

Lecture 3: Theoretical tools of Public Economics (Part II)

Petros Varthalitis

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Equilibrium and Social Welfare

- **Welfare economics:** The study of the determinants of well-being, or welfare, in society.
- Welfare economics is used in normative analysis.
- We discuss the determination of welfare in two steps:
 - First, we discuss **the determinants of social efficiency**, or the size of the economic pie.
 - Second, we consider how to integrate **redistribution** into this analysis so that we can measure the total well-being of society, or *social welfare*.

Demand

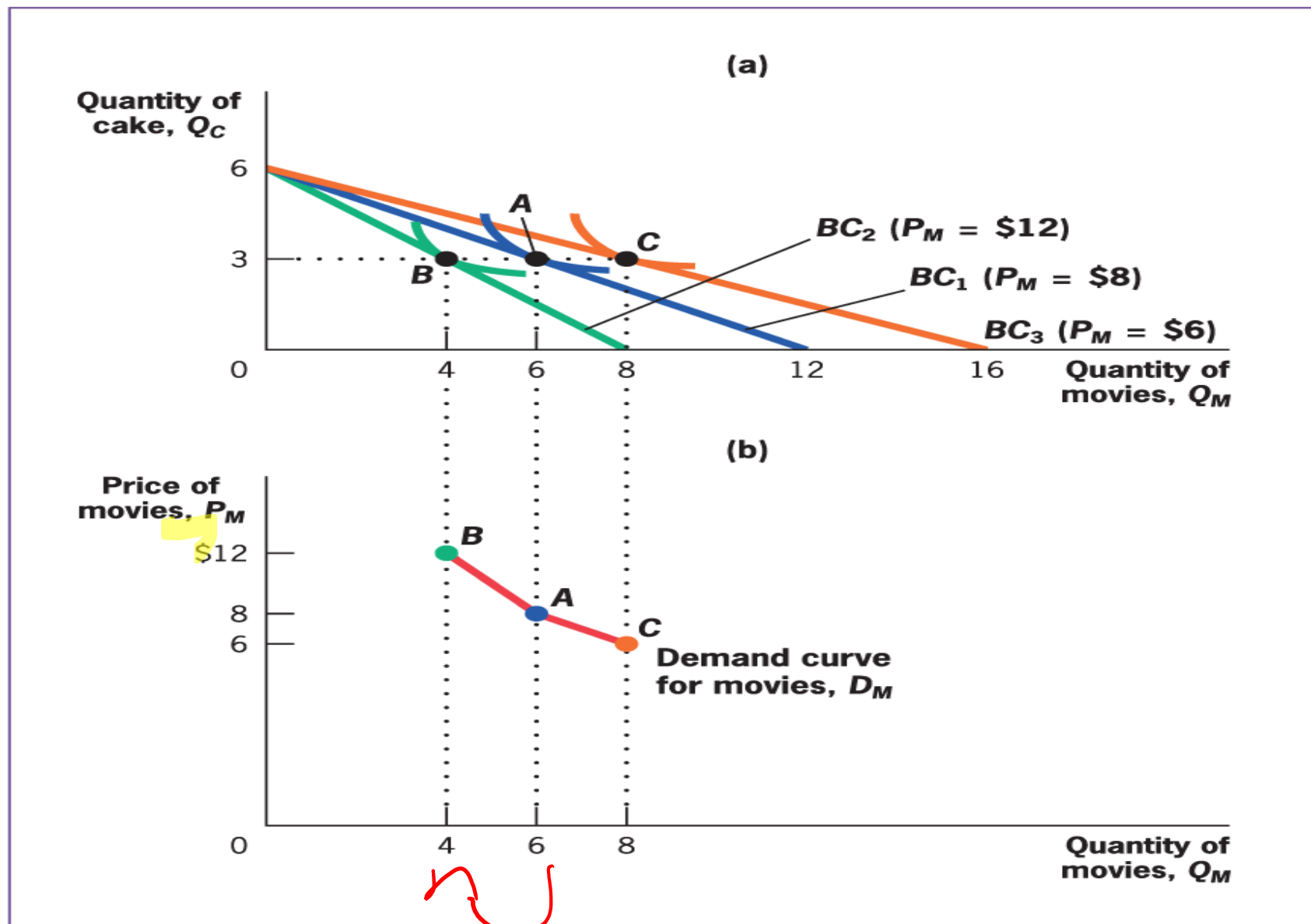
Demand curves

- How much of a good do people want to buy at the market price?
- **Demand curve:** A curve showing the quantity of a good demanded by individuals at each price.
- Obtained by finding the utility-maximizing bundle at each price.

Constrained optimization
as the price
of movies increases



Demand curve is
mapping prices and quantities
from consumer's
maximization problem



Elasticity of Demand

- **Elasticity of demand:** The percentage change in the quantity demanded of a good caused by each 1% change in the price of that good.
- Mathematically:

$$\varepsilon = \frac{\text{percentage change in quantity demanded}}{\text{percentage change in price}} = \frac{\Delta Q / Q}{\Delta P / P}$$

Question

The elasticity of demand when price rises from 8 to 12 is equal to:

1. -1.5015

2. 1

3. -0.666

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2. 1

3. -0.666

Properties of elasticity of demand

- Elasticities of demand are often negative: quantity demanded falls as price rises.
- Elasticities of demand are typically not constant along a demand curve.
- Typically, a change in the price of one good will affect demand for other goods as well.
- The effect of one good's prices on the demand for another good is the *cross-price elasticity*.

