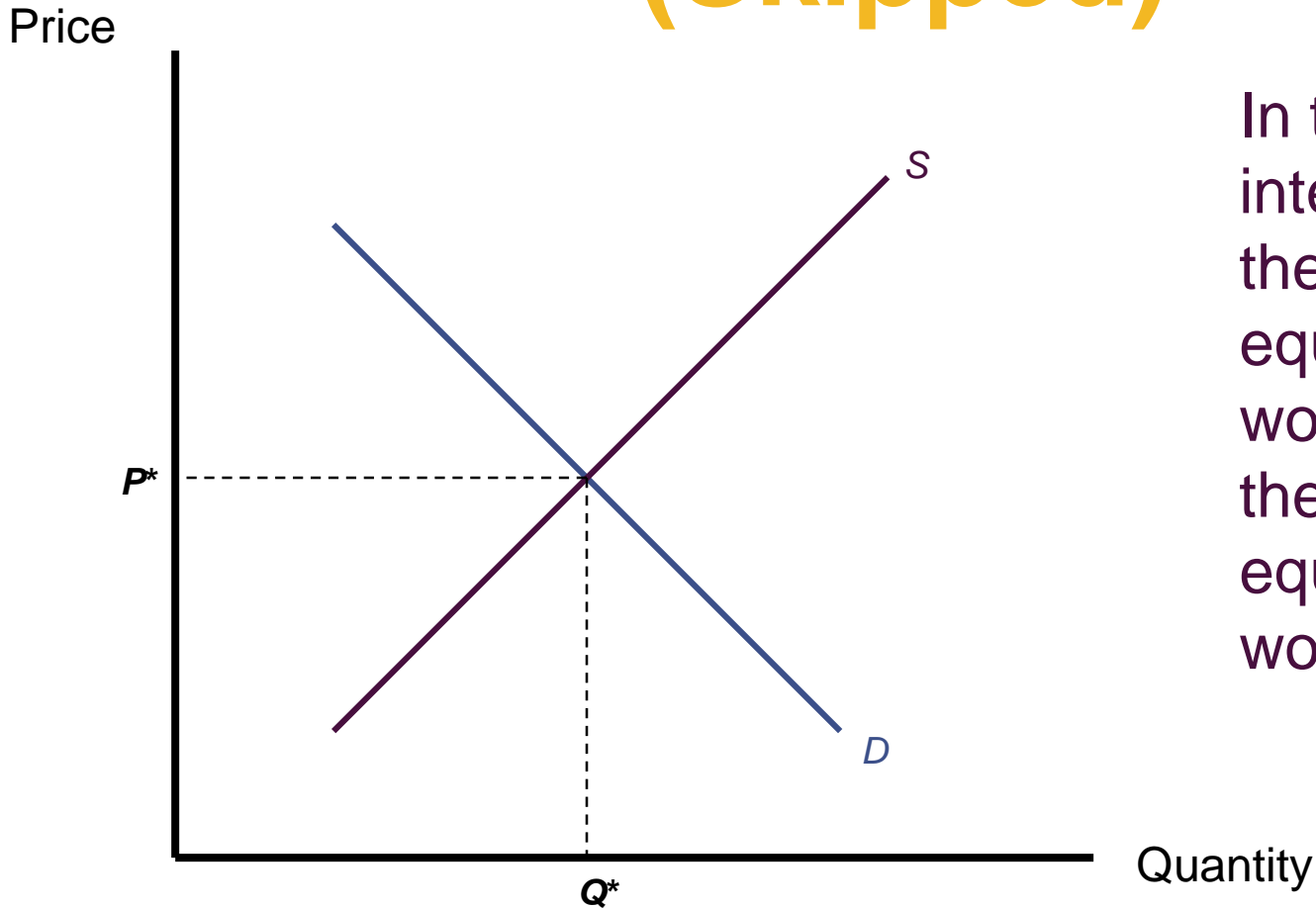
Deadweight Loss and Elasticity

- Deadweight losses are zero if either e_D or e_S are zero
 - the tax does not alter the quantity of the good that is traded
- Deadweight losses are smaller in situations where e_D or e_S are small

