

2. Welfare economics and the rationale for public intervention

(Stiglitz ch.3, 4, 5; Gruber ch.2,5,6,7; Rosen ch. 4,5,6)

- 2.1. The two fundamental theorems of Welfare Economics
- 2.2. Social efficiency: perfect competition and Pareto Efficiency; measuring social efficiency
- 2.3. Equity: From Social Efficiency to Social Welfare

2.1. The benchmark: perfect competition and Pareto Efficiency (Optimal allocation of resources) (Stiglitz ch.3; Gruber ch.2; Rosen Ch. 4)

Welfare economics is a branch of economics studying:

- the optimal allocation of resources and goods, and
- how this allocation affects the aggregate well-being (e.g. social welfare).

It is a **normative approach** (how things should be – primarily theoretical)

It is based on **microeconomics** to study the rationale for public intervention in terms of **efficiency and equity on the basis of two theorems.**

Welfare economics

- ❖ According to this theory **perfect competition** in all markets automatically allocates resources **efficiently** and fully employs all the available resources (**first best**).
- ❖ This result comes from the **classical approach** which states that the **invisible hand** of the market is the best way to maximise social welfare through the maximization of individual preferences.
- ❖ **Only** when the **market does not work** (due to **market failures**), government intervention is justified in order to support a more efficient and equitable use of resources.
- ❖ However government intervention may introduce distortions (due to **government failures**), hence government intervention is justified only when:
 - It is **limited to clearly identified market failures**
 - It is **directly targeted at market failures**

The First Theorem of Welfare Economics

The competitive equilibrium maximizes social efficiency and is Pareto efficient.

- **Pareto efficiency** is reached when:
 - it is not possible to improve the welfare of one agent without reducing that of another agent, i.e. there is an optimal allocation of resources
- **Every competitive economy is Pareto efficient because the competitive market mechanism allocates scarce resources efficiently.**

The second Theorem of Welfare Economics: from social efficiency to social welfare (Equity)

- Pareto Efficiency is associated with economic efficiency, but not necessarily with equity or fairness.
- **A Pareto Optimum may not be socially desirable** (for example an economy based on slavery may reach a Pareto optimum, but it is undesirable; or making the rich better off without affecting the poor is a Pareto improvement, but not equitable).
- **However (2nd theorem of Welfare Economics):**

Society may achieve any Pareto efficient resource allocation by an appropriate initial redistribution of resources and free trade

The second Theorem of Welfare Economics: implications

- Under certain assumptions, the goals of **equity** and **efficiency** can be separated:
 - Society may achieve a whole series of Pareto efficient allocations of resources from which to choose, **according to social preferences** in relation to equity and efficiency issues.
 - The socially preferred distribution of wealth/consumption may be reached **by redistributing initial endowments via lump sum taxes/subsidies (which do not change the agents' behaviour)**.
 - This is the **only** thing the government needs to do: to ensure efficiency, policy makers **should not interfere** with the competitive market mechanism.
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2.2. EFFICIENCY: Perfect competition and Pareto efficiency/1

- With perfect competition firms and workers cannot affect prices and wages **and all of them face the same prices.**
 - **Prices and wages are flexible** and free to adjust according to market conditions until demand equals supply and there is full employment of resources. **This is the equilibrium condition.**
 - **If all market are perfectly competitive, the Pareto Efficiency Condition is satisfied:** there is an optimal allocation of resources (characterized by efficiency in production and efficiency in exchange): it is not possible to improve the welfare of one agent without reducing that of another agent.
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Perfect competition and Pareto efficiency /2

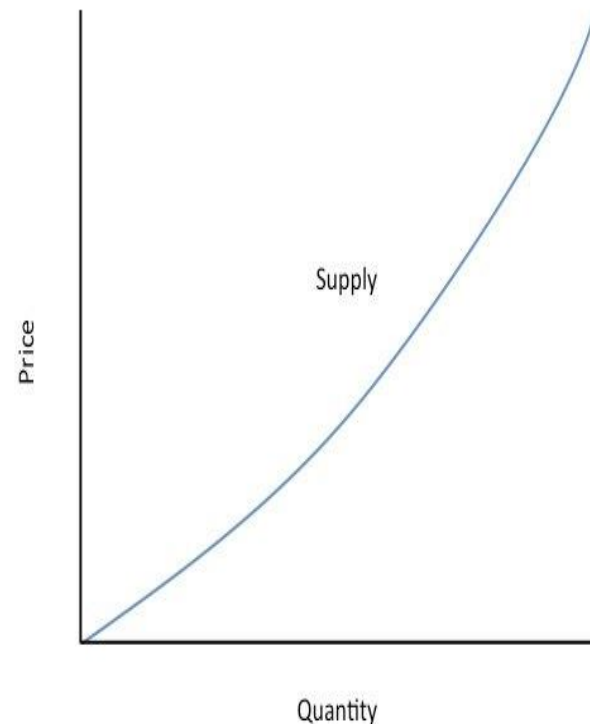
- **Pareto efficiency** requires:
 - **Production efficiency**: production is maximized given the resources and technology available. This means that given the resources available, *the production of one good cannot be increased without reducing the production of another.*
 - **Exchange efficiency**: given the available resources, **social welfare is maximized**. This means that *whatever the goods produced, they go to the individuals who value them most (are willing to pay more for them).*
 - **Product mix efficiency (or total efficiency)**: the goods and services produced correspond to those desired by consumers.