Properties of elasticity of demand (cont'ed)

- Perfectly inelastic and perfectly elastic demand:
- When the elasticity of demand is zero, the demand curve is *perfectly inelastic*, in which case
 - the demand curve is vertical, and **quantity demanded does not change when price rises**.
- When the elasticity of demand is infinite, the demand curve is *perfectly elastic*, in which case
 - the demand curve is horizontal, and **quantity demanded changes infinitely** for even a very small change in price.

Supply

Supply side: Production

- Producers (firms) use technology to transform inputs into outputs.
- Inputs: Labour and capital
- Output: Consumption goods
- How they choose inputs? **Profit maximization**

Profit Maximization

- Profits are given by $\omega = pQ - c(Q)$ so:

$$\max_Q \omega = pQ - c(Q)$$

where $c(Q)$ denotes the cost of producing quantity Q .

$c(Q)$ is an increasing function of Q .

Solution of profit maximization

$$\frac{\partial \omega}{\partial Q} = 0$$

$$p = c'(Q)$$

where $c'(Q)$ is marginal cost.

Price equal to the marginal cost of production.

This problem defines **the supply curve**.

How do firms decide how much to produce?

- **Marginal productivity:** The impact of a unit change in any input, holding other inputs constant, on the firm's output.
- **Marginal cost:** The incremental cost to a firm of producing one more unit of a good.
- Firms choose quantities to maximize **profits**, the difference between revenues and costs.
- Profit is maximized when market price equals marginal cost.

Supply Curves

- How much do firms want to sell or produce at each price?
- **Supply curve:** A curve showing the quantity of a good that firms are willing to produce (supply) at each price.
- Supply curves are the outcome of profit maximization by firms.
- Firms produce output using a production, such as $q = \sqrt{K \times L}$.

Supply curve

- Supply curve is the quantity that firms in aggregate are willing to supply at each price.
- Typically, upward sloping due to decreasing returns to scale.

Elasticity of supply

Elasticity of supply: The percentage change in the quantity supplied of a good caused by each 1% change in the price of that good.

Mathematically:

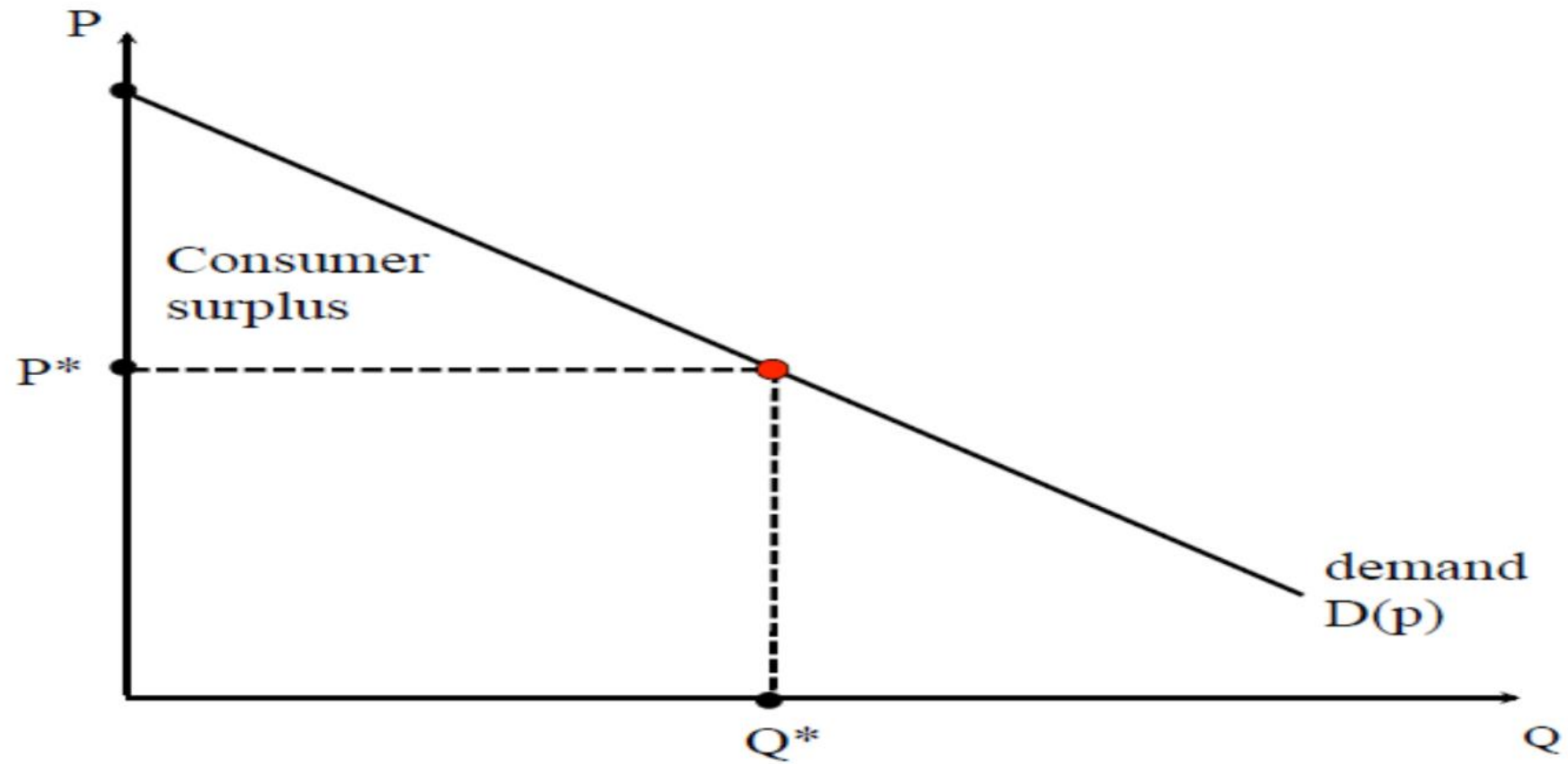
$$\varepsilon_s = \frac{\text{percentage change in quantity supplied}}{\text{percentage change in price}} = \frac{\Delta Q / Q}{\Delta P / P}$$