Transactions Costs

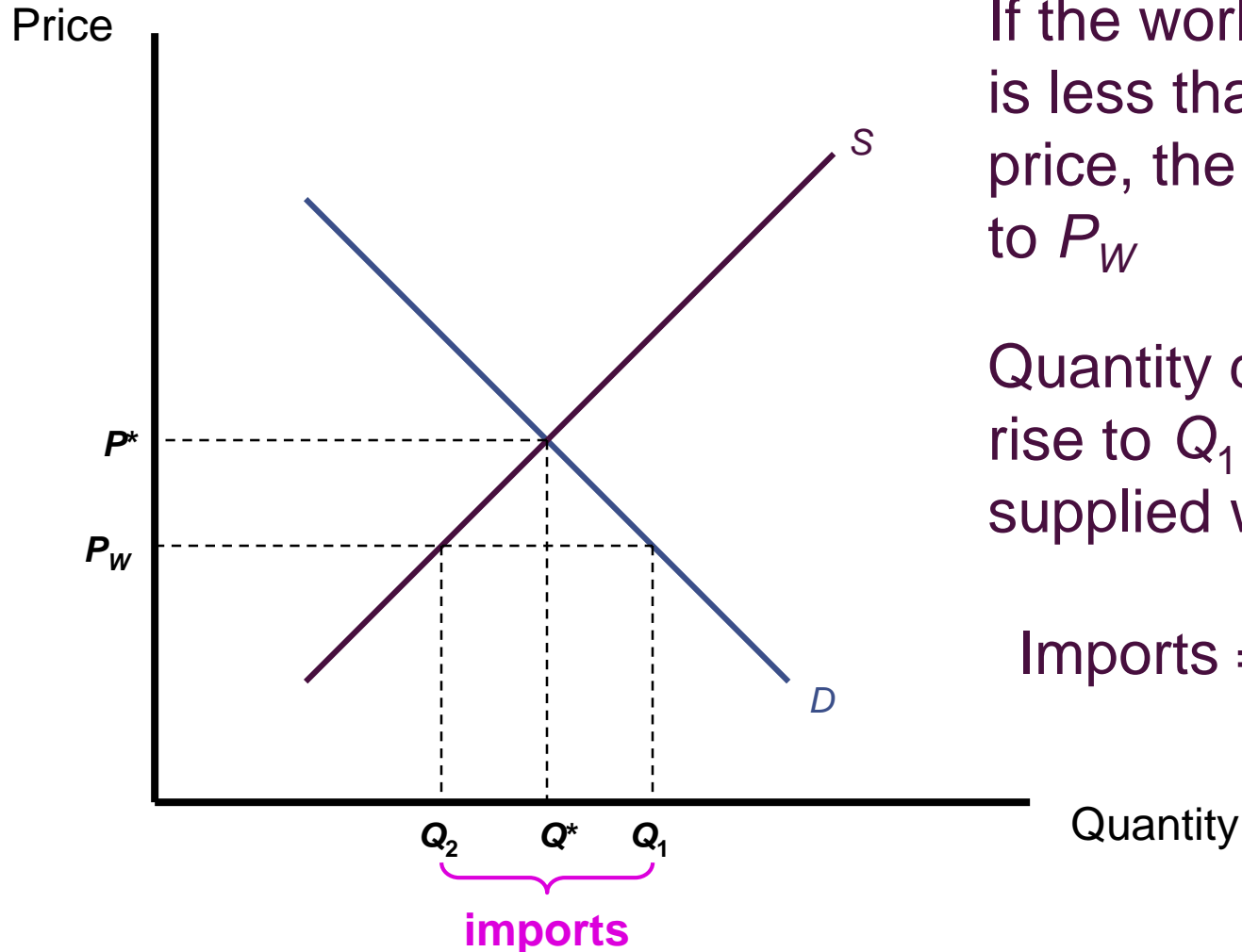
- Transactions costs can also create a wedge between the price the buyer pays and the price the seller receives
 - real estate agent fees
 - broker fees for the sale of stocks
- If the transactions costs are on a per-unit basis, these costs will be shared by the buyer and seller
 - depends on the specific elasticities involved