Perfect competition and Pareto efficiency/3 - Intuition

- In perfectly competitive markets:
 - **FIRMS** have to be competitive in buying all their inputs (production factors) at the lowest possible cost, using these inputs to maximize production, selling outputs at the lowest possible price to remain in business. **Competition minimizes costs and maximizes production (production efficiency)**
 - **CONSUMERS** buy goods and services at the lowest possible prices and are thus able to **maximize their utility and consumption** given their preferences and budget constraints (**exchange efficiency**)
 - **Hence both Production and Consumption are maximized, given the available resources:**
 - **If perfect competition exists in all markets**, then all production and consumption will be maximized and it will not be possible to increase either by reallocating resources (**General Equilibrium conditions**).
 - **Since all producers and consumers face the same set of prices** it is not possible to increase the economic welfare by rearranging production and consumption, given the *set of production conditions and consumers' preferences*.
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Competitive Equilibrium – The Supply curve/1

- The **SUPPLY CURVE** shows the quantity of a good or service that firms are willing to supply at given prices.
- The supply curve is derived from the profit maximization decision of firms and it is always upward sloped: the higher the price of the firm's output, the more the firm will produce. This because marginal costs rise as output increases (due to the assumption of diminishing marginal productivity of factors of production) and firms produce more only if prices increase.



Competitive Equilibrium – The Supply curve/2

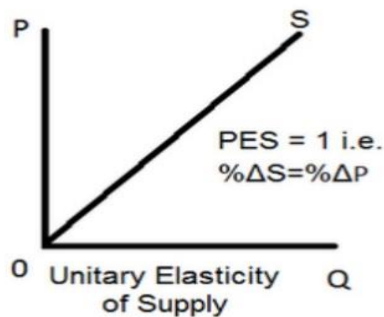
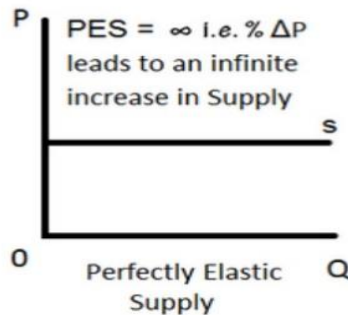
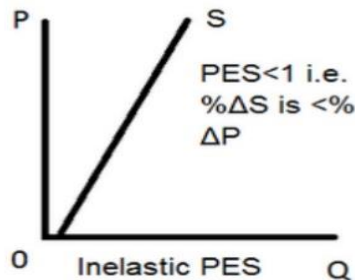
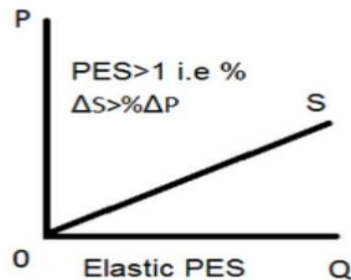
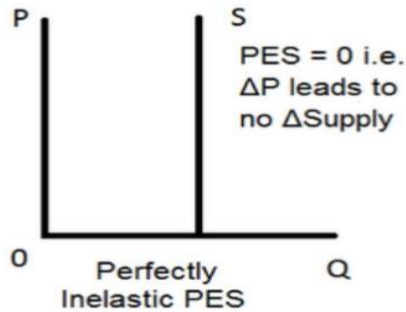
- **Firms maximize profits**, e.g. the **difference between revenues** ($P \cdot Q$) **and costs, given the technology available.**
- Assuming only two factors of production L and K: total costs are:
 $TC = wL + rK$,
- In order **to maximize profits** firms produce until the revenue from an additional unit of output (marginal revenue) is equal the cost of that additional unit of output (marginal cost): **MR = MC**
- In perfect competition **MR=P**, hence a firm producing good A will produce until **MC_a=MR_a=P_a**.
- **The supply curve (S) is the marginal cost curve for firms and shows the quantity of a good/service that firms are willing to supply at each price.**
- With two goods (A and B), the production efficiency condition is that **MC_a/MC_b = P_a/P_b**.

Competitive Equilibrium – The Supply curve/3

- Profit maximization defines the amount of output Q the firm is willing to produce. **The amount of production factors used to produce output Q is derived from cost minimization:** for each level of production, firms choose the combination of factors of production (Capital, K , and Labour, L) such that $MP_K/MP_L = P_K/P_L$
 - ❑ The **marginal productivity of a factor of production** is the change in the output given by a one unit change in a production factor, holding the others constant. In discrete terms the **marginal productivity of labour** is: $MP_L = \Delta Q / \Delta L$
 - ❑ We assume that the marginal productivity of each factor of production declines the more is used of that factor in production, given the other (*diminishing marginal productivity*).
- **The Price Elasticity of Supply (PES)** measures the percentage change in quantity supplied for each percentage change in price, e.g. the **steepness of the supply curve**:

$$PES = (\Delta Q_s / Q_s) / (\Delta P / P)$$

The supply curve and price elasticity



PES is positive (when prices increase, firms produce more) and high when firms are able to respond quickly to changes in prices.

Extreme cases:

- **Perfectly elastic (PES = ∞)**, where supply is infinite at any one price (horizontal curve).
- **Perfectly inelastic (PES=0)**, where only a specific quantity can be supplied (vertical curve).
- **Unitary elasticity (PES=1)**: a linear supply curve coming from the origin.