Market Equilibrium

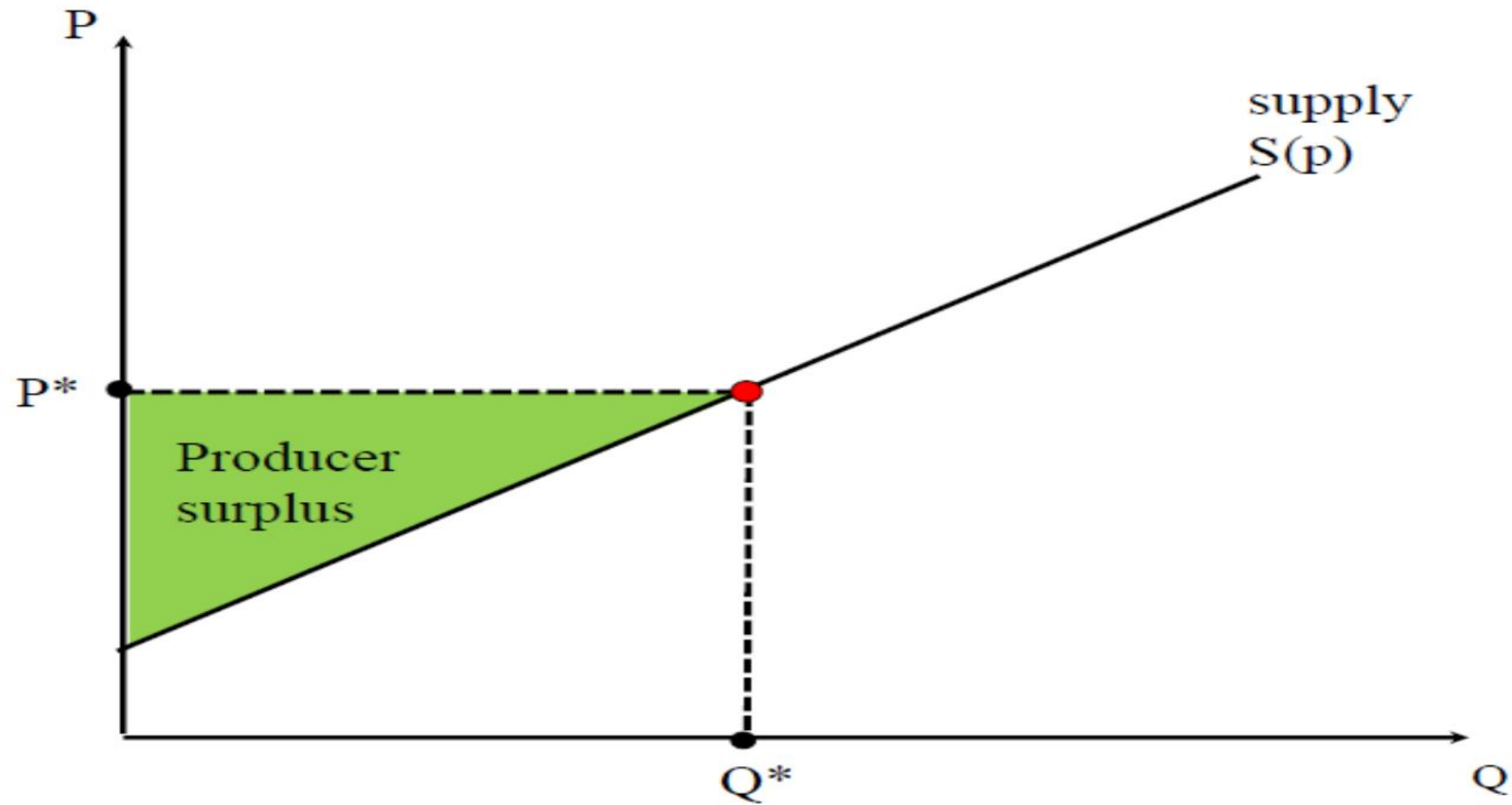
Market equilibrium

- Consumers (demand side) and producers (supply side) interact on markets.
- The demands of each individual who is demanding goods in this market are added to obtain market demand.
- The supplies of each firm that is supplying goods in the market are added to get market supply.

