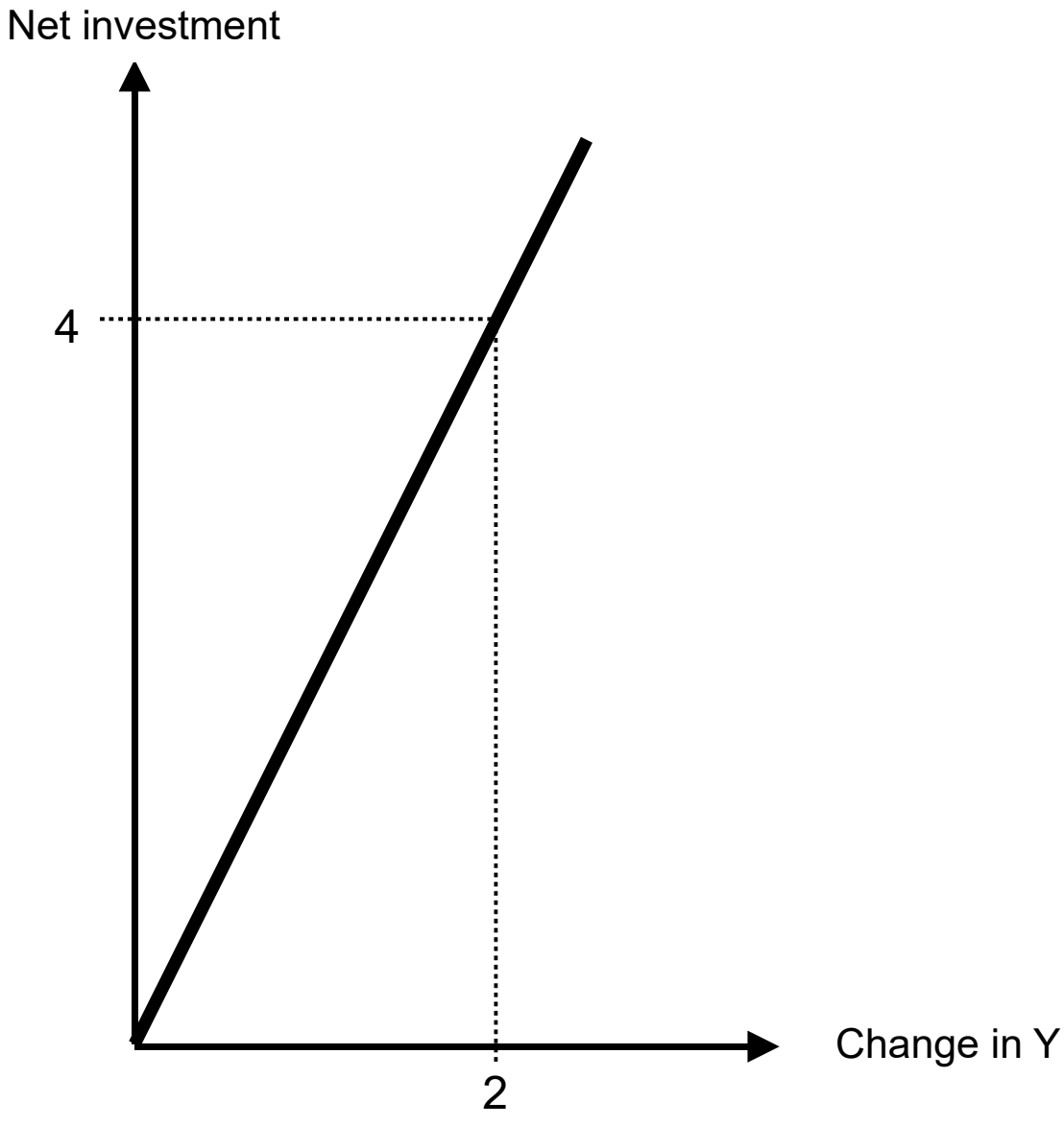
Accelerator

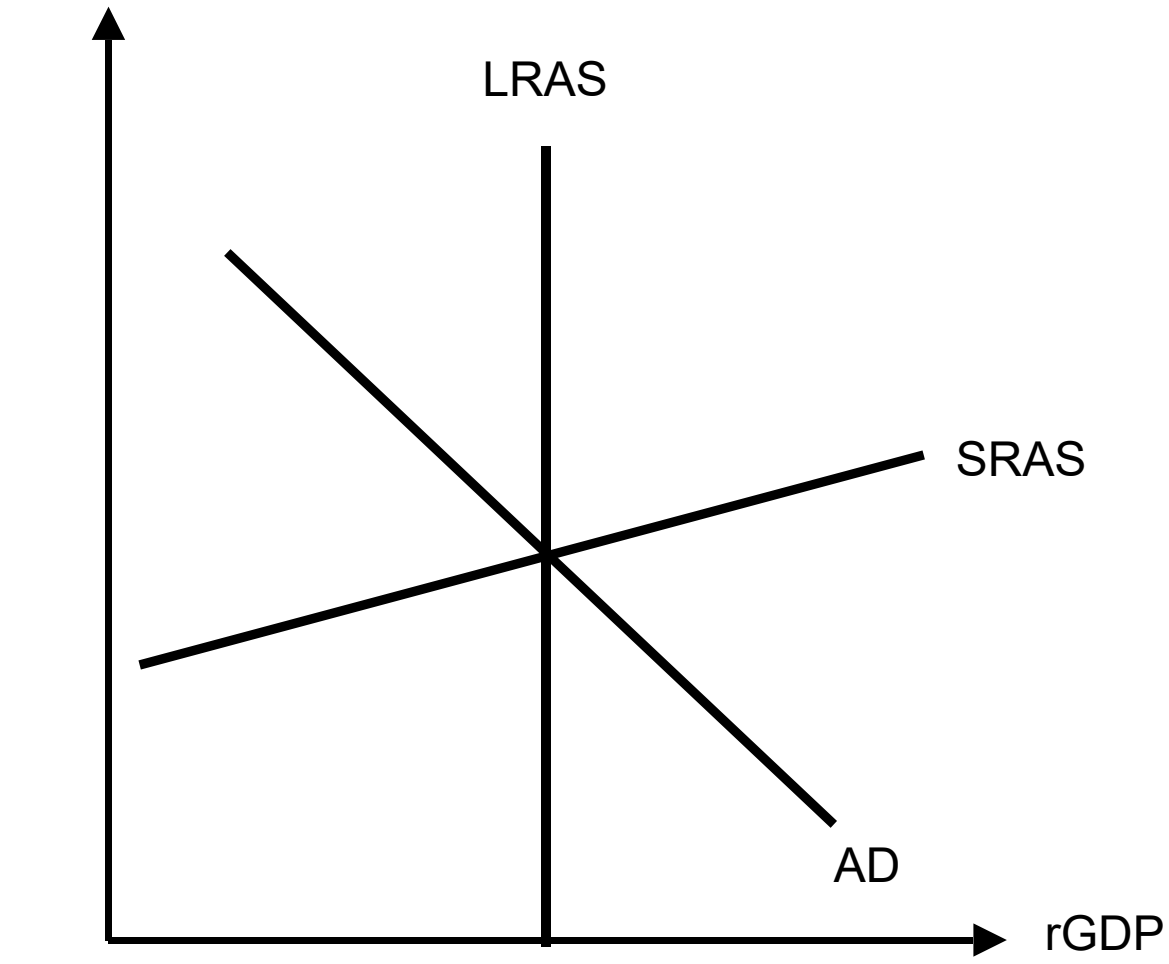
① $\text{Accelerator} = \dfrac{\text{Net investment}}{\text{Change in Y}}$

Net investment = Gross investment - depreciation
Y = Output

② We assume an accelerator of 2.