Competitive Equilibrium – The Demand curve/1

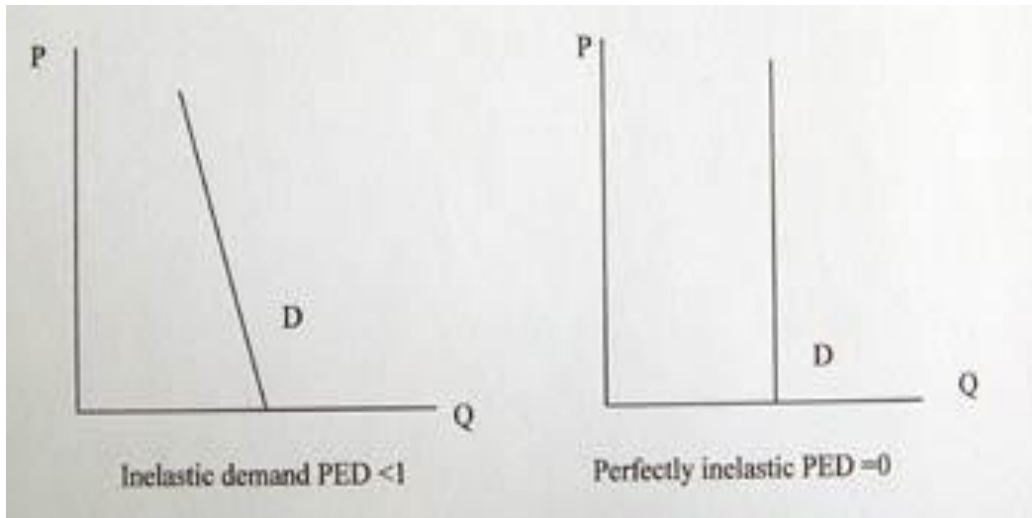
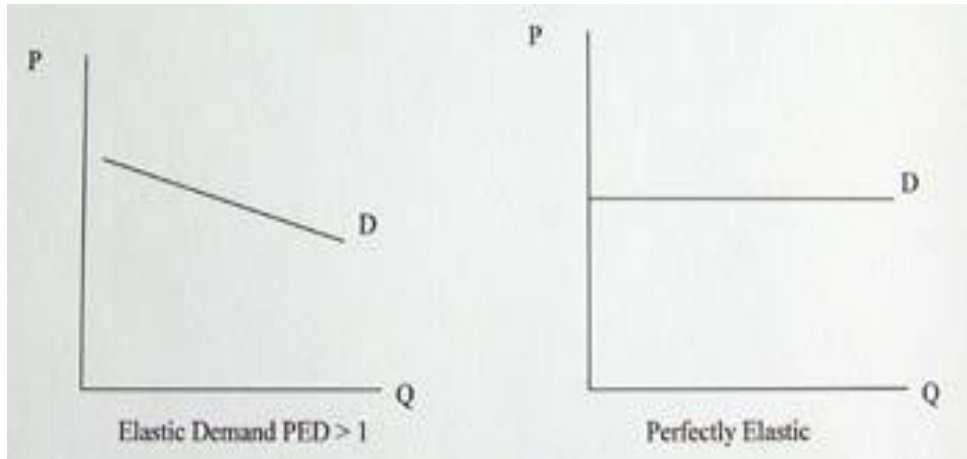
- **The DEMAND CURVE** shows the quantity of a good /service consumers are willing to buy at each price. The willingness to buy depends on the utility consumers get out of each additional unit of a good/service (*marginal utility*).
- Consumers maximize their utility (e.g. their set of preferences), given their budget constraint (e.g. the combination of goods the individual can afford to buy if she spends her entire income).
- The marginal utility derived from the consumption of each additional unit of a good declines the more is consumed of that good, given the others (*diminishing marginal utility*).
- The consumer will consume a given good **A** up to the point where the additional utility she derives from the consumption of that good equals its price: $MU_a = P_a$.

Competitive Equilibrium –The Demand curve/2

- With two goods (A and B) the efficiency condition is:
 $MU_a/MU_b = P_a/P_b$.
- With two consumers (Jane and Sam) the Pareto efficiency condition is that: **$(MU_a/MU_b)_{Sam} = (MU_a/MU_b)_{Jane} = P_a/P_b$**
- **The Price Elasticity of Demand (PED)** measures the percentage change in quantity demanded for each percentage change in price:

$$PED = (\Delta Q_D / Q_D) / (\Delta P / P)$$

The price elasticity of demand

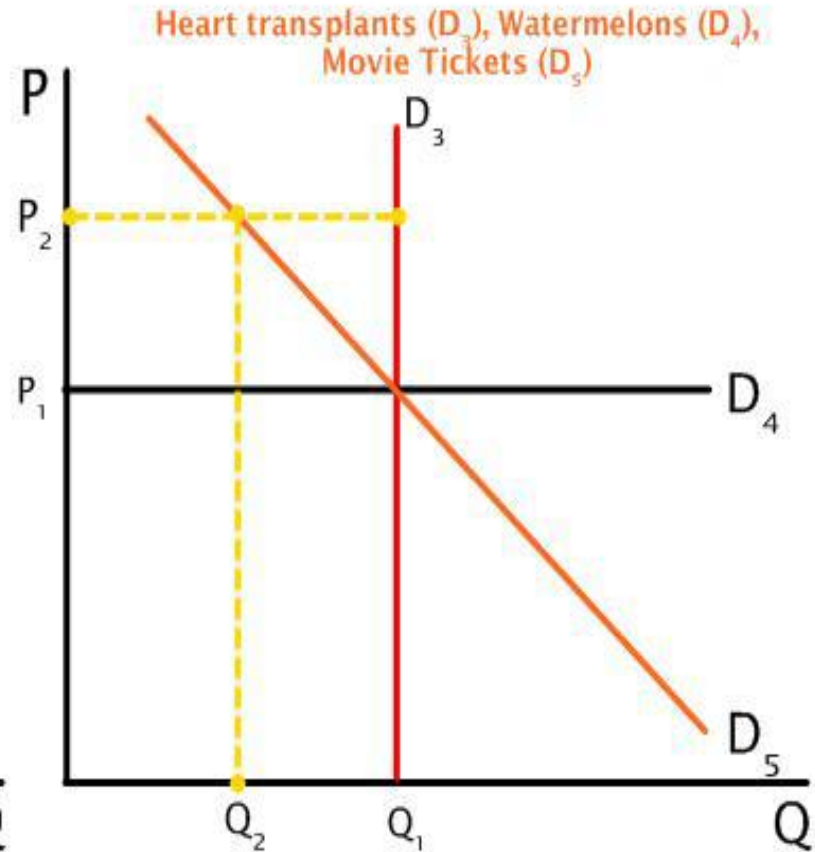
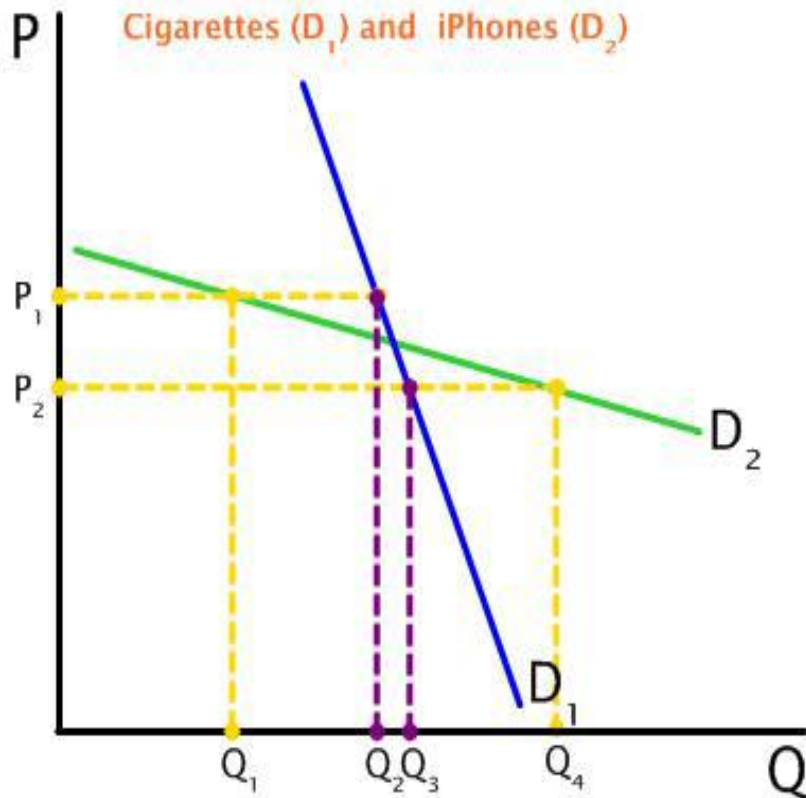


PED is negative (when prices increase, consumers demand less).

Extreme cases:

- **Elastic demand (PED > 1** in absolute value) the change in demand is greater than the change in price
- **Perfectly elastic (PED = ∞)**, where demand is infinite at any one price (horizontal curve).
- **Inelastic demand (PED < 1** in absolute value): the change in demand is lower than the change in price
- **Perfectly inelastic (PED = 0)**, where only a specific quantity of a good is demanded (vertical curve).

The price elasticity of the demand curve: two examples



Source: <http://welkerswikinomics.com/blog/2010/10/05/from-heart-transplants-to-watermelons-understanding-price-elasticity-of-demand/>

The equilibrium for Good A in perfect competition

S_a: quantity of **good A** firms are willing to supply at each price;

D_a : quantity of **good A** consumers are willing to buy at each price.

At the competitive equilibrium:

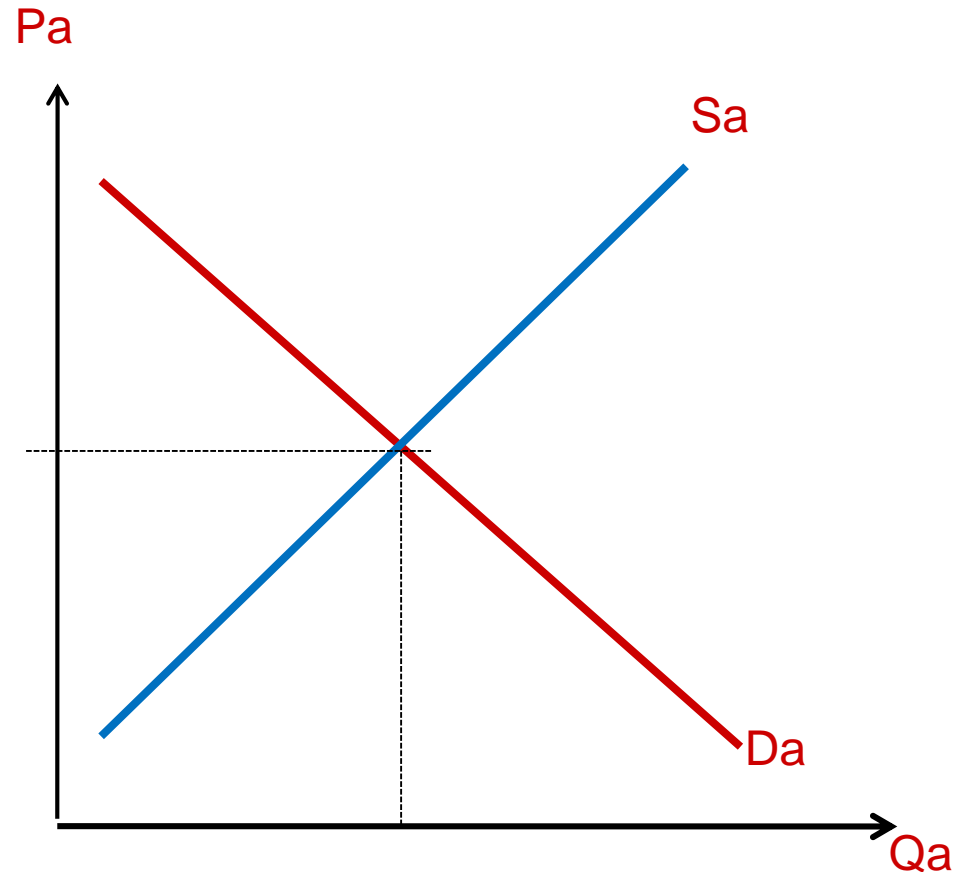
i. the **Marginal Costs** of producing good A for producers equals the price (on the Supply curve) **MC_a = P_a**

ii. the **marginal Utility** of acquiring good A for consumers equals the price (on the Demand curve) **MU_a = P_a**

Hence: **MU_a = MC_a = P_a**, which is the condition required for economic efficiency.