Gains from International Trade (Skipped)



In the absence of international trade, the domestic equilibrium price would be P^* and the domestic equilibrium quantity would be Q^*

Gains from International Trade

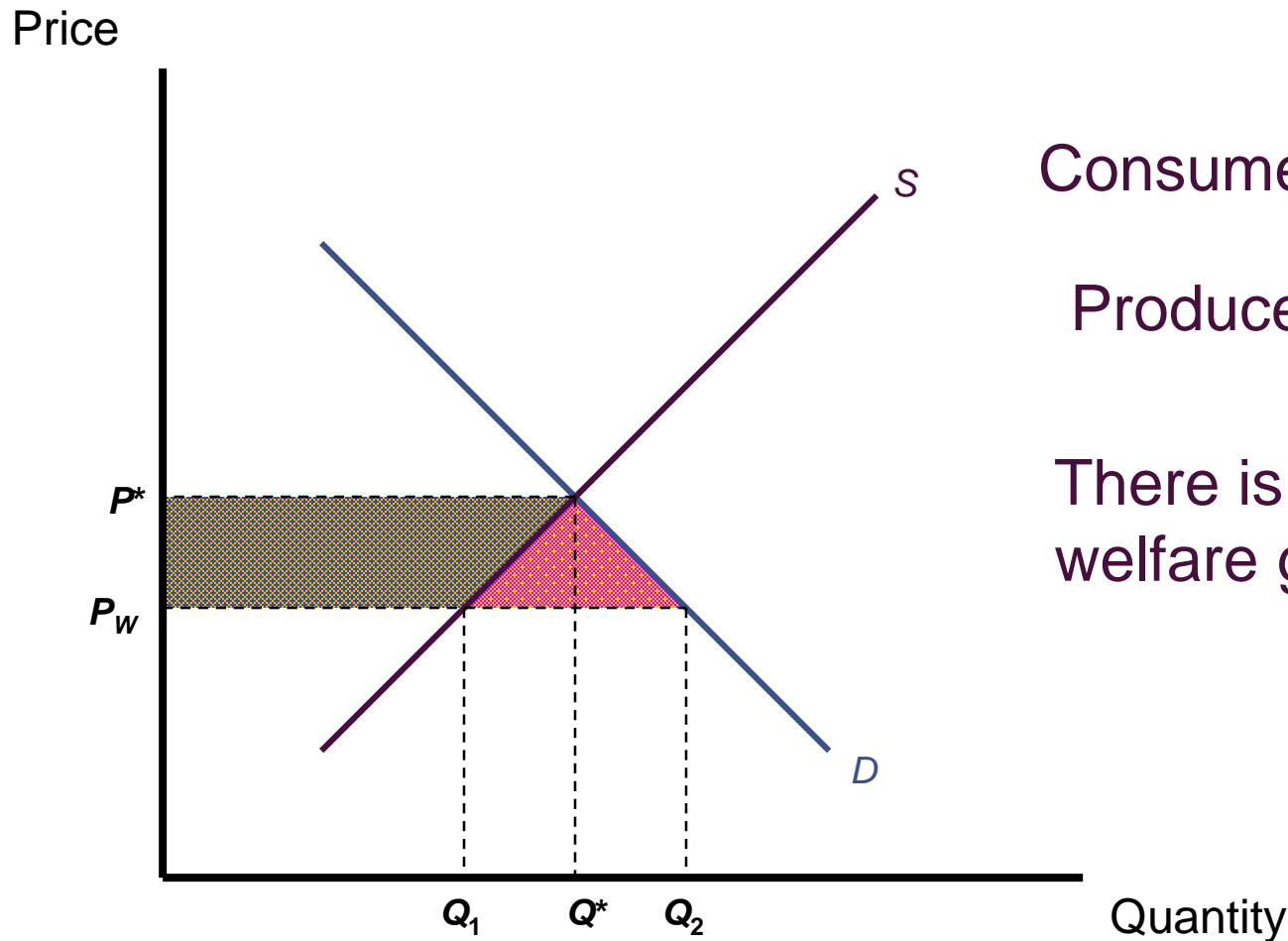


If the world price (P_W) is less than the domestic price, the price will fall to P_W