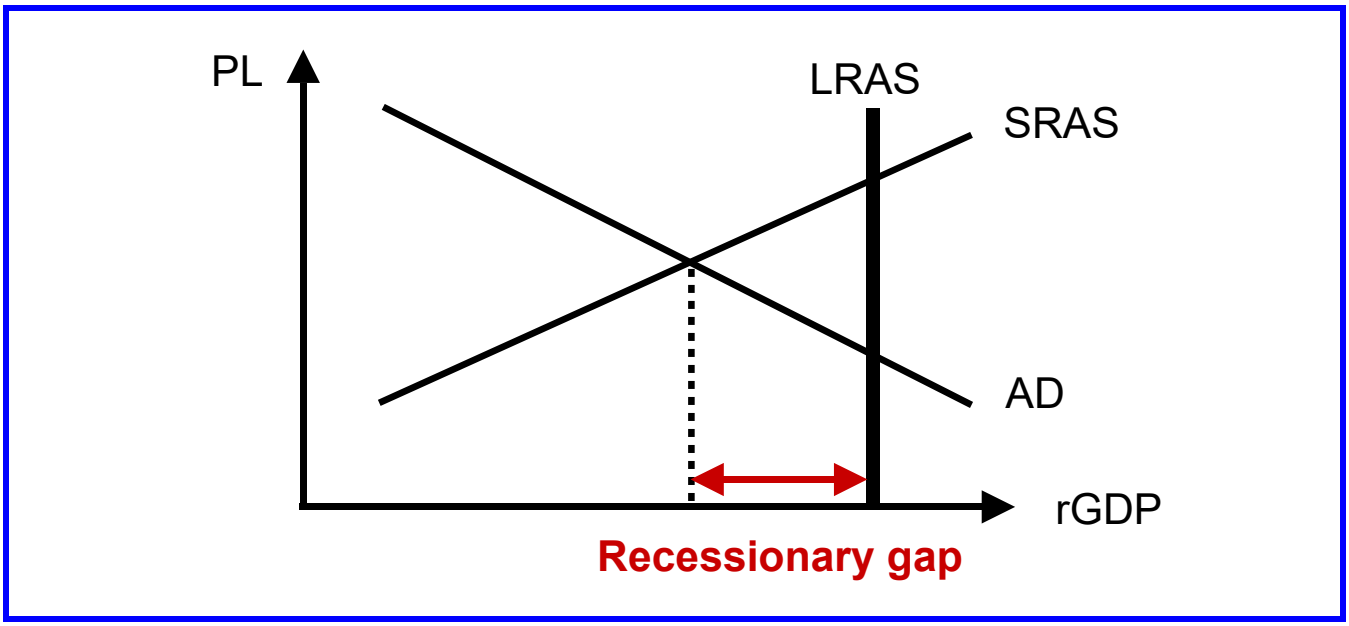
AD-AS model 1 - equilibrium



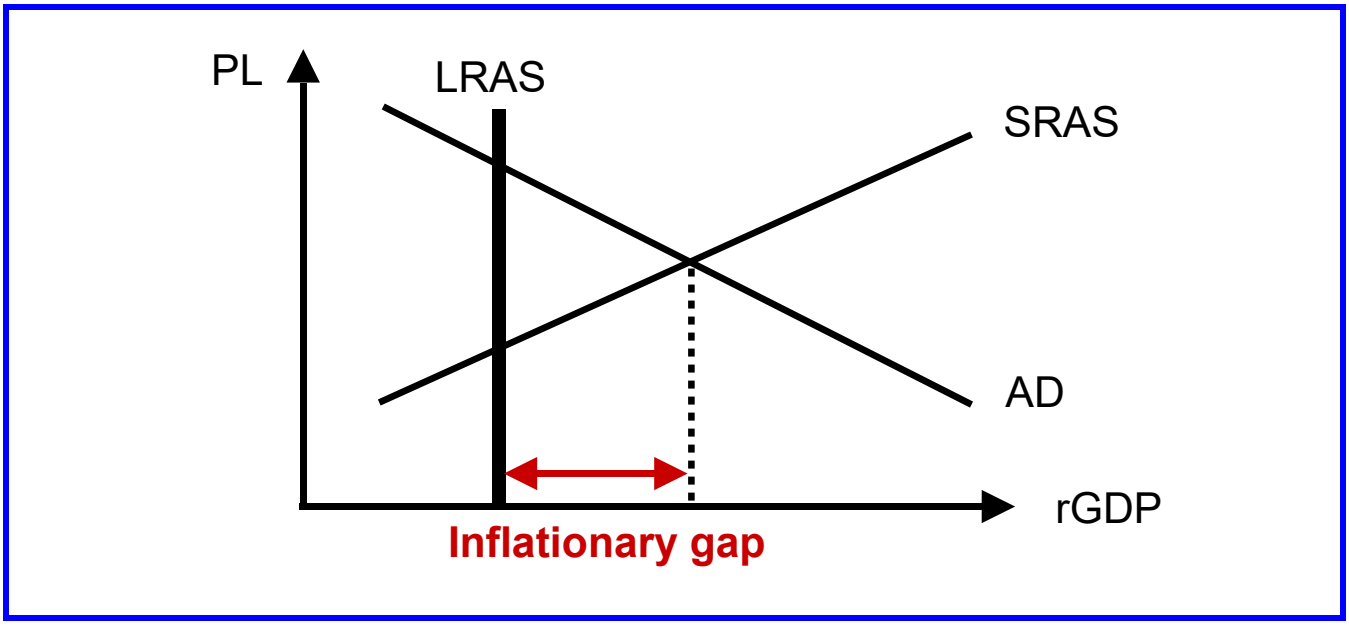
LRAS = Long-run aggregate supply
SRAS = Short-run aggregate supply
AD = Aggregate demand
rGDP = Real gross domestic product

AD-AS model 2 - disequilibria

① Recessionary gap

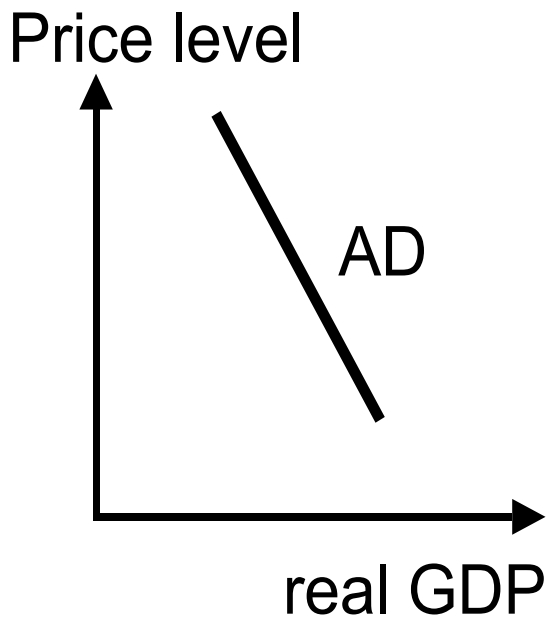


② Inflationary gap



PL = Price level	rGDP = Real Gross Domestic Product
AD = Aggregate demand	AS = Aggregate supply
SRAS = Short-run AS	LRAS = Long-run AS