This is a **partial equilibrium condition**.

It is generalised (**general equilibrium**) by the profit maximising behaviour of all firms and the utility maximising behaviour of all consumers in competitive markets.

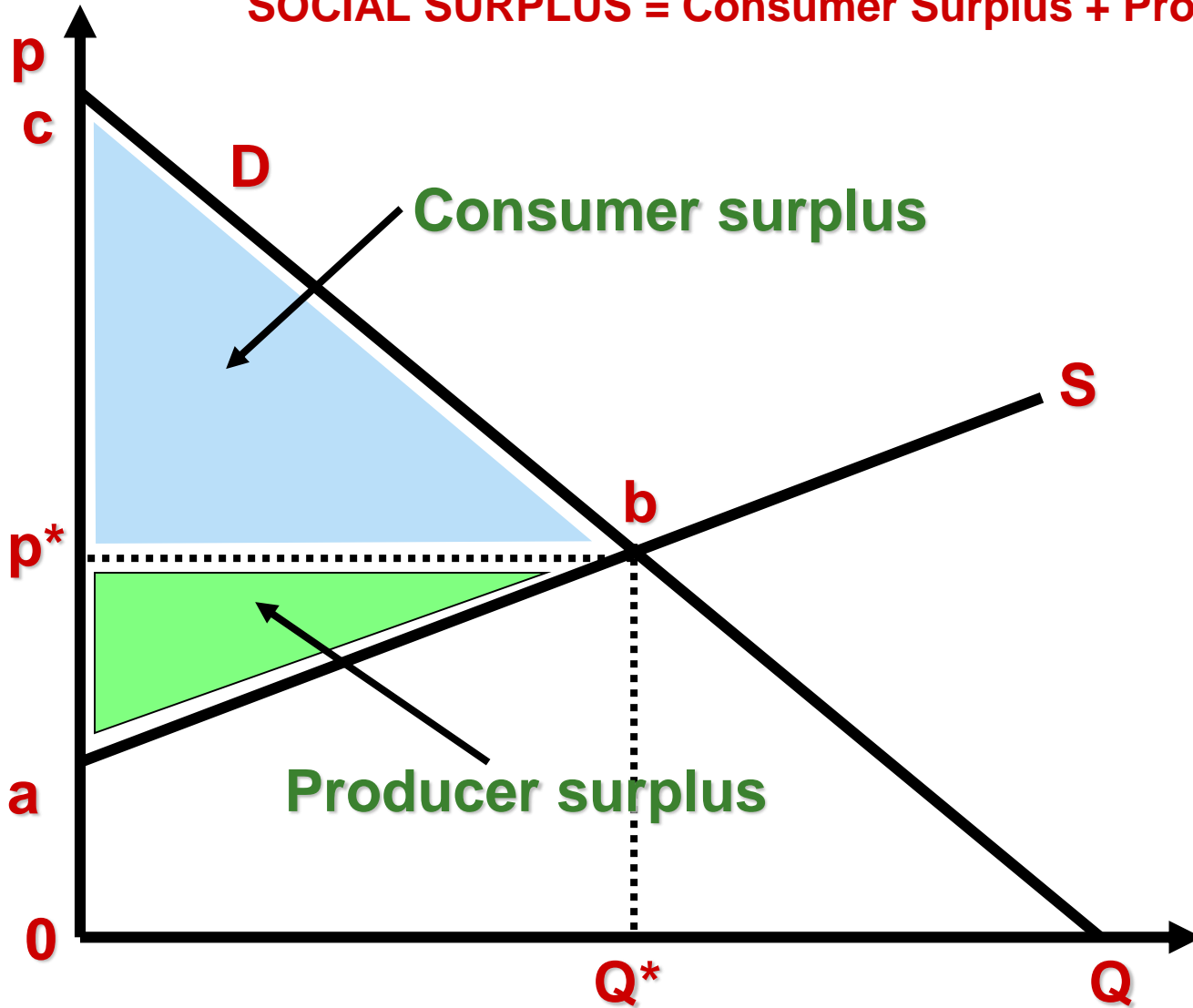


With **two goods and two consumers** the Pareto Efficiency conditions becomes:
 $(MU_a/MU_b)^{sam} = (MU_a/MU_b)^{jane} = MC_a / MC_b = P_a/P_b$; with MU_a/MU_b equal for the two consumers and equal to the MC of the two goods because prices are the same for consumers and producers.

