Welfare Analysis

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Measuring Consumer Welfare Using a Demand Curve

- Consumer welfare from a good is the benefit a consumer gets from consuming that good minus what the consumer paid to buy the good.
- The demand curve reflects a consumer's *marginal willingness to pay*:
  - the maximum amount a consumer will spend for an extra unit
  - the *marginal value* the consumer places on the last unit of output

Consumer Surplus

- **Consumer surplus (*CS*) -** the monetary difference between what a consumer is willing to pay for the quantity of the good purchased and what the good actually costs.

- An individual's consumer surplus is the area under the demand curve and above the market price up to the quantity the consumer buys.

- Market consumer surplus is the area under the market demand curve above the market price up to the quantity consumers buy.

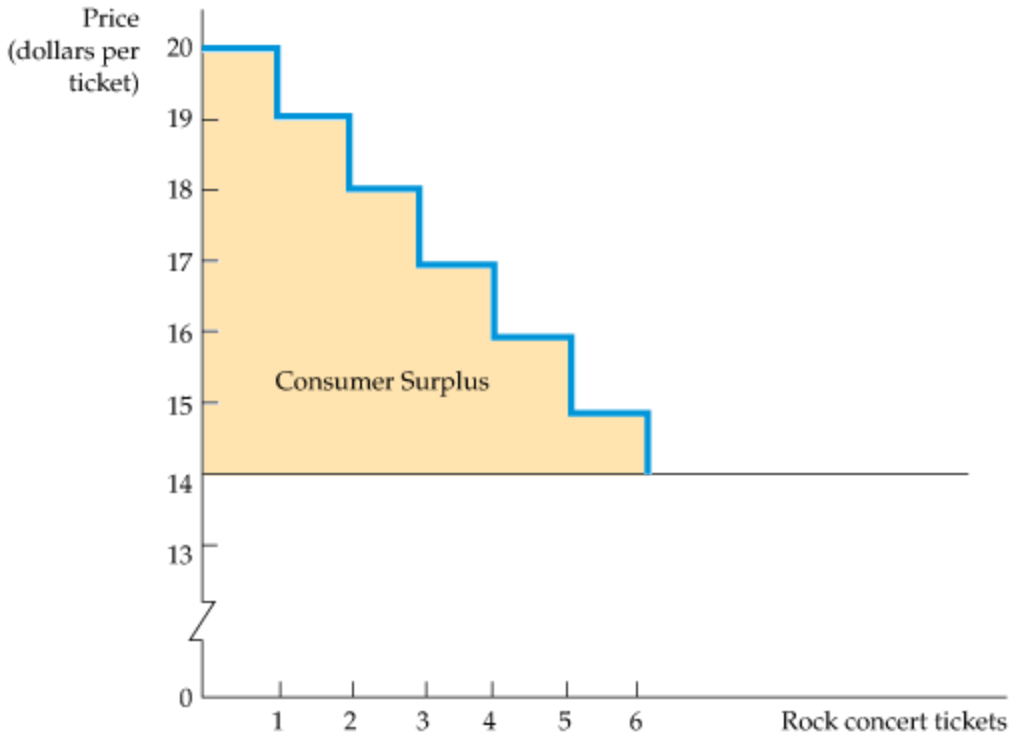
Consumer Surplus

- **consumer surplus** Difference between what a consumer is willing to pay for a good and the amount actually paid.

Consumer surplus is the total benefit from the consumption of a product, less the total cost of purchasing it.

Here, the consumer surplus associated with six concert tickets (purchased at $14 per ticket) is given by the yellow-shaded area:

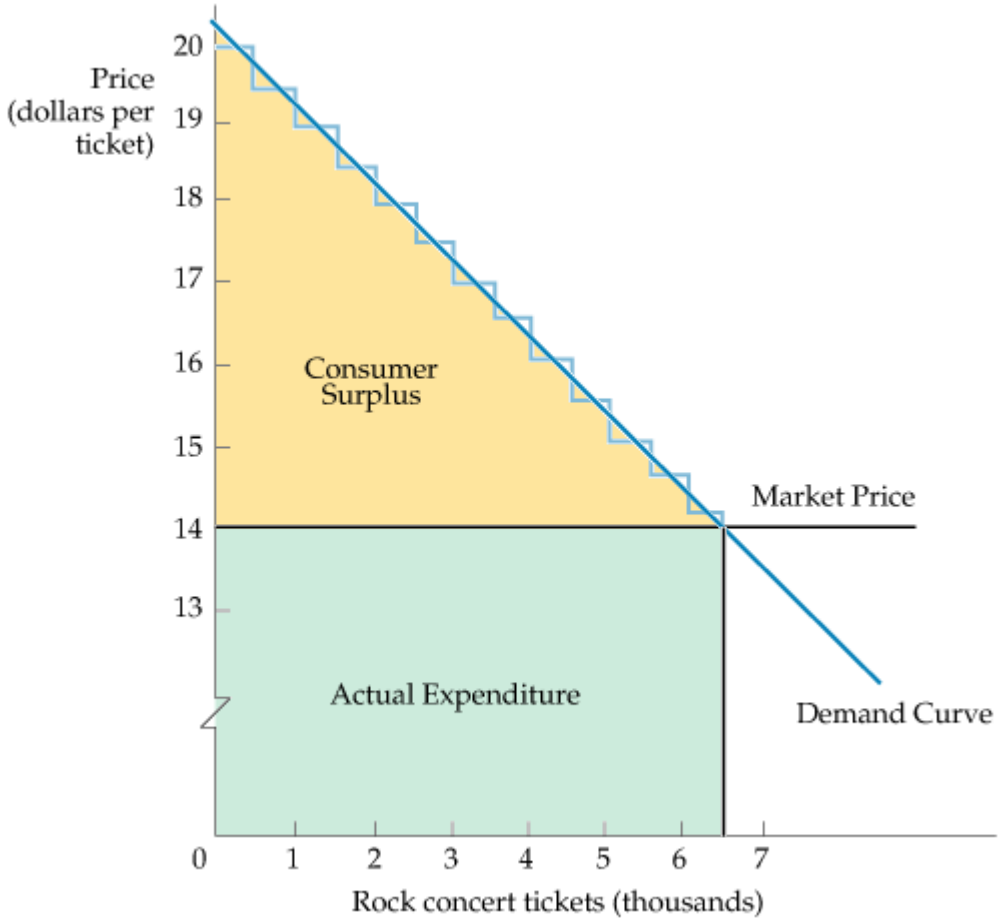
$6 + $5 + $4 + $3 + $2 + $1 = $21



CONSUMER SURPLUS

For the market as a whole, consumer surplus is measured by the area under the demand curve and above the line representing the purchase price of the good.

Here, the consumer surplus is given by the yellow-shaded triangle and is equal to 1/2 × ($20 − $14) × 6500 = $19,500.



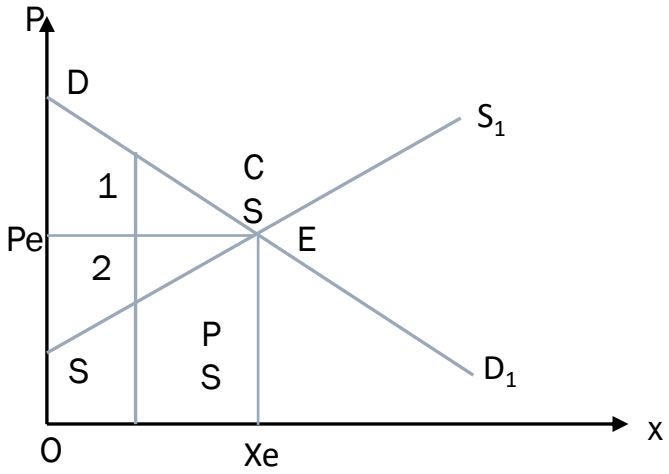
APPLYING CONSUMER SURPLUS

Consumer surplus has important applications in economics. When added over many individuals, it measures the aggregate benefit that consumers obtain from buying goods in a market. When we combine consumer surplus with the aggregate profits that producers obtain, we can evaluate both the costs and benefits not only of alternative market structures, but of public policies that alter the behavior of consumers and firms in those markets.

Measuring Producer Surplus Using a Supply Curve

- Producer surplus is the area above the supply curve and below the market price up to the quantity actually produced.

- It is the difference between the actual price that the producer gets and the minimum price that the producer needs to sell a particular amount.



Below demand curve = value of the good
Below supply curve = cost of the good

Market surplus = value of the good - cost of the good
= area ODEXe – area OSEXe = area DSE

$$S = \int_0^{x_e} f(x)dx - \int_0^{x_e} g(x)dx$$

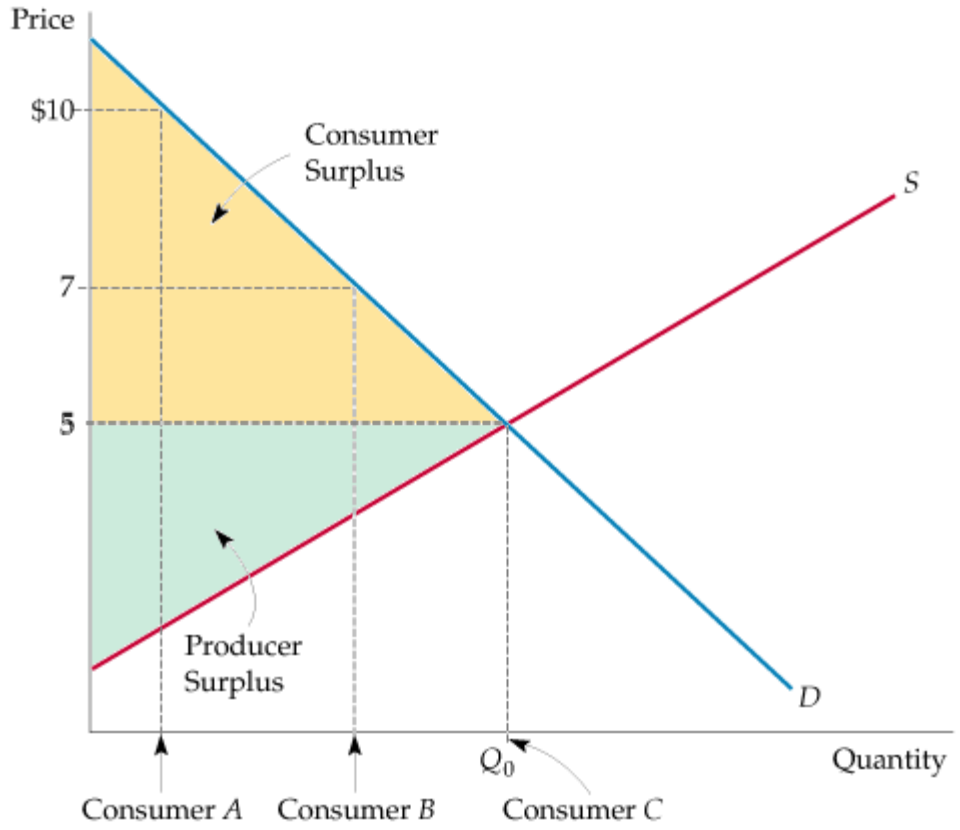
EVALUATING THE GAINS AND LOSSES FROM GOVERNMENT POLICIES— CONSUMER AND PRODUCER SURPLUS