Quantity demanded will rise to Q_1 and quantity supplied will fall to Q_2

$$\text{Imports} = Q_1 - Q_2$$

Gains from International Trade

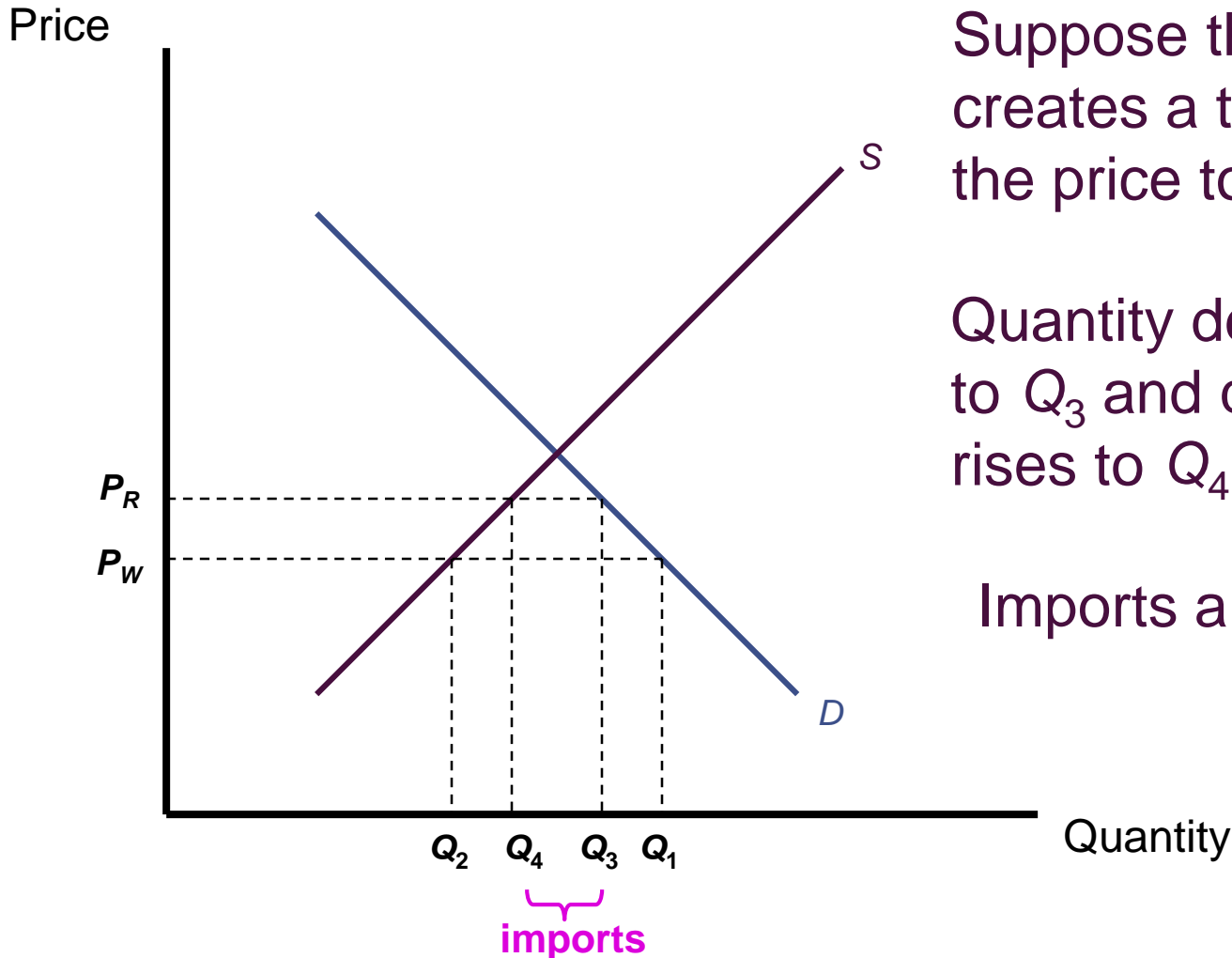


Consumer surplus rises

Producer surplus falls