Demand curve



Supply curve

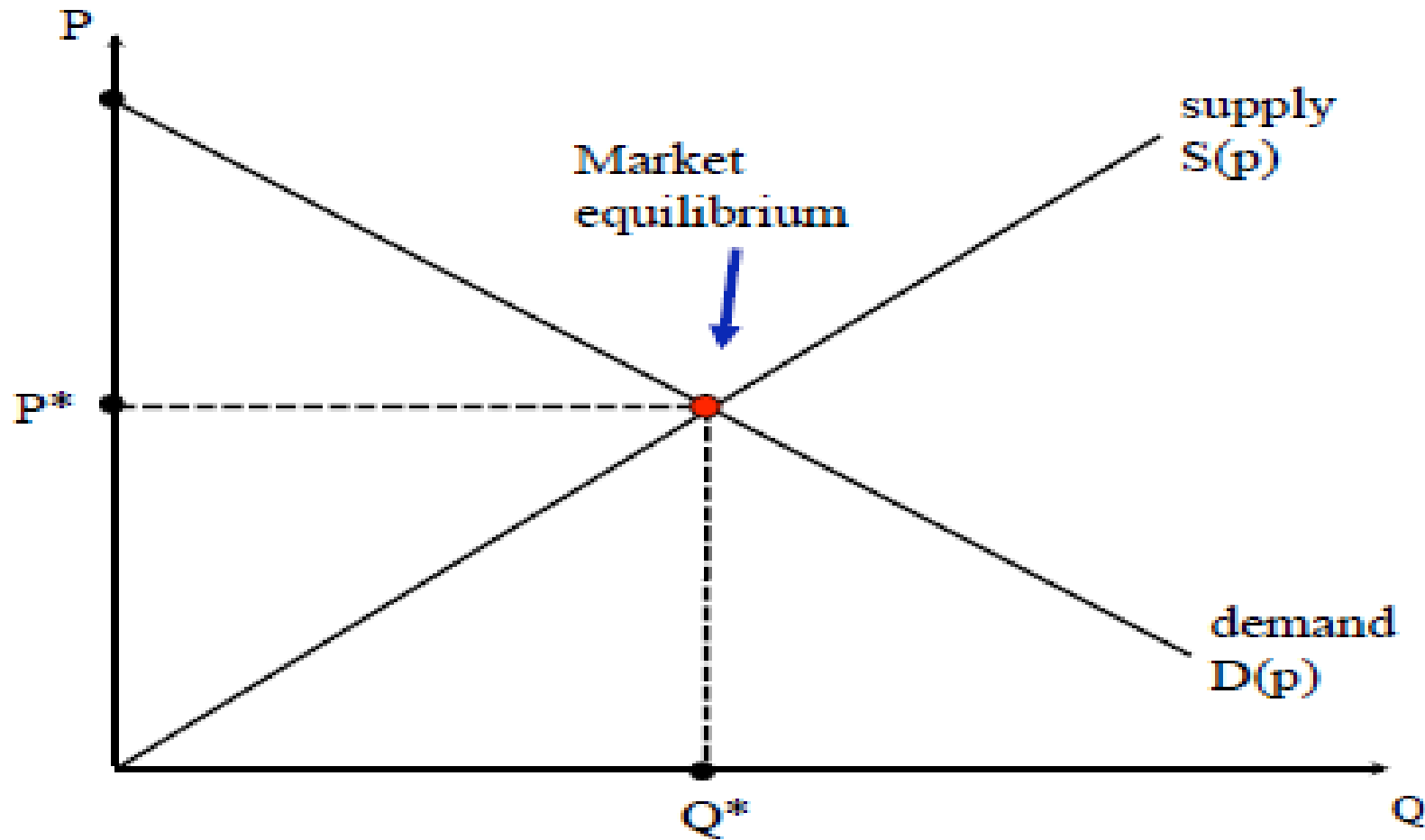


Market equilibrium

Definition: The market equilibrium is a price, p^* , and a quantity, Q^* , such that supply equals demand:

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

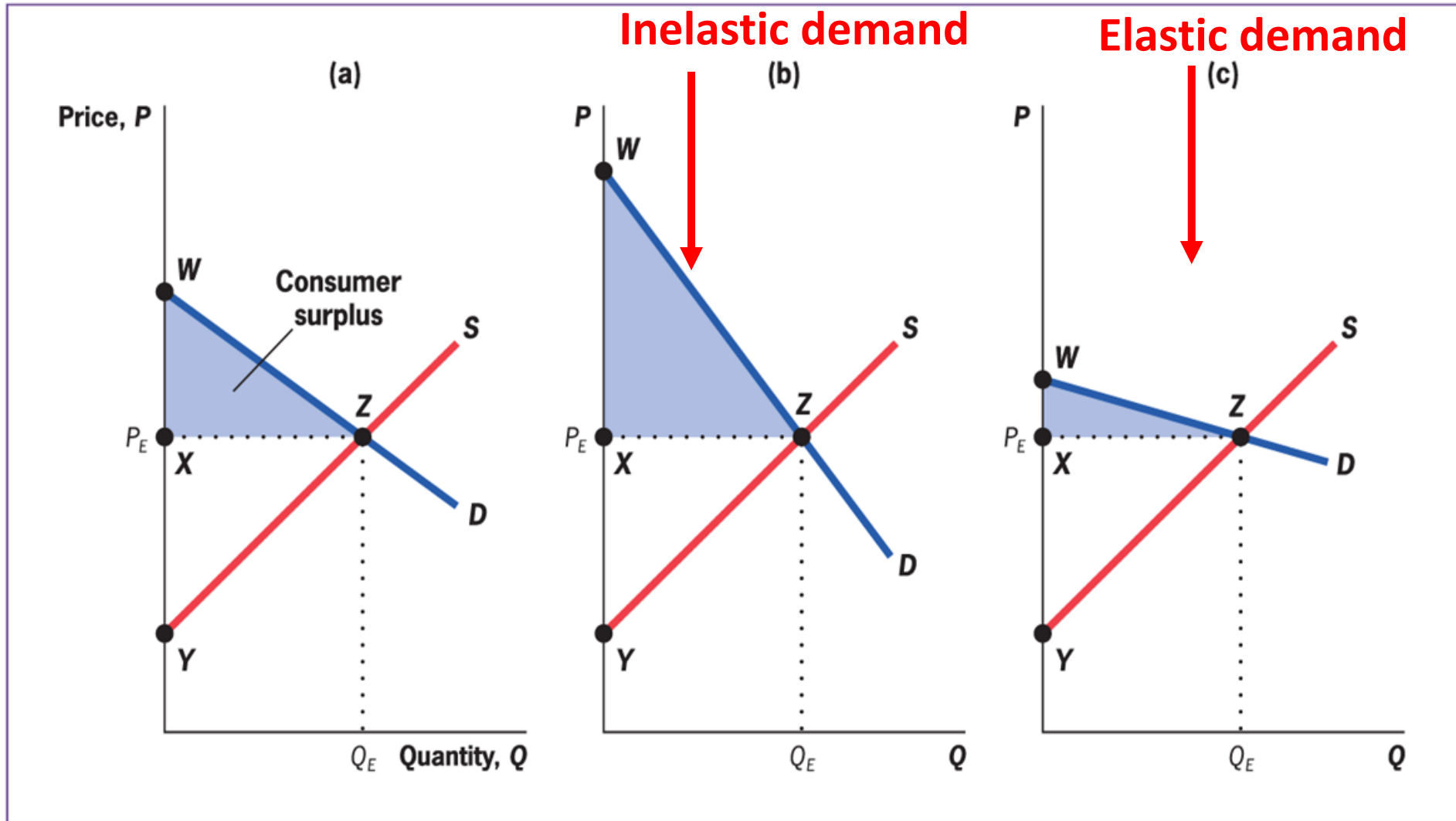
Market Equilibrium: Graphical Representation