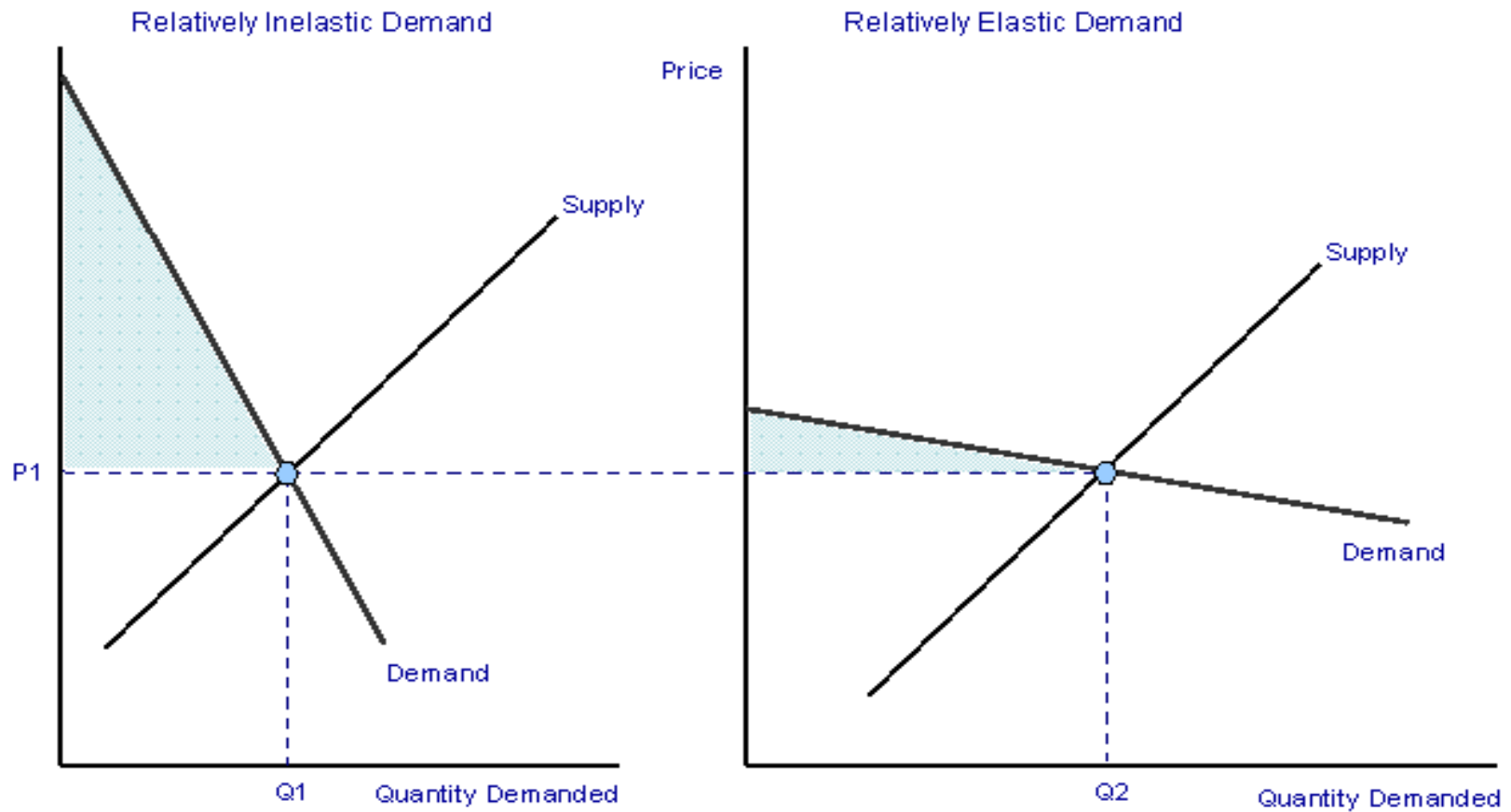
Measuring social efficiency/1

- **CONSUMER SURPLUS (CS):** is the area below the demand curve and above the equilibrium market price, i.e. it is the difference between what consumers are willing to pay and what they have actually to pay. It measures the benefit consumers derive from consuming a good above and beyond the price they pay for that good.
- **WILLINGNESS TO PAY:** how much a person is willing to pay in order to get additional units of a commodity. It measures the additional unit of utility the individual gets out of each additional unit of a commodity.
- **PRODUCER SURPLUS (PS):** is the area below the equilibrium market price and above the supply curve. It measures the benefit (profits) the producers derive from selling a good, above and beyond the costs of producing that good.
- **SOCIAL SURPLUS OR SOCIAL EFFICIENCY:**
$$PS + CS$$
- **Note that the size of PS and CS depends on the elasticity of supply and demand.**