Consumer and Producer Surplus (continued)

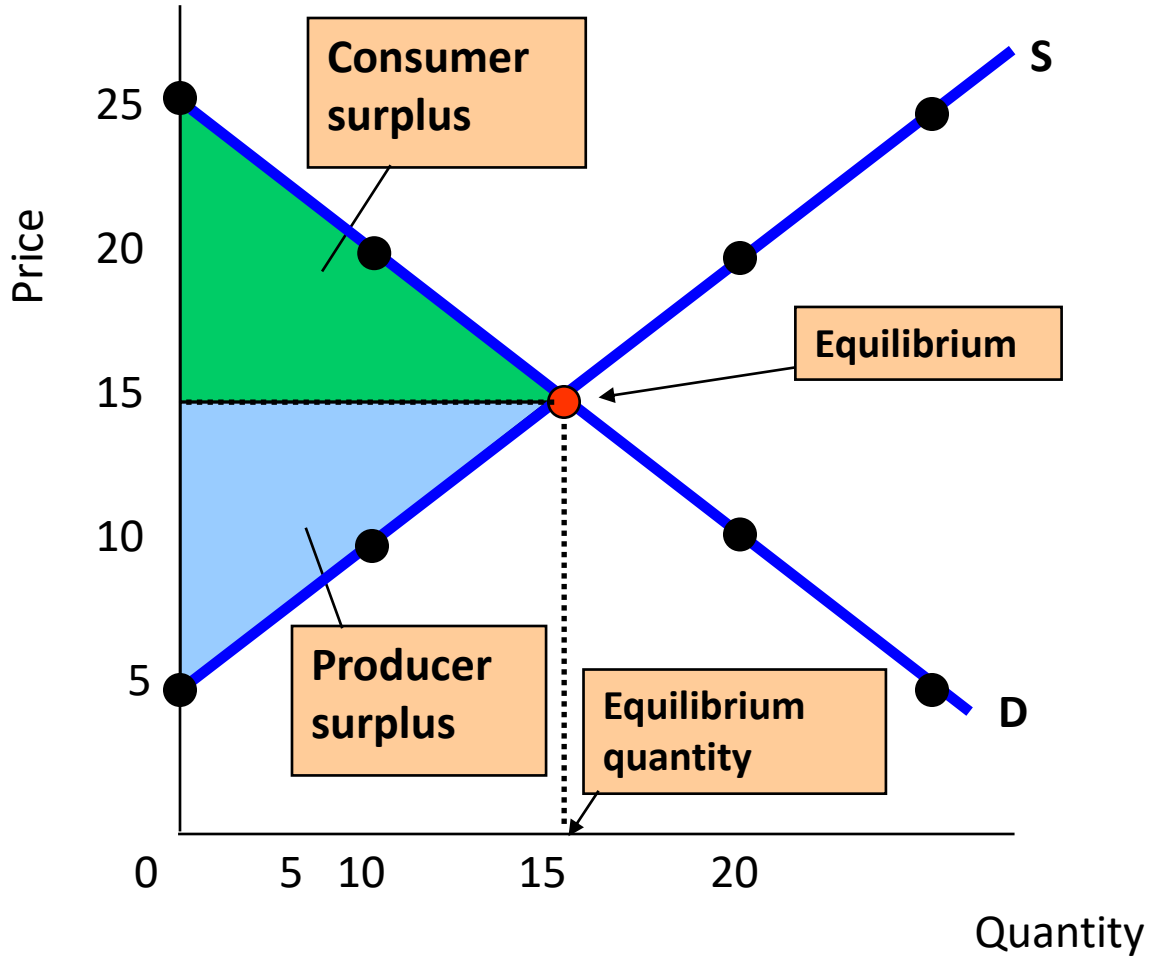
Producer surplus measures the total profits of producers, plus rents to factor inputs.

It is the green-shaded area between the supply curve and the market price.

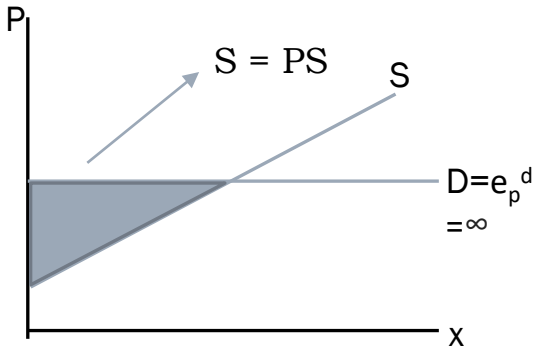
Together, consumer and producer surplus measure the welfare benefit of a competitive market.