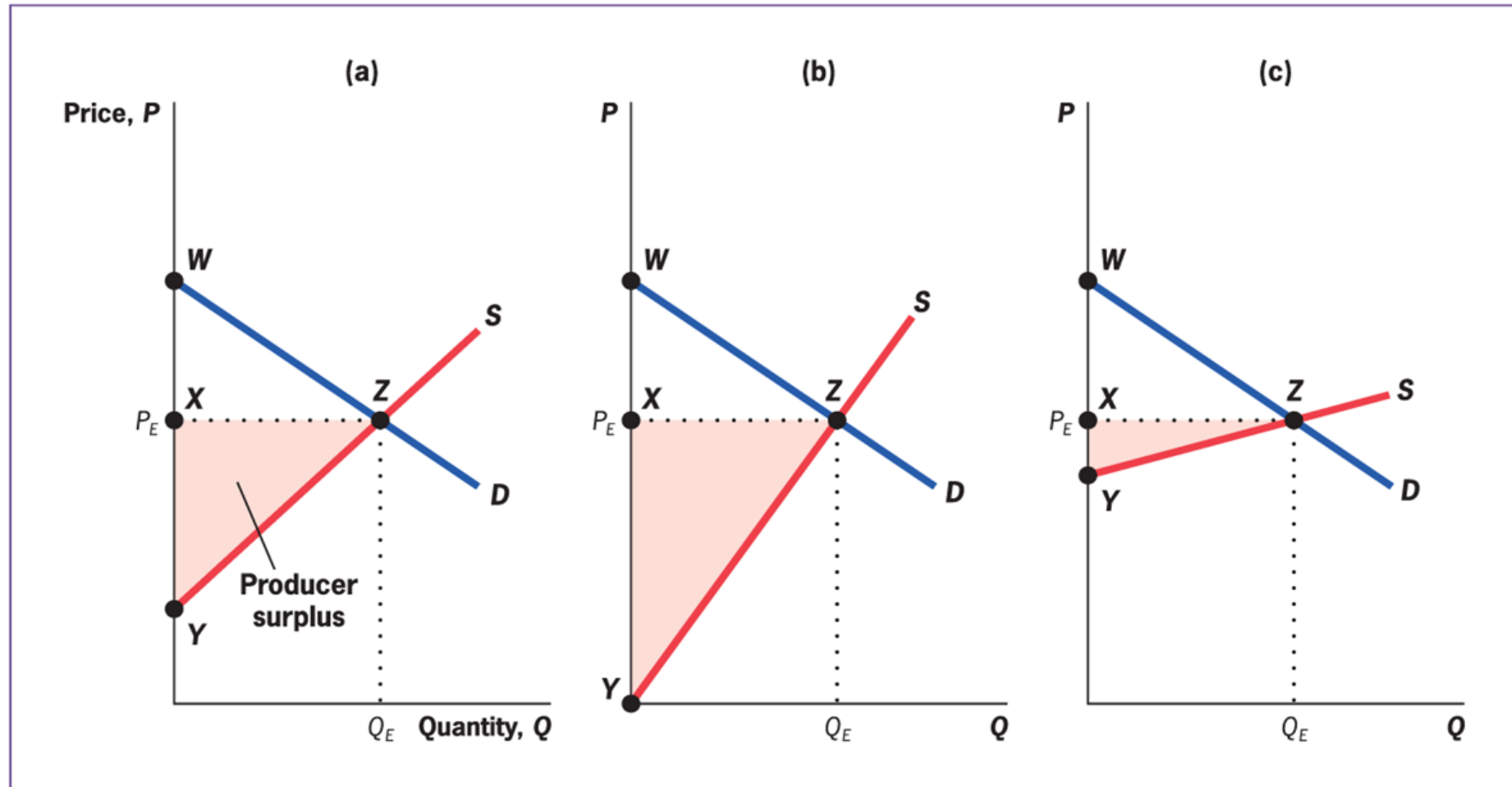
Social Efficiency

- **Social efficiency** represents **the net gains to society from all trades** that are made in a market, and it consists of the sum of two components: *consumer* and *producer surplus*. Also called **total social surplus**.
- **Consumer surplus:** The benefit that consumers derive from consuming a good, above and beyond the price they paid for the good.
- **Producer surplus:** The benefit that producers derive from selling a good, above and beyond the cost of producing that good.