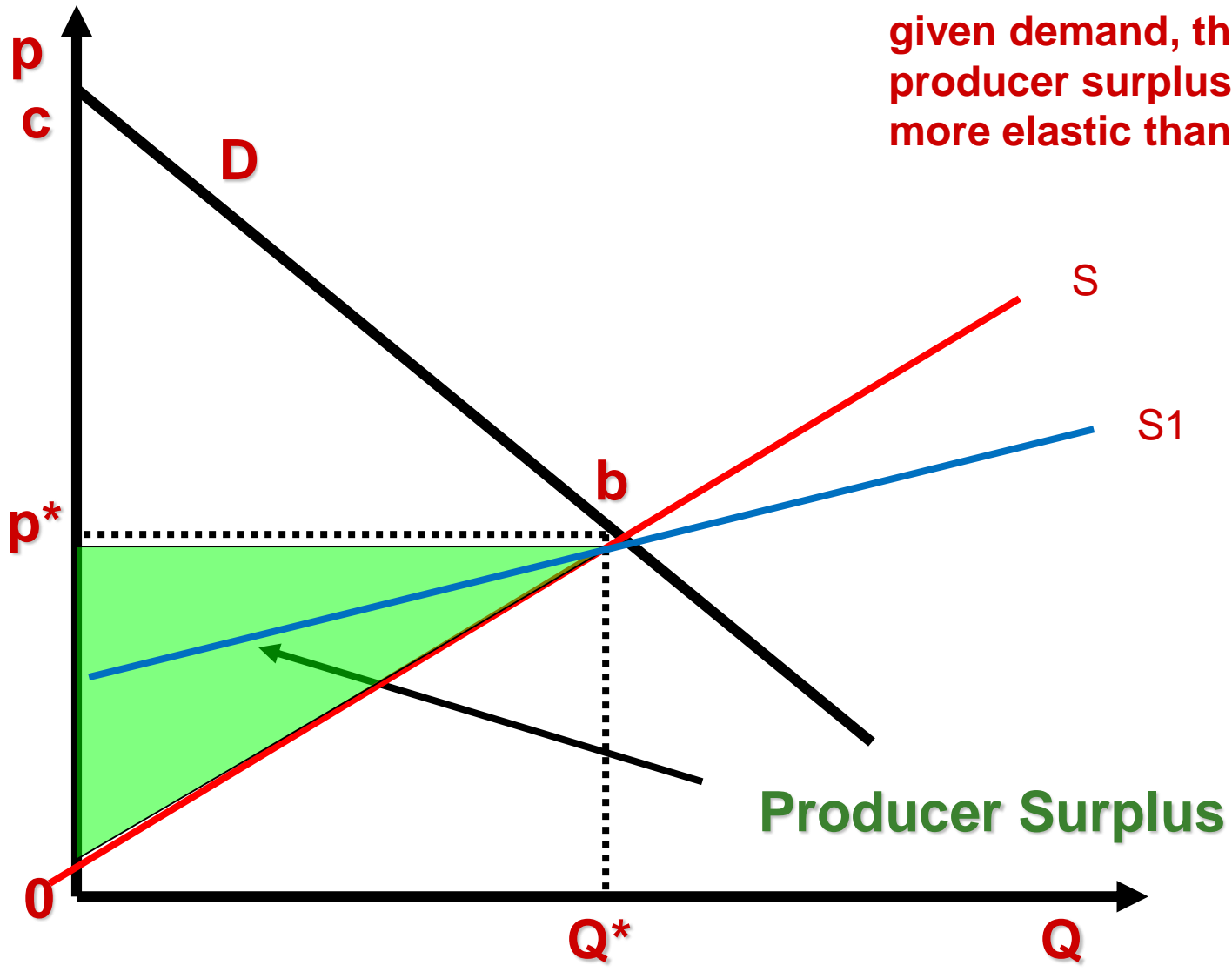
SOCIAL SURPLUS = Consumer Surplus + Producer Surplus



The more elastic is consumer demand, given supply, the lower is consumer surplus:



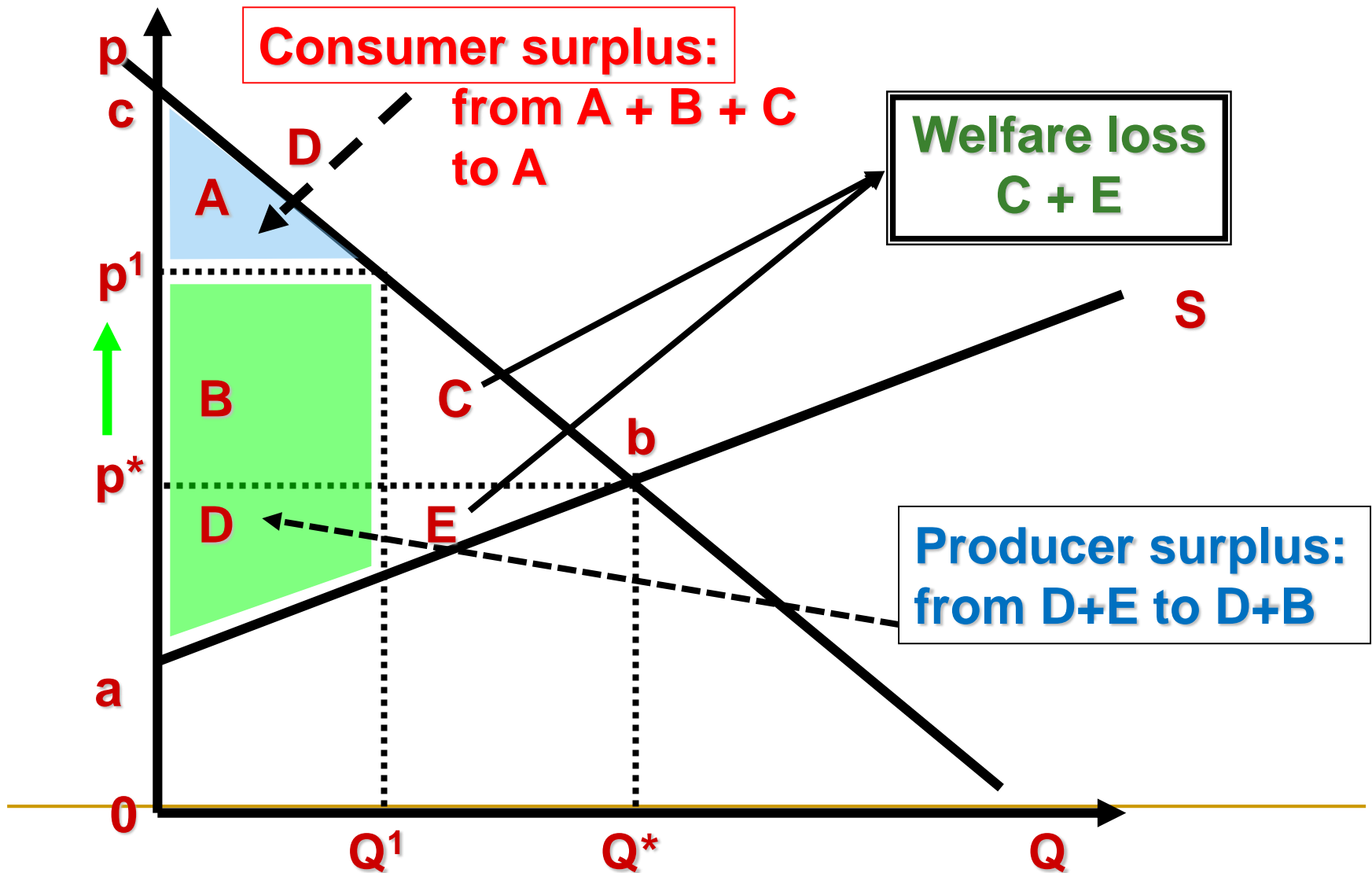
The more elastic is supply, given demand, the lower is producer surplus: S1 is more elastic than S