An Efficient Market

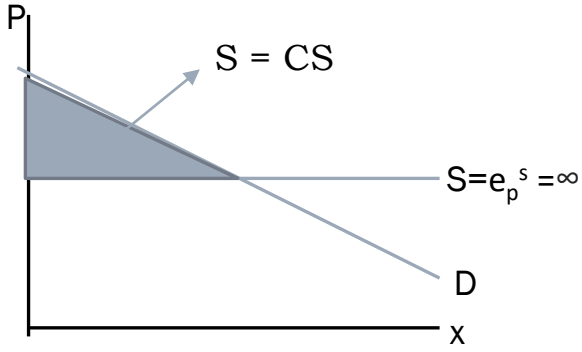


Division of surplus among producer and consumer depends on the elasticity of demand and supply.



CS = 0

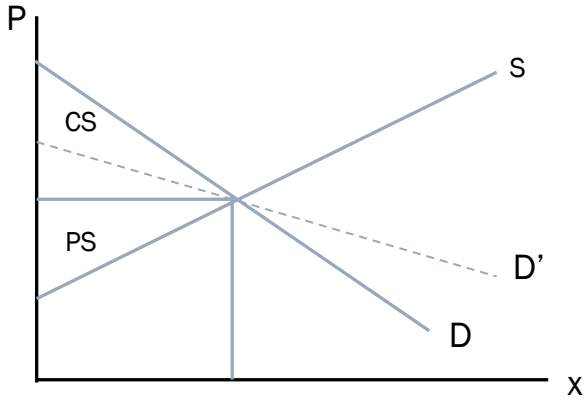
S = PS

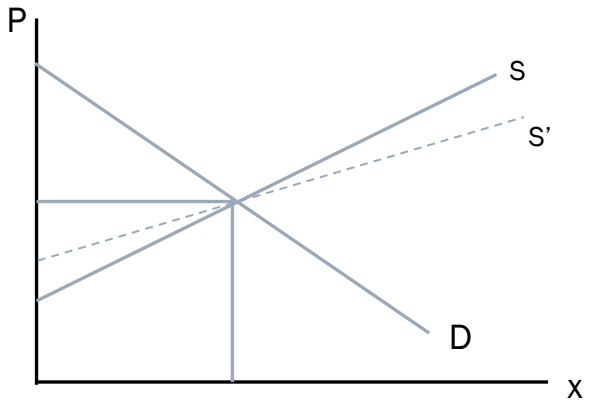


PS = 0

S= CS

$$CS \propto \frac{1}{\left|e_p^d\right|}; PS \propto \frac{1}{\left|e_p^s\right|}$$

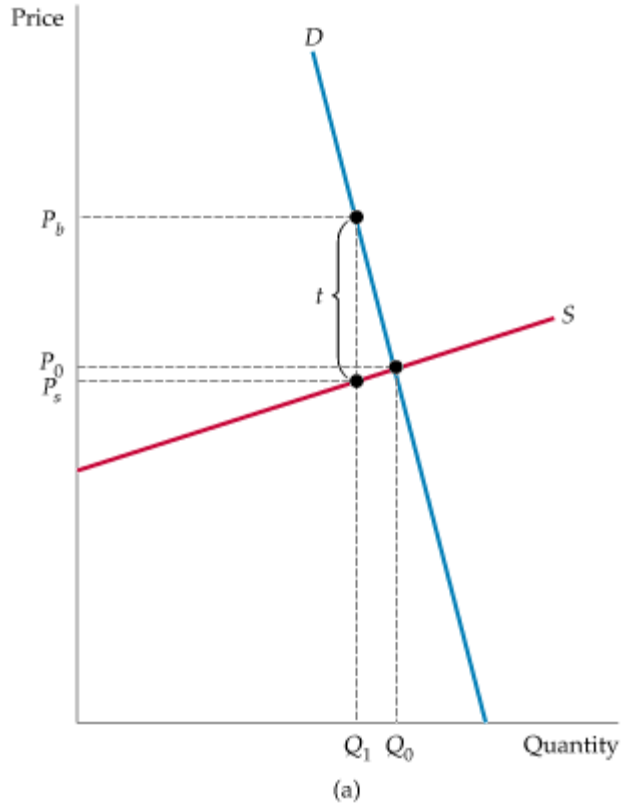




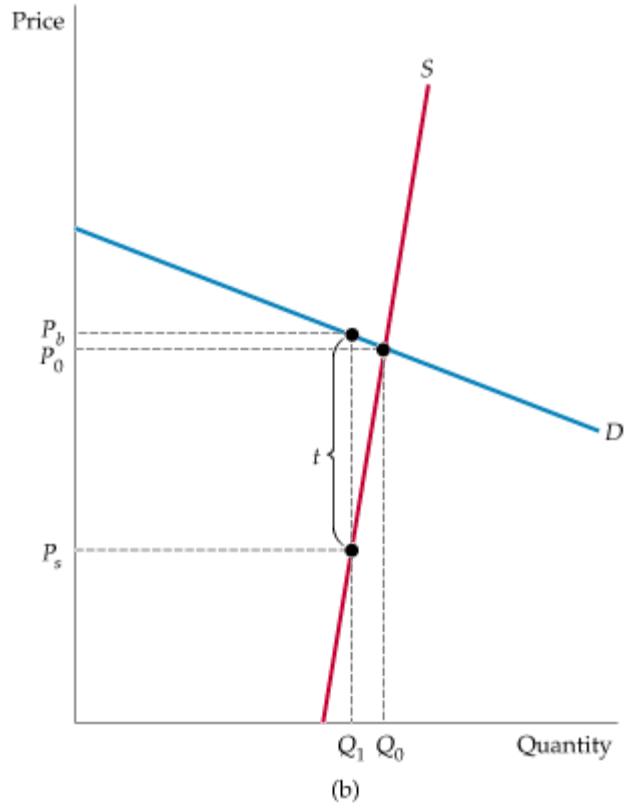
$$e_p^d = \infty, CS = 0;$$
$$e_p^s = \infty, PS = 0$$

THE IMPACT OF A TAX OR SUBSIDY

Impact of a Tax Depends on Elasticities of Supply and Demand



(a) If demand is very inelastic relative to supply, the burden of the tax falls mostly on buyers.