Aggregate demand

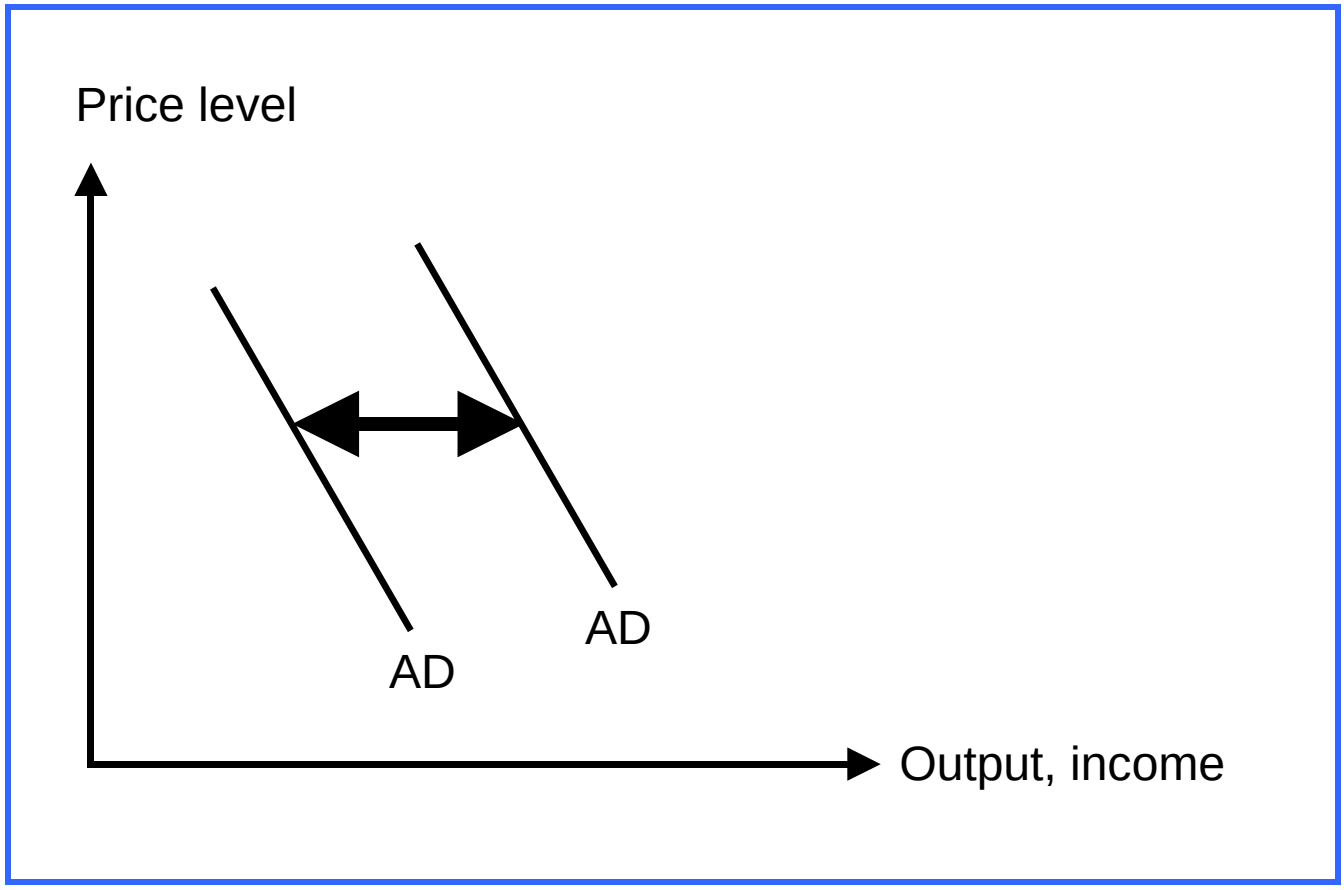


AD = Aggregate demand

GDP = Gross domestic product

- AD shows total spending (consumption, investment, government spending and net exports) at different price levels.
- Reasons for downward sloping:
  - Wealth effect
  - Interest rate effect
  - Effect on exports and imports

Aggregate demand - shifts



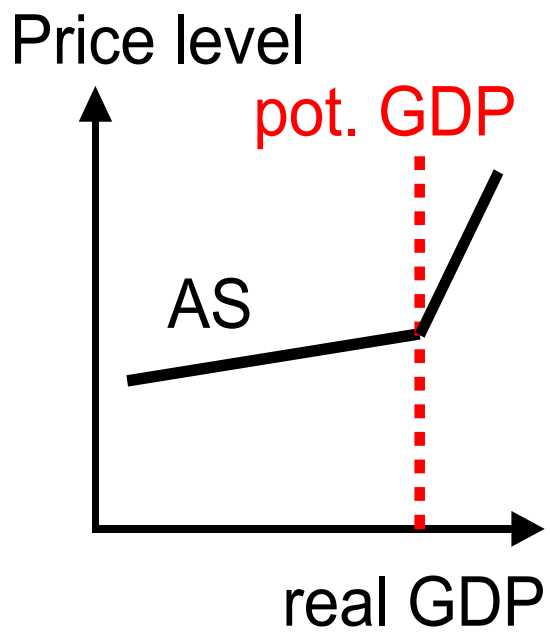
AD = Aggregate demand

Possible reasons for shifts

Change in the following items:

- Consumption
- Investment
- Government spending
- Net exports

Aggregate supply



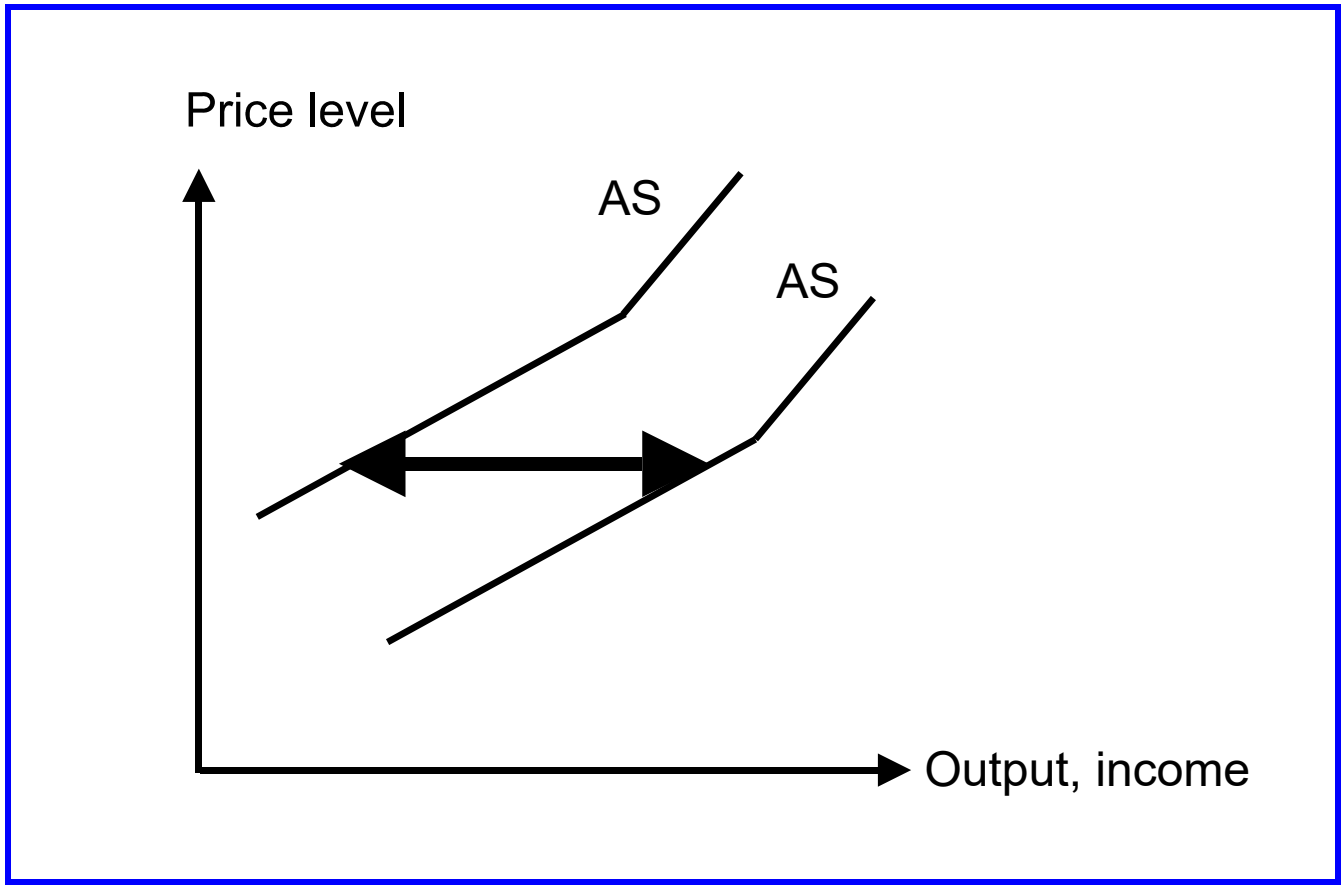
AS = Aggregate supply

GDP = Gross domestic product

pot. = potential (>>> full employment)

- AS shows real GDP produced in a country during a period of time, usually in a year, at different price levels.
- AS slopes upwards because firms have an incentive to offer more at higher price levels or less at lower price levels.

Aggregate supply - shifts



AS = Aggregate supply

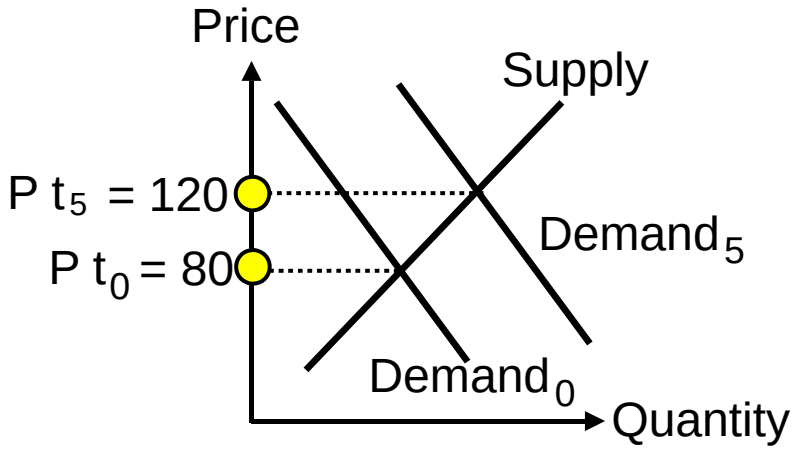
Possible reasons for shifts

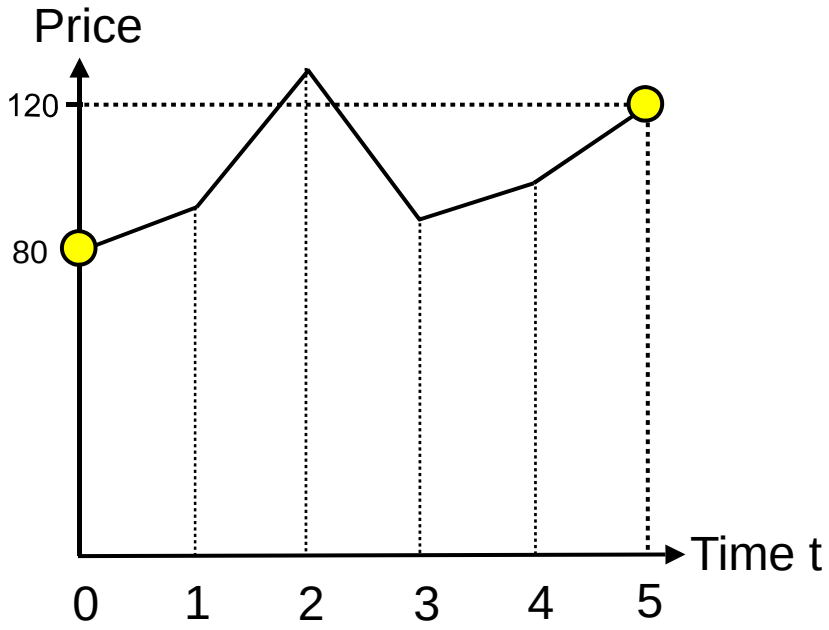
Change in the following items:

- Productivity
- Input prices
- Regulations by the government
- Business taxes

Analysis of markets - comparative static and dynamic

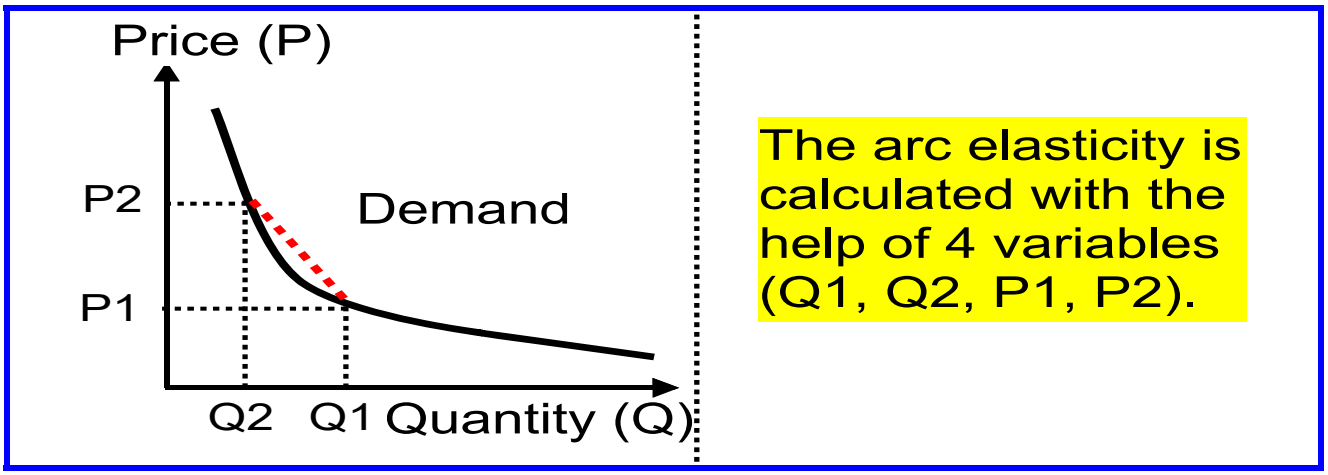
Comparative static analysis of markets	**Dynamic** analysis of markets
→ Different equilibrium positions are displayed without taking notice of the adjustment process.	→ Analysis of a market during a period of time
Ex.: Market for oil at time t_0 and t_5; the change is due to an increase in demand	Ex.: Price trend of oil from t_0 to t_5