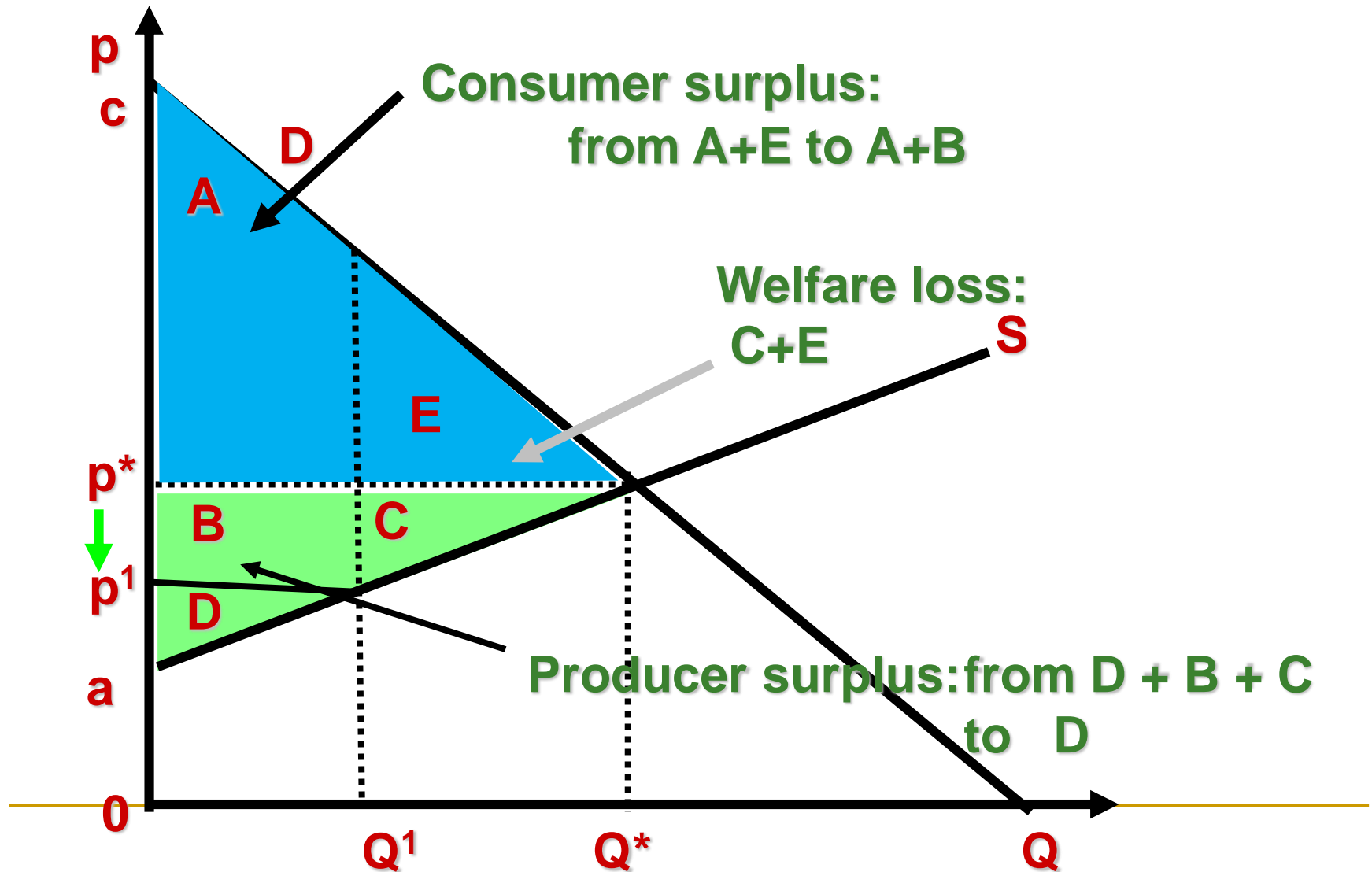
Welfare losses when markets are not competitive

- If prices are higher or lower than the equilibrium price in perfect competition, there is a loss in social efficiency: i.e a reduction in consumer and producer surplus
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Welfare loss (deadweight loss): when the price p^1 is higher than the perfectly competitive price p^*



Welfare loss when the price p^1 is lower than the equilibrium one p^* (due to restrictions on price)



Pareto efficiency and income distribution: assumptions and limits/1

- Behind the Pareto efficiency conditions there are a number of assumption:
 - **The welfare of society is the sum of the welfares of all individuals, which can be measured and aggregated;**
 - **Welfare is a private condition:** each individual is the best judge of his/her own welfare and of the choice of activities to reach it
 - **Individuals are rational** in pursuing the maximization of their welfare.

Given these assumptions, **voluntary exchange** is the only way to pursue social welfare and to allocate resources efficiently.

Note that the PE condition accepts whatever distribution of income arises out of the free market system and derives the first best efficiency situation from it.

There are infinite configurations which satisfy PE, which depend on the initial endowments of individuals.

Pareto efficiency and distribution of income: assumptions and limits/2

Limits of PE:

- Equity issues are disregarded by efficiency prescriptions.
- There may be social values and interests which are not simply the sum of individual ones
- Individuals are not always able to act in their interests (for example many individuals do not save for retirement and old age)
- Lump sum transfers among individuals (as required by the 2^o theorem) are not always feasible.