(b) If demand is very elastic relative to supply, it falls mostly on sellers.

Deadweight Loss (*DWL*)

- **Deadweight loss (*DWL*) -** the net reduction in welfare from a loss of surplus by one group that is not offset by a gain to another group from an action that alters a market equilibrium.

- This is the net loss of total (consumer plus producer) surplus.

THE IMPACT OF A TAX OR SUBSIDY

- **specific tax** Tax of a certain amount of money per unit sold.

Incidence of a Tax

P_b is the price (including the tax) paid by buyers. P_s is the price that sellers receive, less the tax.

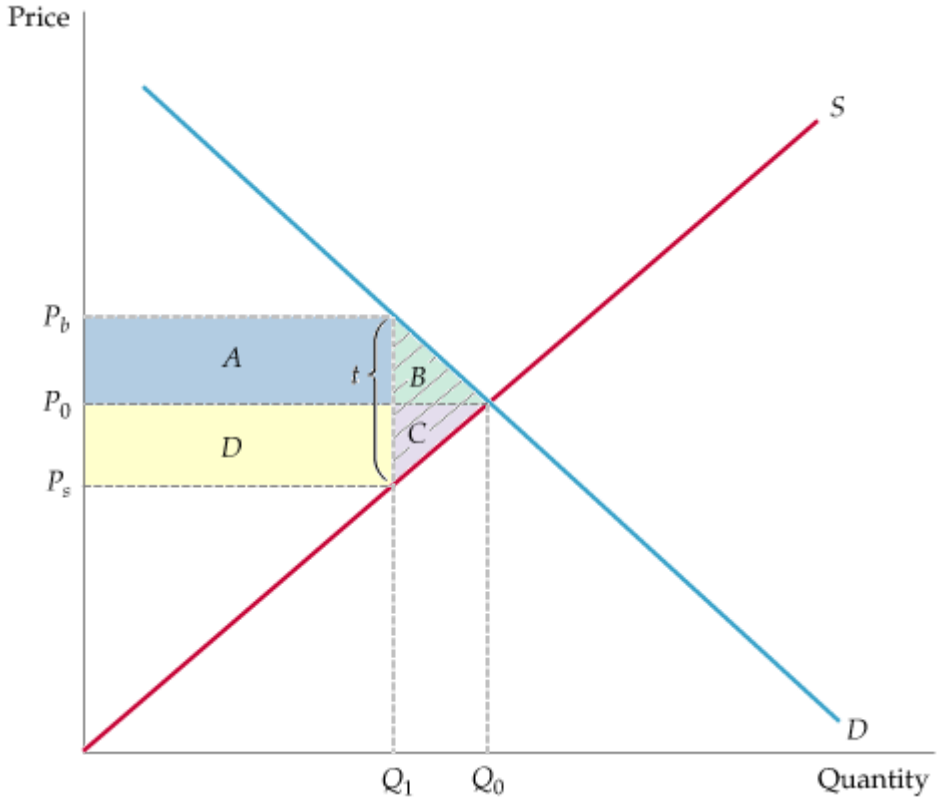
Here the burden of the tax is split evenly between buyers and sellers.

Buyers lose *A* + *B.*

*S*ellers lose *D* + *C.*

*T*he government earns *A* + *D* in revenue.

The deadweight loss is *B* + *C*.



Market clearing requires *four conditions* to be satisfied after the tax is in place:

$Q^D = Q^D(P_b)$ **(a)**

$Q^S = Q^S(P_s)$ **(b)**

$Q^D = Q^S$ **(c)**

$P_b - P_s = t$ **(d)**

THE IMPACT OF A TAX OR SUBSIDY

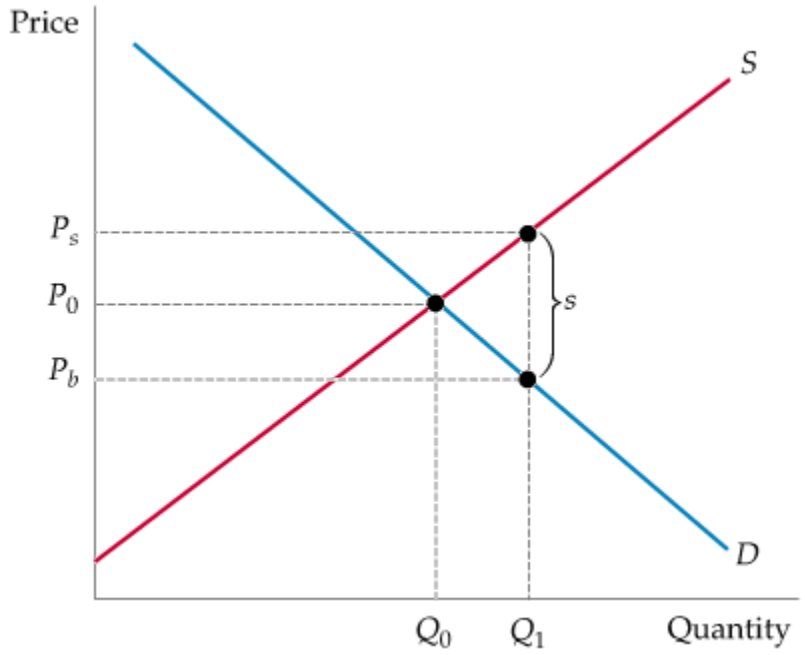
- The Effects of a Subsidy
  - **subsidy** Payment reducing the buyer's price below the seller's price; i.e., a negative tax.