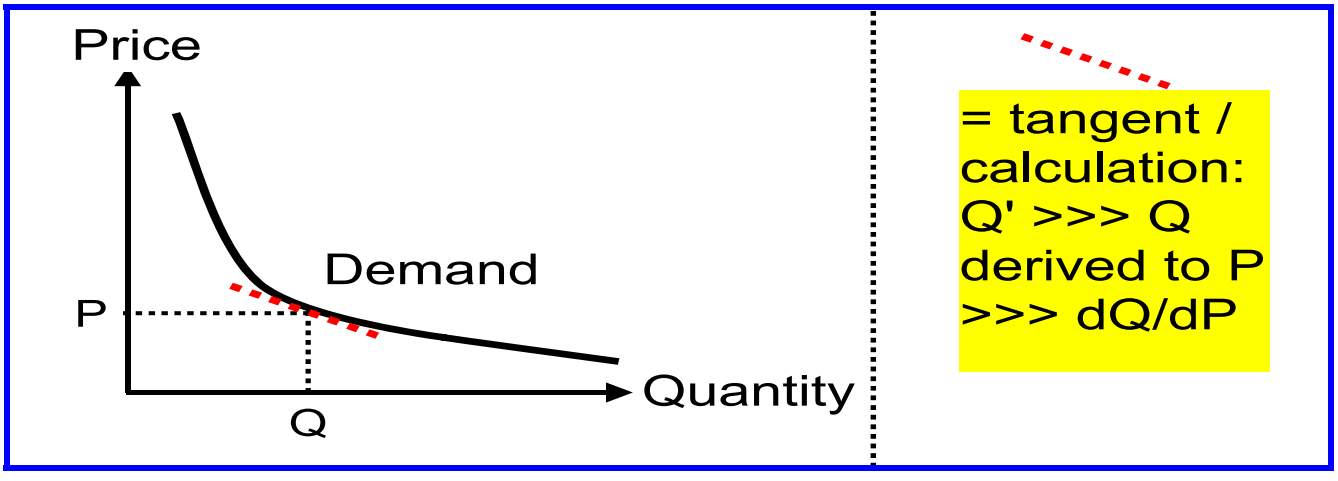
Arc and point elasticity

① Arc elasticity



$$\text{Arc elasticity} = \frac{\Delta Q}{\Delta P} * \frac{P1}{Q1} \rightarrow \quad (\Delta Q = Q2 - Q1) \text{ and } (\Delta P = P2 - P1)$$

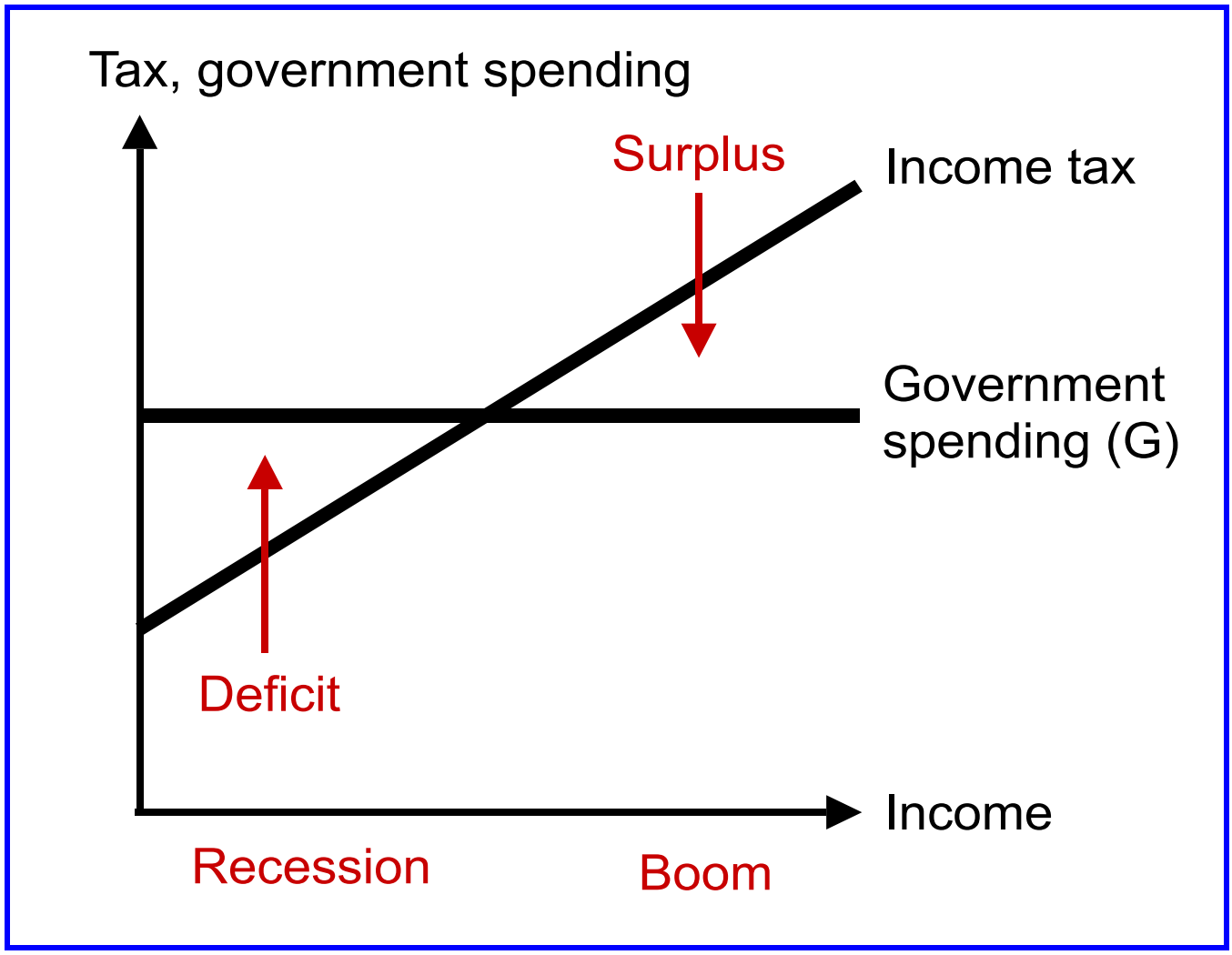
② Point elasticity



$$\text{Point elasticity} = \frac{dQ}{dP} * \frac{P}{Q}$$

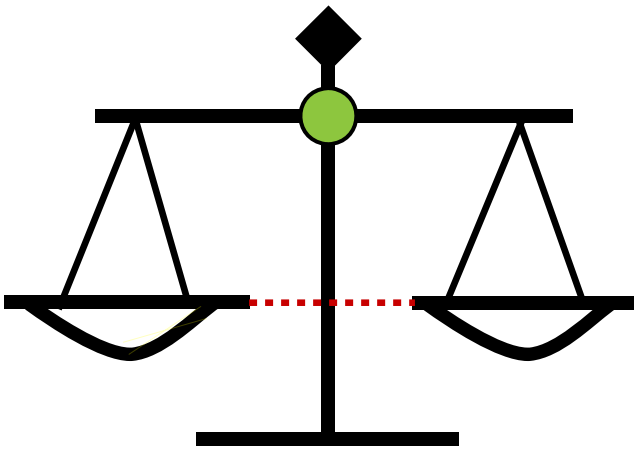
Automatic stabilizer (example of income tax)