Consumer Surplus: Graphical Representation

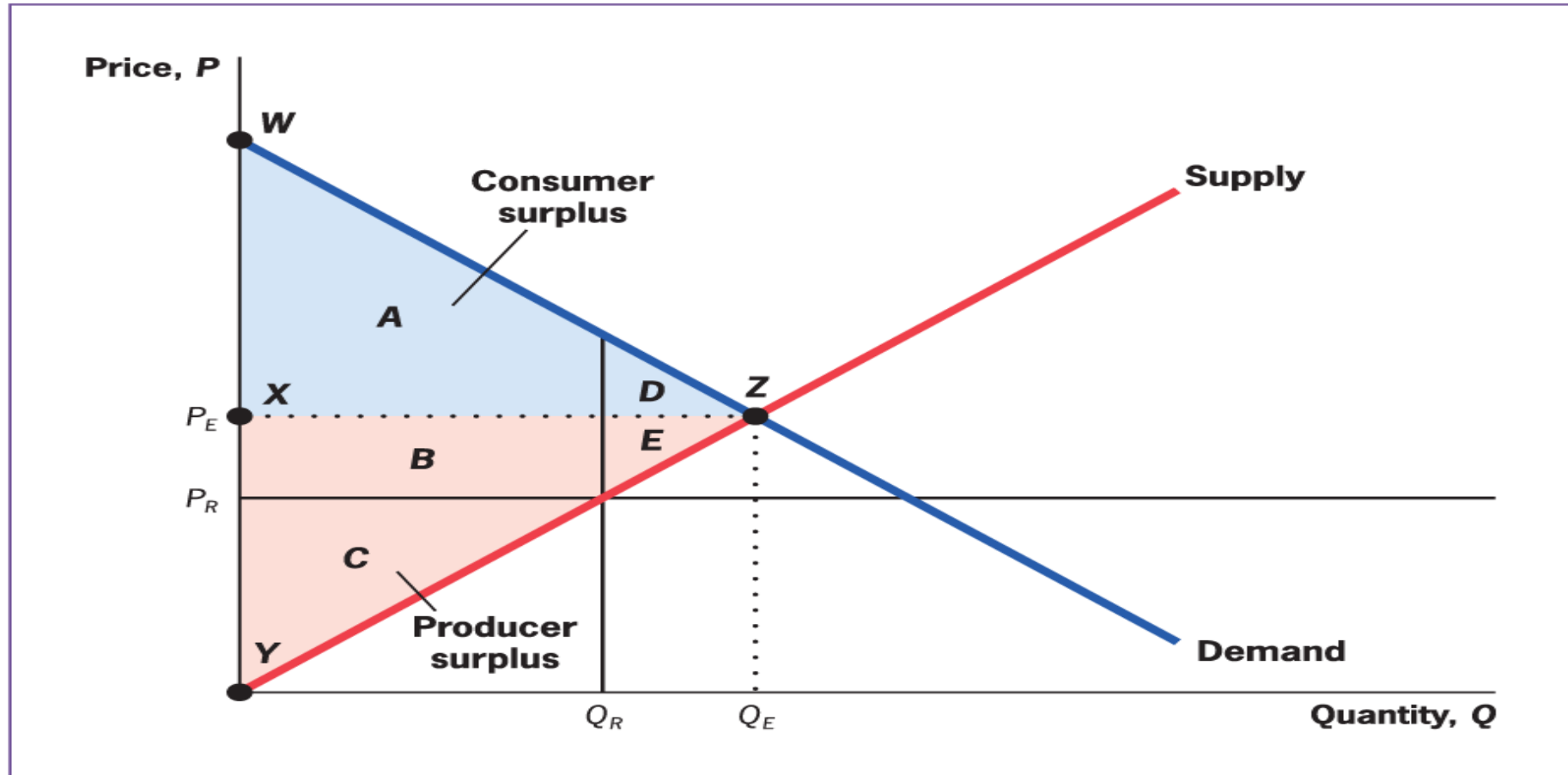


Producer Surplus: Graphical Representation



Gruber, *Public Finance and Public Policy*, 6e, © 2019 Worth Publishers

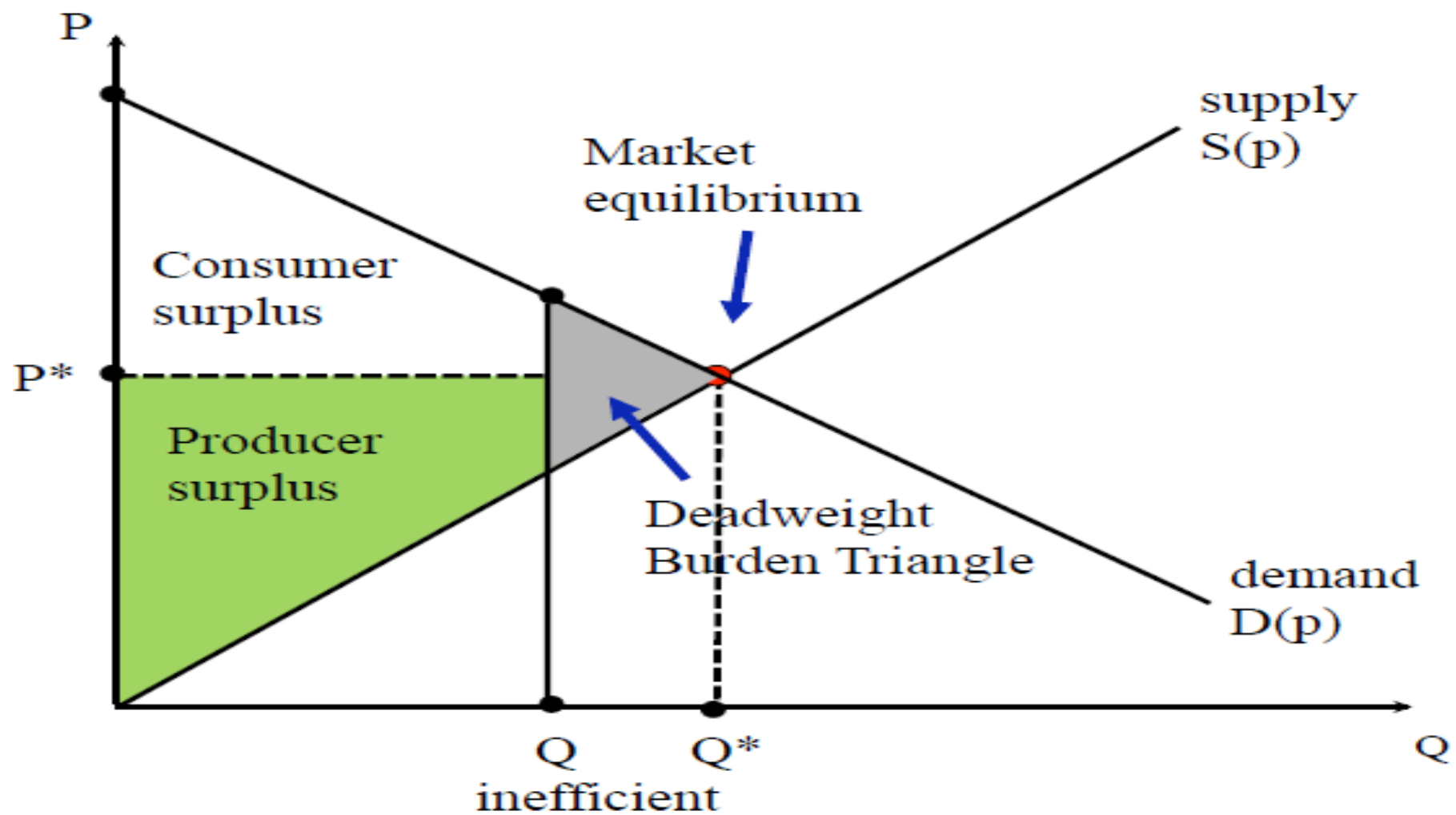
Social Surplus: Graphical Representation