Conditions needed for the market to clear with a subsidy:

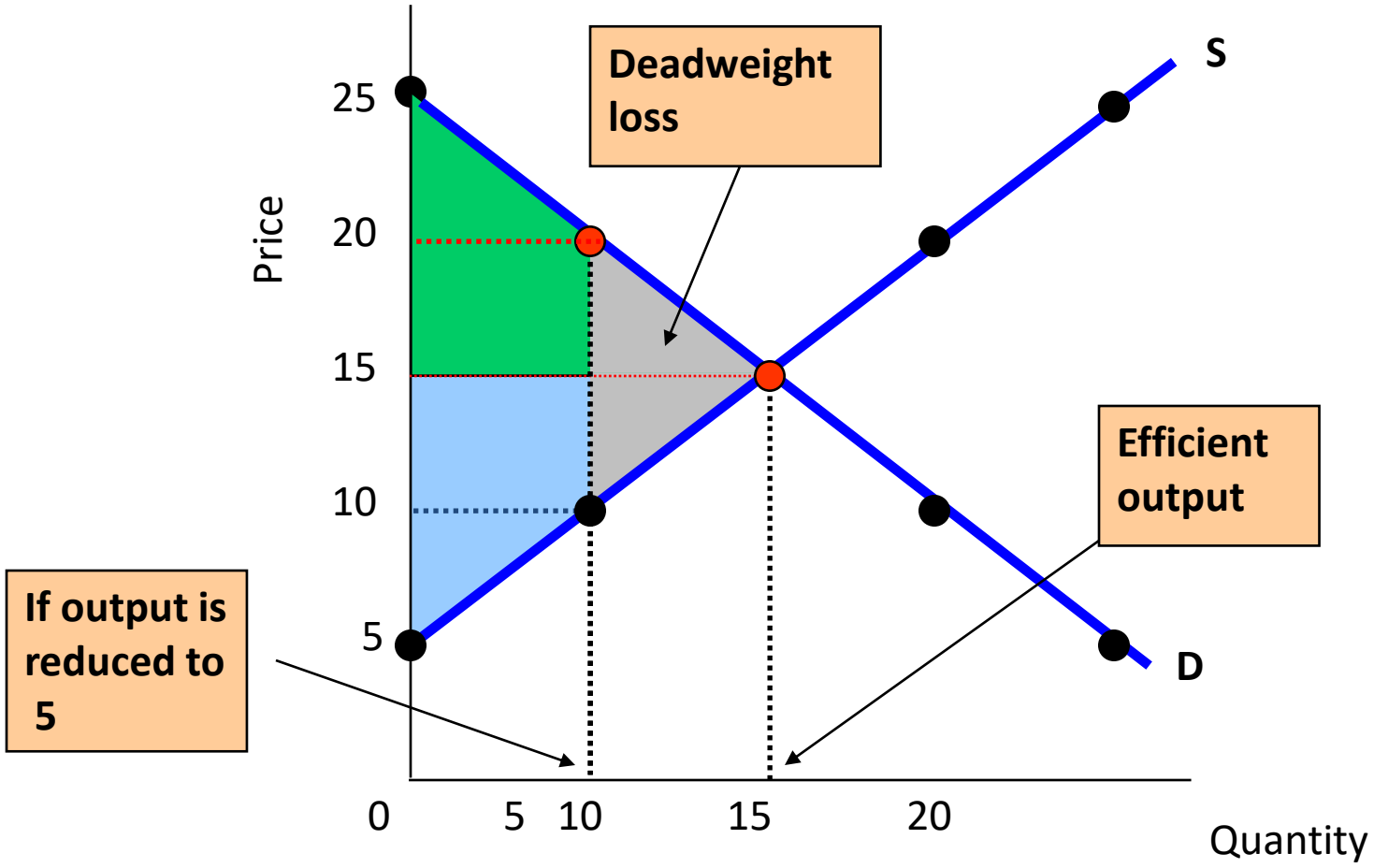
$$Q^D = Q^D(P_b) \quad \textbf{(a)}$$
$$Q^S = Q^S(P_s) \quad \textbf{(b)}$$
$$Q^D = Q^S \quad \textbf{(c)}$$
$$P_s - P_b = s \quad \textbf{(d)}$$

Subsidy

A subsidy can be thought of as a negative tax. Like a tax, the benefit of a subsidy is split between buyers and sellers, depending on the relative elasticities of supply and demand.



Underproduction



- Application of Consumer and Producer Surplus

  - **welfare effects** Gains and losses to consumers and producers.