There is an unambiguous welfare gain

Effects of a Tariff

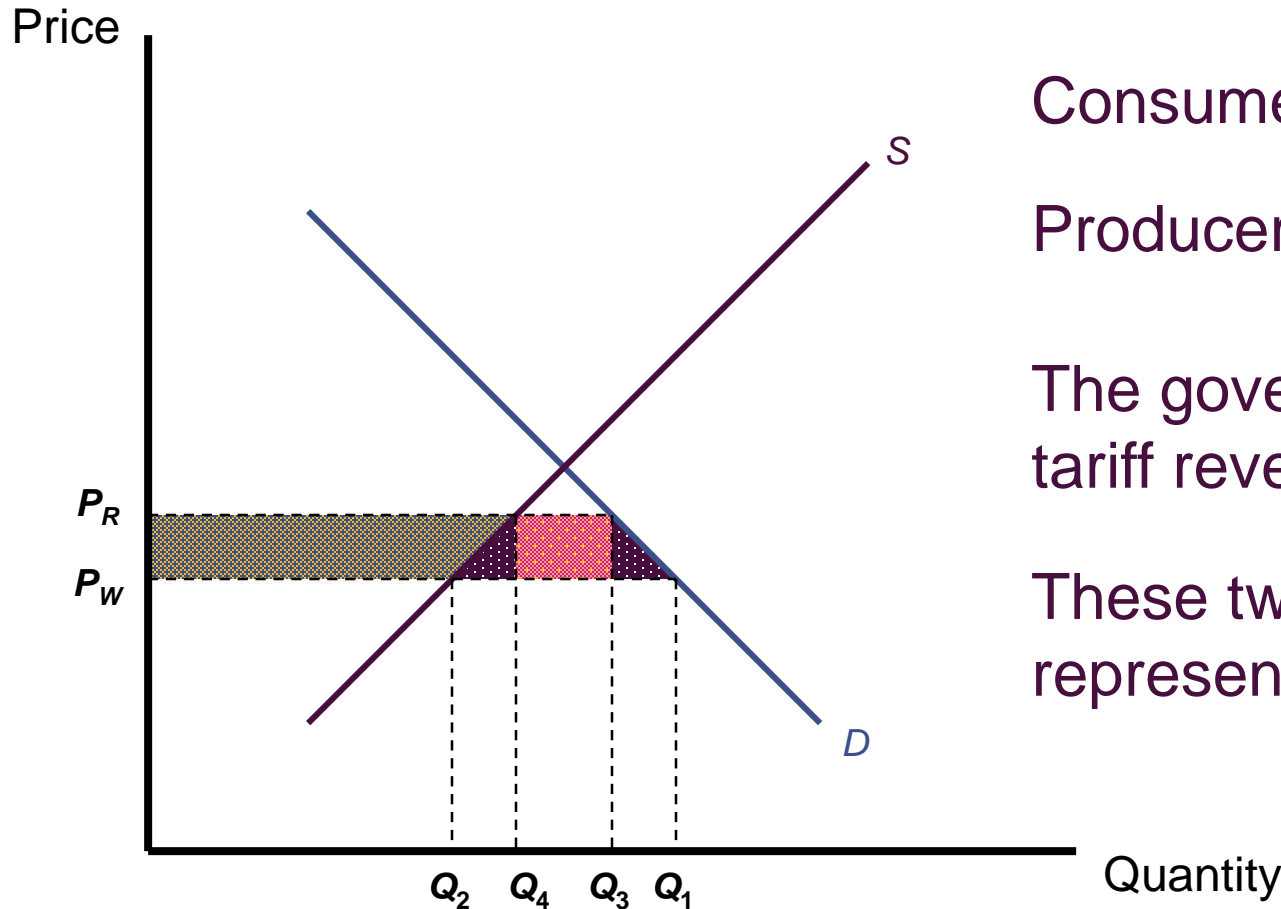


Suppose that the government creates a tariff that raises the price to P_R

Quantity demanded falls to Q_3 and quantity supplied rises to Q_4