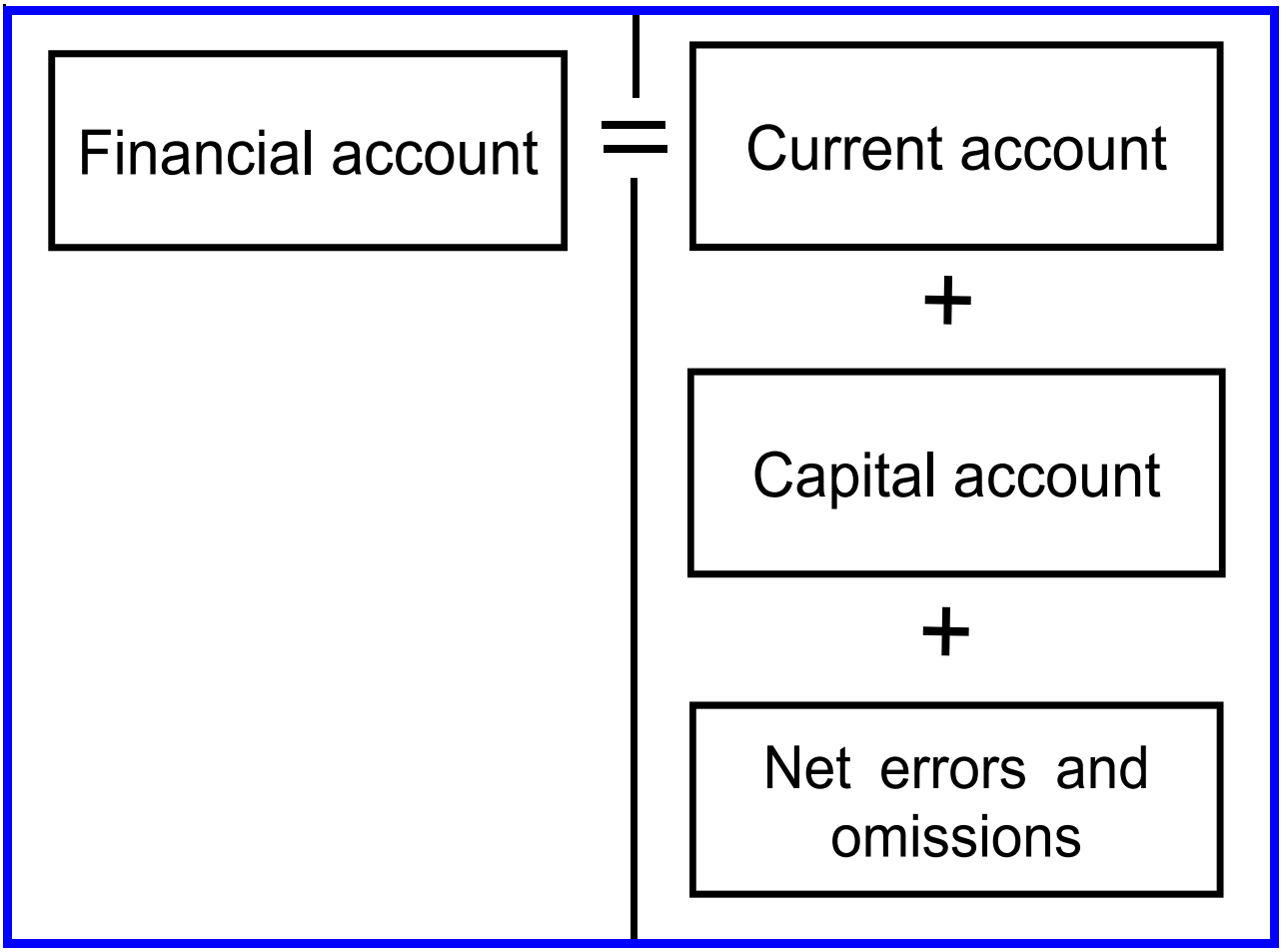
Business cycle	Taxation revenue (progressive tax)	Government budget (G constant)
Recession	lower	Deficit
Boom	higher	Surplus



In a recession, lower taxes stimulate private consumption; in a boom, higher taxes slow down private consumption. This is why progressive income tax stabilizes the economy automatically, i.e. without a change in the law (→ stimulation during a recession, slowdown during a boom).

Balance of payments



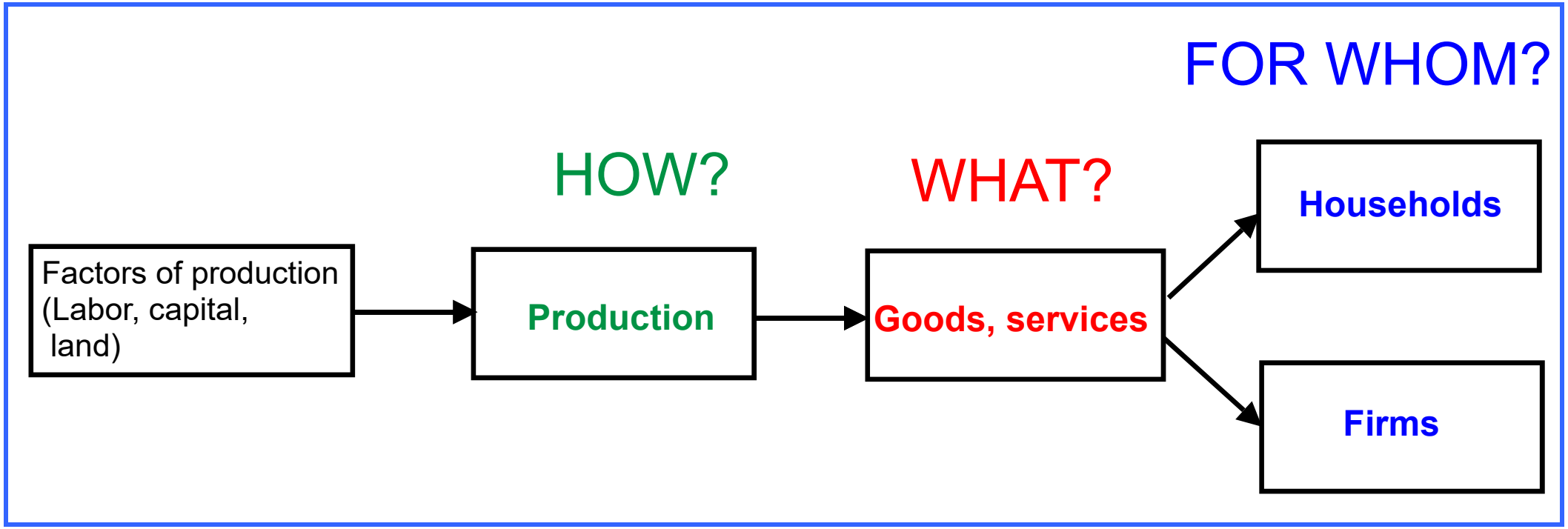


Alternatively:

0 = Current account + capital account + net errors and omissions
- **financial account**

Basic questions in every economy

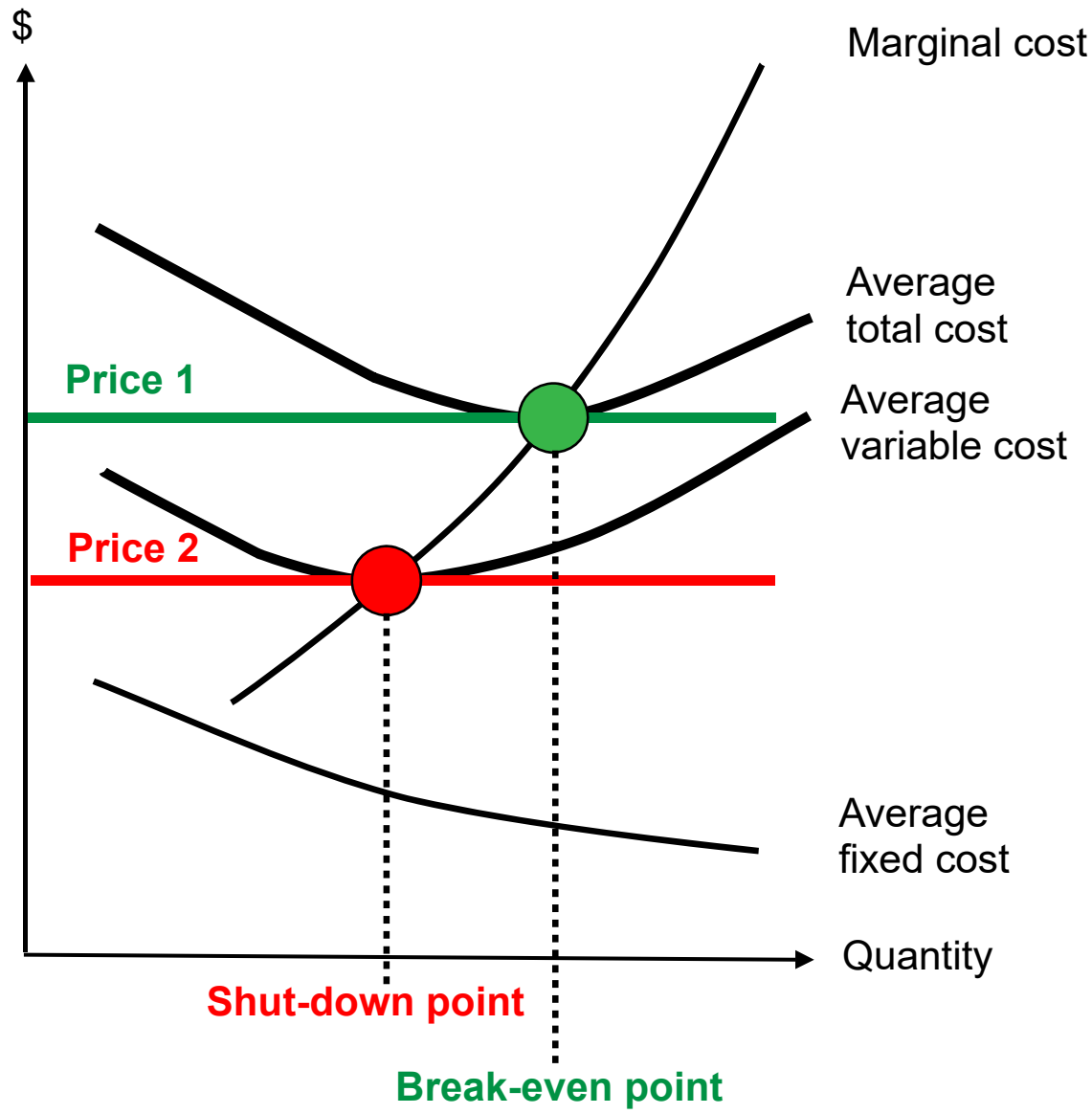
- **HOW** to produce?
- **WHAT** is to be produced?
- **FOR WHOM** is to be produced?



Break-even and shut-down point

Assumptions:

- Competitive firm (→ The price is given.)
- Short-run (→ There are fixed and variable costs.)