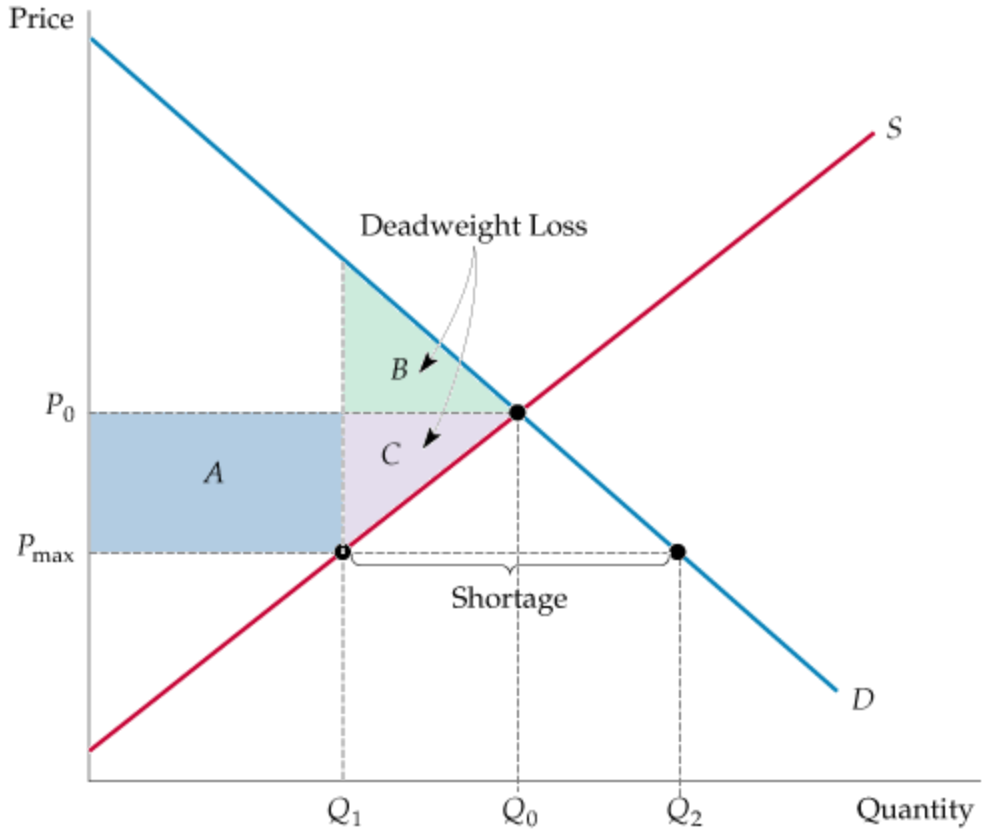
Change in Consumer and Producer Surplus from Price Controls

The price of a good has been regulated to be no higher than P_{max}, which is below the market-clearing price P_0.

The gain to consumers is the difference between rectangle *A* and triangle *B*.

The loss to producers is the sum of rectangle *A* and triangle *C*.

Triangles *B* and *C* together measure the deadweight loss from price controls.

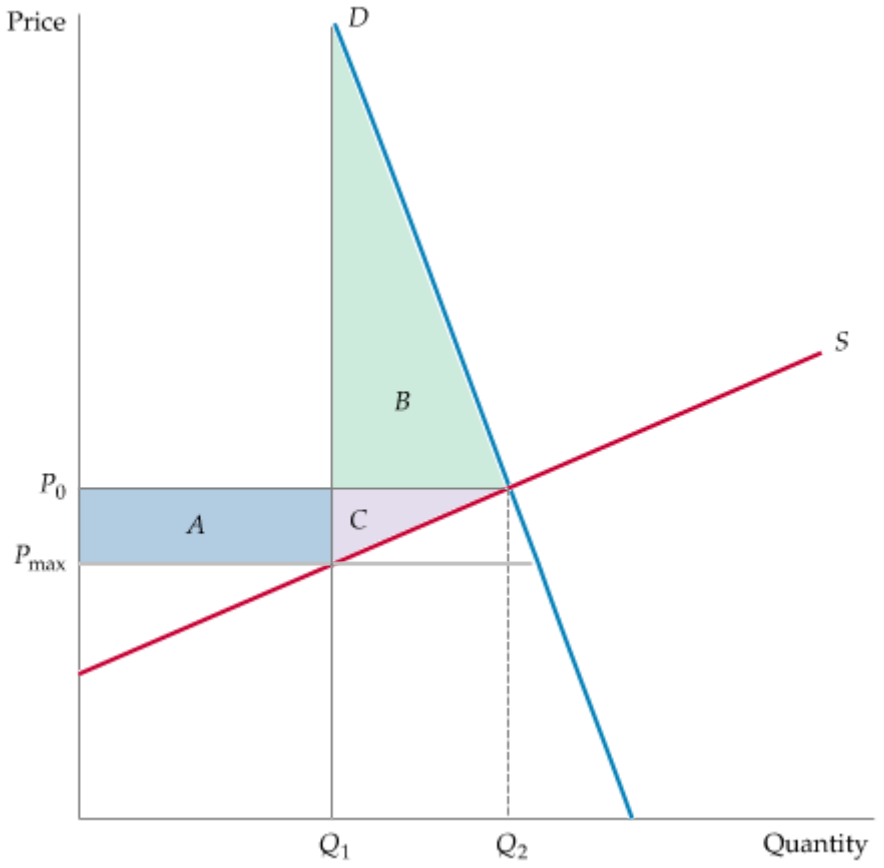


EVALUATING THE GAINS AND LOSSES FROM GOVERNMENT POLICIES— CONSUMER AND PRODUCER SURPLUS

- Application of Consumer and Producer Surplus

Effect of Price Controls When Demand Is Inelastic

If demand is sufficiently inelastic, triangle *B* can be larger than rectangle *A*. In this case, consumers suffer a net loss from price controls.