Imports are now $Q_3 - Q_4$

Effects of a Tariff



Consumer surplus falls

Producer surplus rises

The government gets
tariff revenue

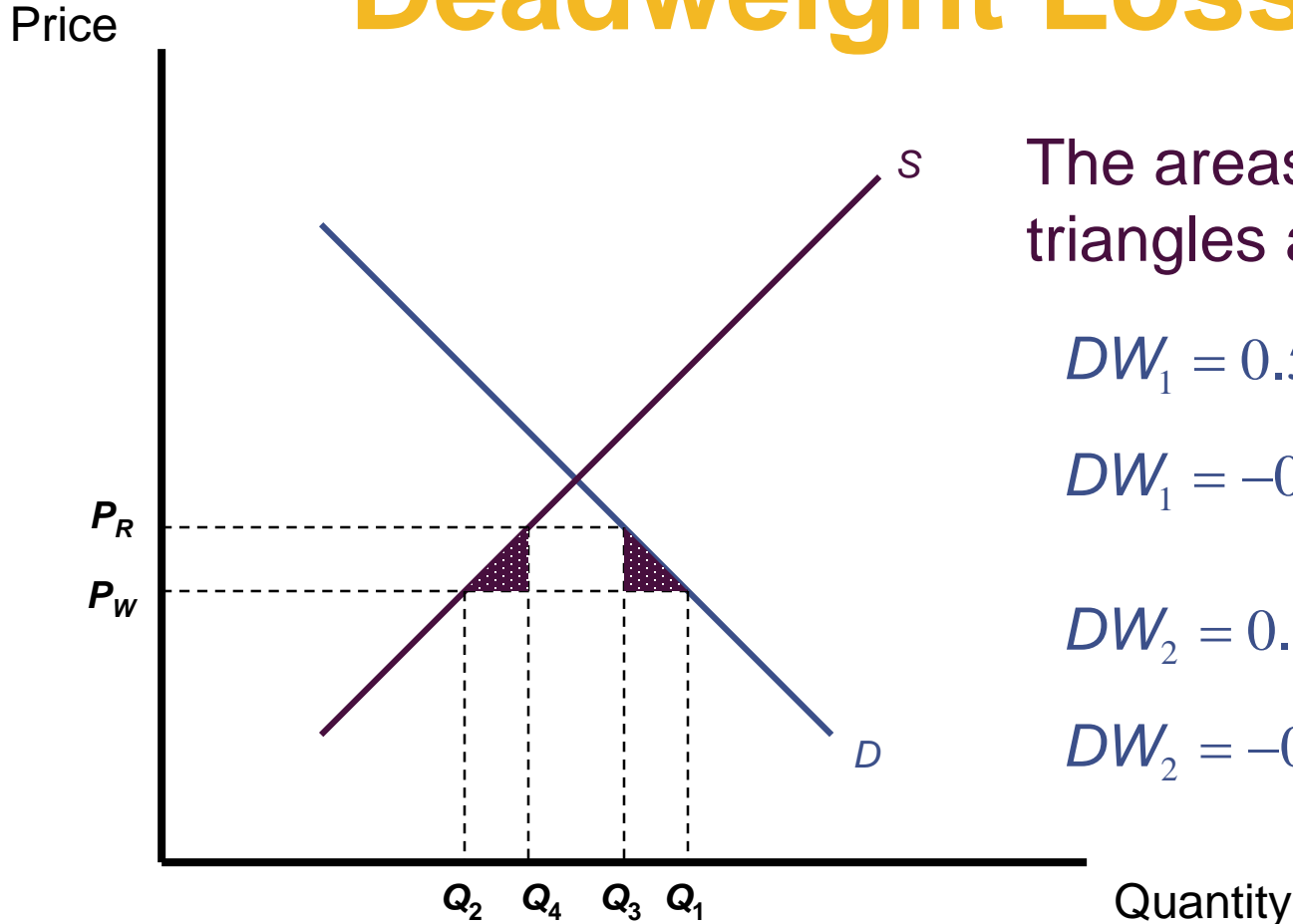
These two triangles
represent deadweight loss