Gruber, *Public Finance and Public Policy*, 6e, © 2019 Worth Publishers

First Fundamental Theorem of Welfare Economics

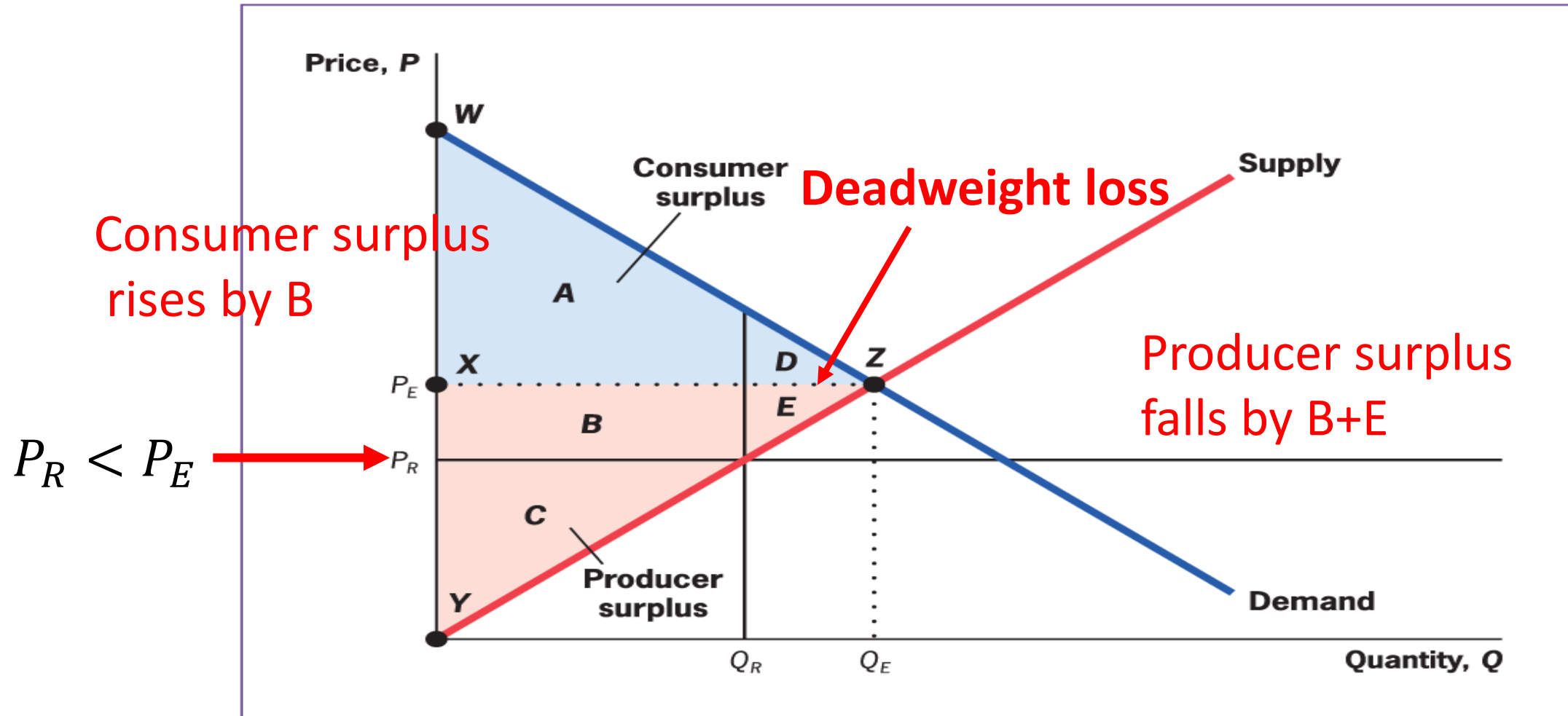
The competitive equilibrium, where supply equals demand, maximizes social efficiency.



Deadweight loss

The reduction in social efficiency from preventing trades for which benefits exceed costs.

Deadweight loss in more detail



From social efficiency to social welfare: The role of distribution

- Market equilibrium maximizes social welfare (the so called size of economic pie).
- However, societies usually care about not only about the **size of social surplus**, but also how it is **distributed** among the population.
- Under certain assumptions, society doesn't have just one socially efficient point but a whole series of socially efficient points from which it can choose.

Second Fundamental Theorem of Welfare Economics

Society can attain any efficient outcome by suitably redistributing resources among individuals and then allowing them to freely trade.

- Difficult in practice to redistribute like this.
- **Social welfare:** The level of well-being in society.
 - Determined by both how much gets produced and how it is distributed.
- **Equity–efficiency trade-off:** The choice society must make between the total size of the economic pie and its distribution among individuals.
- We model government's trade-off using a social welfare function.

Social Welfare Functions

Social Welfare Function (SWF): A function that combines the utility functions of all individuals into an overall social utility function.

It represents government's (or society) preferences.

Common specifications:

- A government which cares about efficiency.
- A government which cares about the distribution of resources.

Utilitarian social welfare

The *utilitarian social welfare function* maximizes the sum of individual utility:

$$SWF^U = U_1 + U_2 + \cdots + U_N$$

Rawlsian social welfare

The Rawlsian social welfare function maximizes the utility of the worst-off member of society:

$$SWF^R = \min(U_1, U_2, \dots, U_N)$$

Choosing an Equity Criterion

Social welfare functions reflect different possible equity criteria, including:

- **Commodity egalitarianism:** The principle that society should ensure that individuals meet a set of basic needs but that beyond that point, income distribution is irrelevant.
- **Equality of opportunity:** The principle that society should ensure that all individuals have equal opportunities for success but not focus on the outcomes of choices made.

Additional Reading (More Advanced)

- Hindricks J. and Myles G.D. (2013). Intermediate Public Economics. *MIT Press*.
 - Chapter 2
 - Especially pp. 35-39 which focus on the two Fundamental Theorems of Welfare Economics.