MINIMUM PRICES

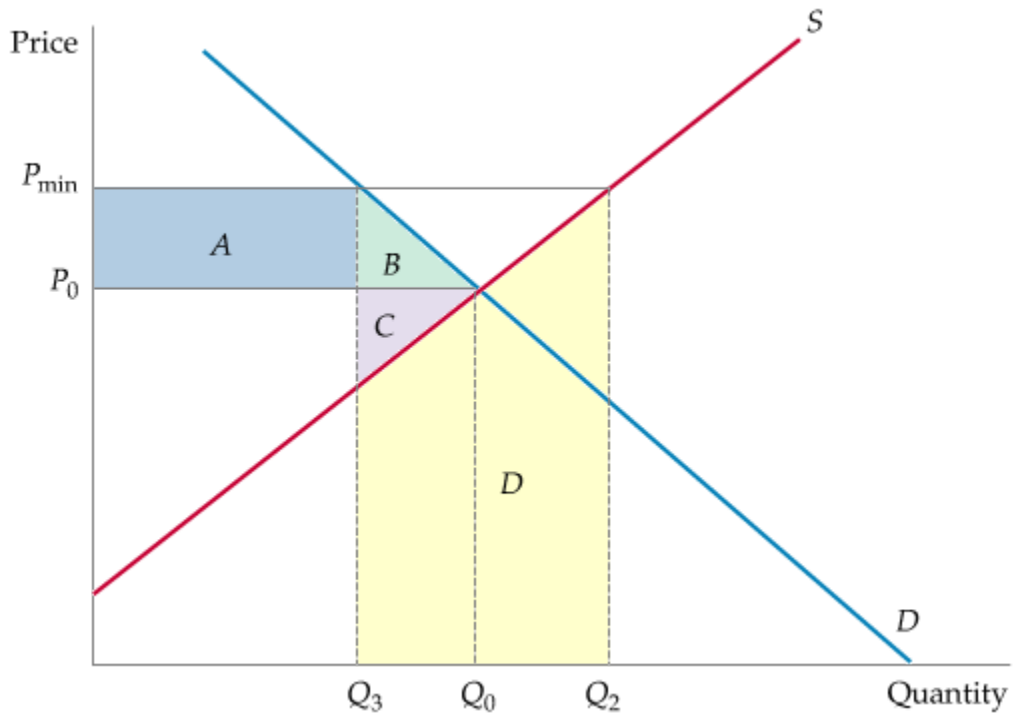
Price Minimum

Price is regulated to be no lower than P_{min}.

Producers would like to supply Q_2,

but consumers will buy only Q_3.

If producers indeed produce Q_2, the amount $Q_2 - Q_3$ will go unsold and the change in producer surplus will be $A - C - D$. In this case, producers as a group may be worse off.



MINIMUM PRICES

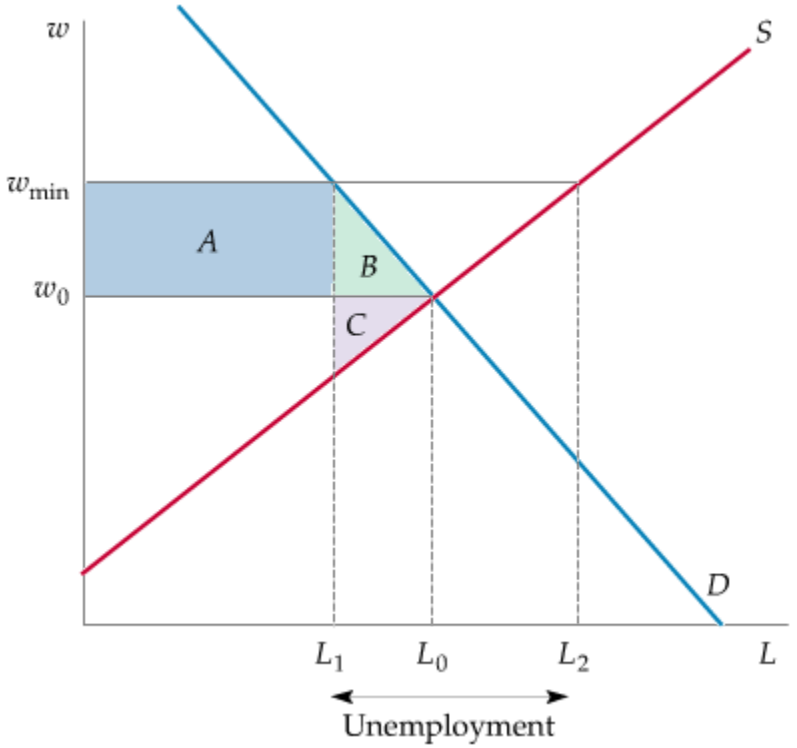
The Minimum Wage

Although the market-clearing wage is w_0,

firms are not allowed to pay less than w_{min}.

This results in unemployment of an amount $L_2 - L_1$

and a deadweight loss given by triangles *B* and *C*.



Reference:

Pindyck & Rubinfeld (Chapters 3, 8, 9)