Quantitative Estimates of Deadweight Losses

- Estimates of the sizes of the welfare loss triangle can be calculated
- Because $P_R = (1+t)P_W$, the proportional change in quantity demanded is

$$\frac{Q_3 - Q_1}{Q_1} = \frac{P_R - P_W}{P_W} \cdot e_D = te_D$$

Quantitative Estimates of Deadweight Losses



The areas of these two triangles are

$$DW_1 = 0.5(P_R - P_W)(Q_1 - Q_3)$$

$$DW_1 = -0.5t^2 e_D P_W Q_1$$

$$DW_2 = 0.5(P_R - P_W)(Q_4 - Q_2)$$

$$DW_2 = -0.5t^2 e_S P_W Q_2$$

Other Trade Restrictions

- A quota that limits imports to $Q_3 - Q_4$ would have effects that are similar to those for the tariff
 - same decline in consumer surplus
 - same increase in producer surplus
- One big difference is that the quota does not give the government any tariff revenue
 - the deadweight loss will be larger

Trade and Tariffs

- If the market demand curve is

$$Q_D = 200P^{-1.2}$$

and the market supply curve is

$$Q_S = 1.3P,$$

the domestic long-run equilibrium will occur where $P^* = 9.87$ and $Q^* = 12.8$

Trade and Tariffs

- If the world price was $P_W = 9$, Q_D would be 14.3 and Q_S would be 11.7
 - imports will be 2.6
- If the government placed a tariff of 0.5 on each unit sold, the world price will be $P_W = 9.5$
 - imports will fall to 1.0

Trade and Tariffs

- The welfare effect of the tariff can be calculated

$$DW_1 = 0.5(0.5)(14.3 - 13.4) = 0.225$$

$$DW_2 = 0.5(0.5)(12.4 - 11.7) = 0.175$$

- Thus, total deadweight loss from the tariff is $0.225 + 0.175 = 0.4$

Important Points to Note:

- The concepts of consumer and producer surplus provide useful ways of analyzing the effects of economic changes on the welfare of market participants
 - changes in consumer surplus represent changes in the overall utility consumers receive from consuming a particular good
 - changes in long-run producer surplus represent changes in the returns product inputs receive

Important Points to Note:

- Price controls involve both transfers between producers and consumers and losses of transactions that could benefit both consumers and producers

Important Points to Note:

- Tax incidence analysis concerns the determination of which economic actor ultimately bears the burden of a tax
 - this incidence will fall mainly on the actors who exhibit inelastic responses to price changes
 - taxes also involve deadweight losses that constitute an excess burden in addition to the burden imposed by the actual tax revenues collected

Important Points to Note:

- Transaction costs can sometimes be modeled as taxes
 - both taxes and transaction costs may affect the attributes of transactions depending on the basis on which the costs are incurred

Important Points to Note:

- Trade restrictions such as tariffs or quotas create transfers between consumers and producers and deadweight losses of economic welfare
 - the effects of many types of trade restrictions can be modeled as being equivalent to a per-unit tariff