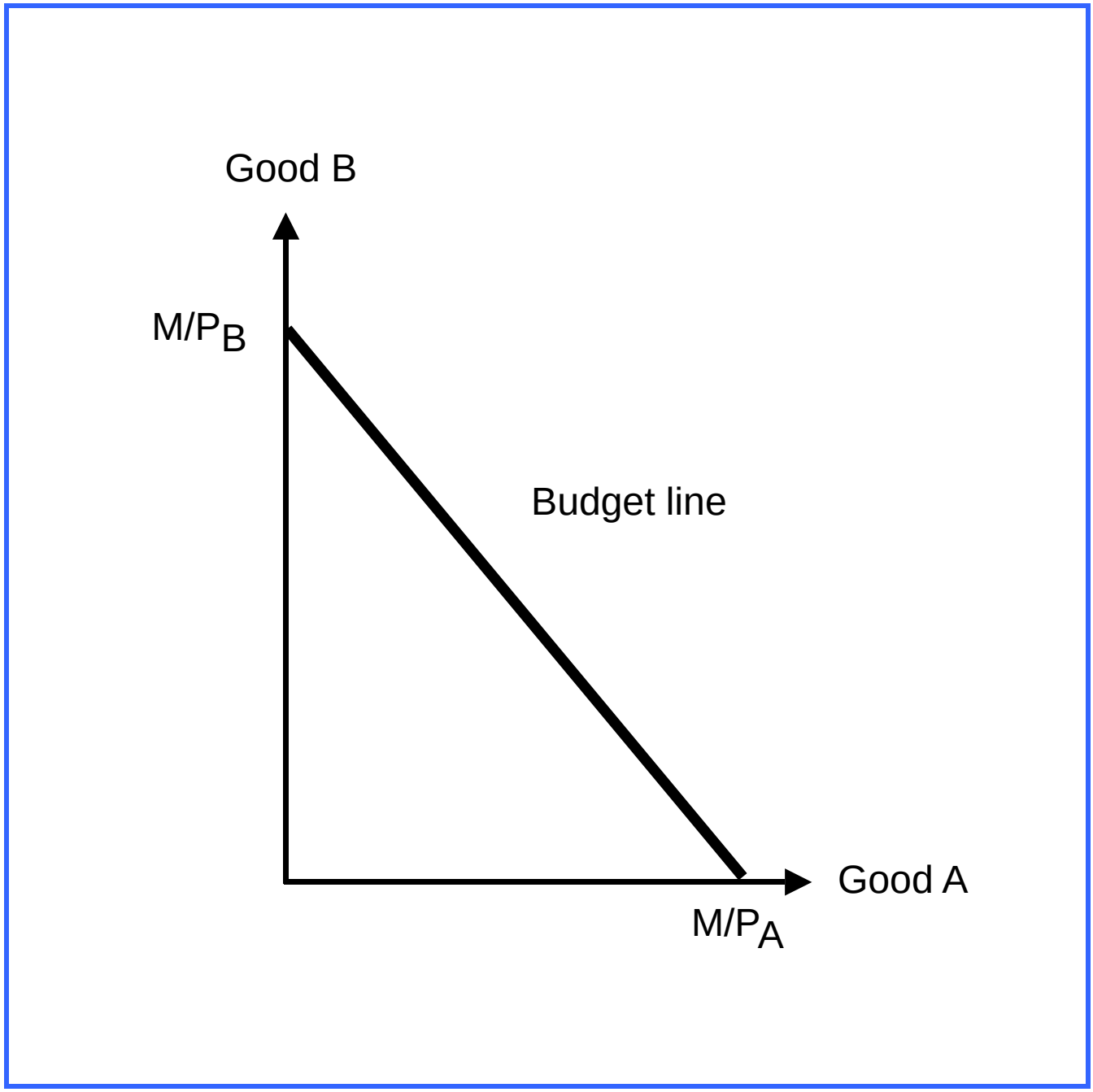


Shut-down point → Price (P) = Average variable cost
There is no production if P **<** Average variable cost

Break-even point → P = Average revenue = Average cost
There is no profit at the break-even point.

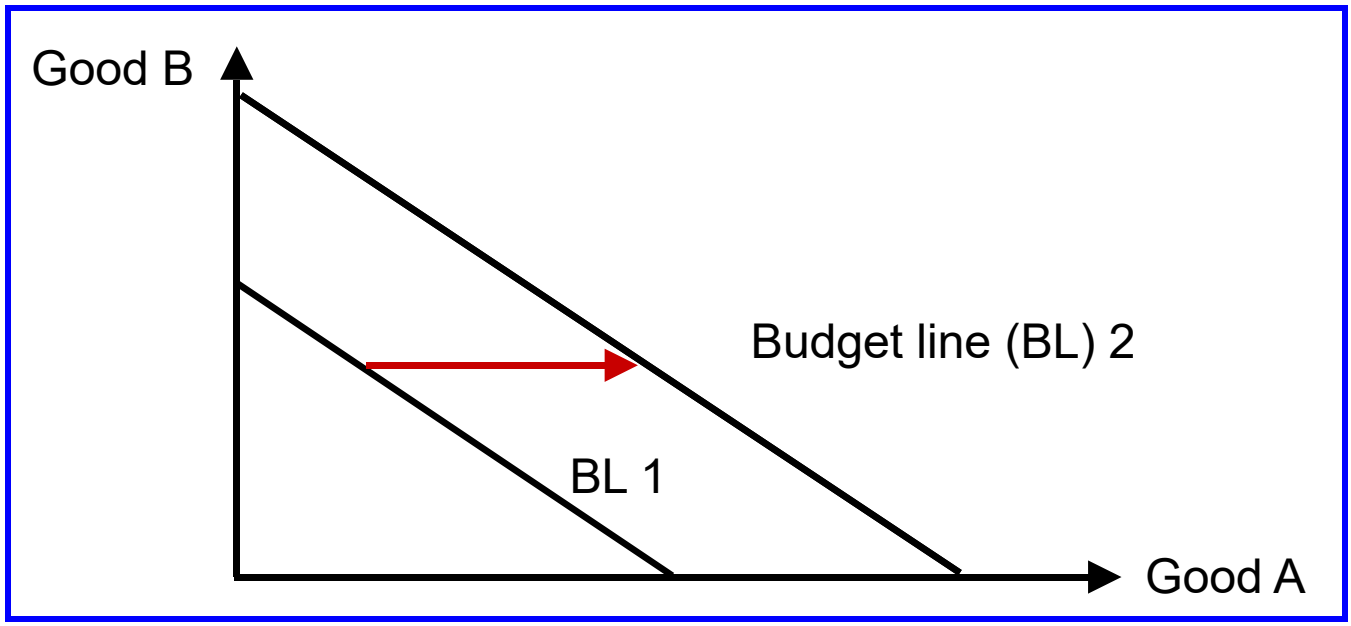
Budget line

A consumer with an income of M can choose between two goods, A and B, at the prices of P_A and P_B. The budget line shows the possible combinations with regard to the 2 divisible goods A and B.

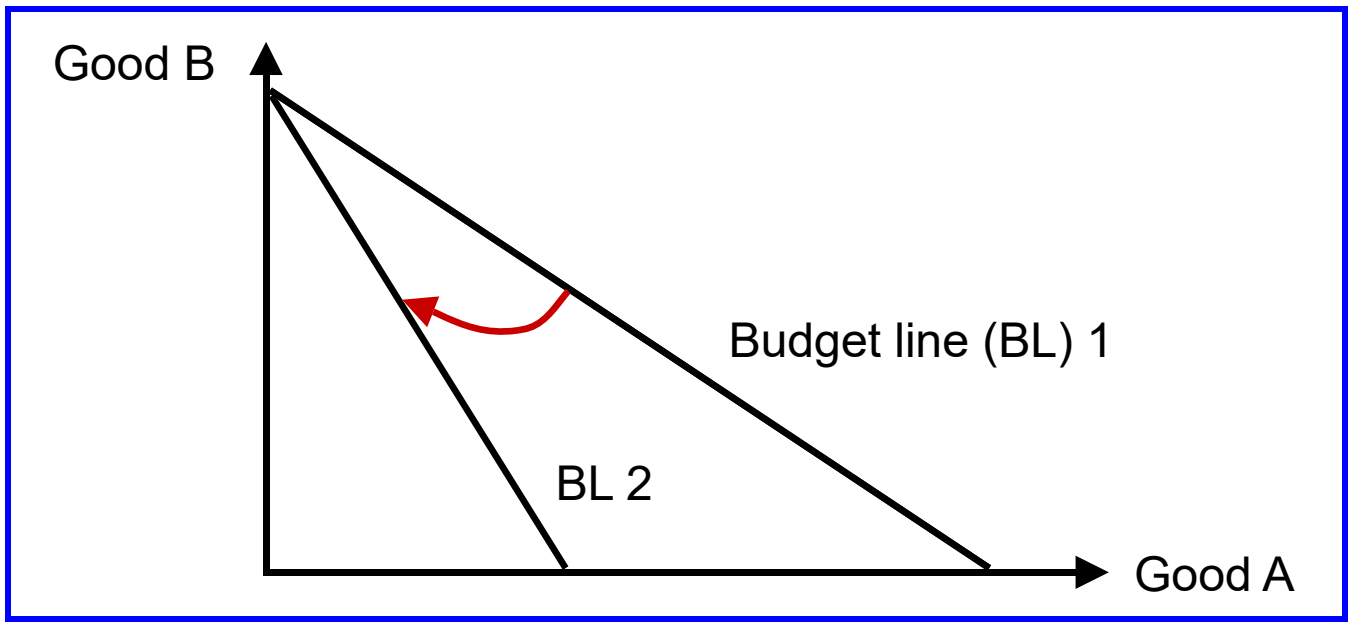


Budget line - changes

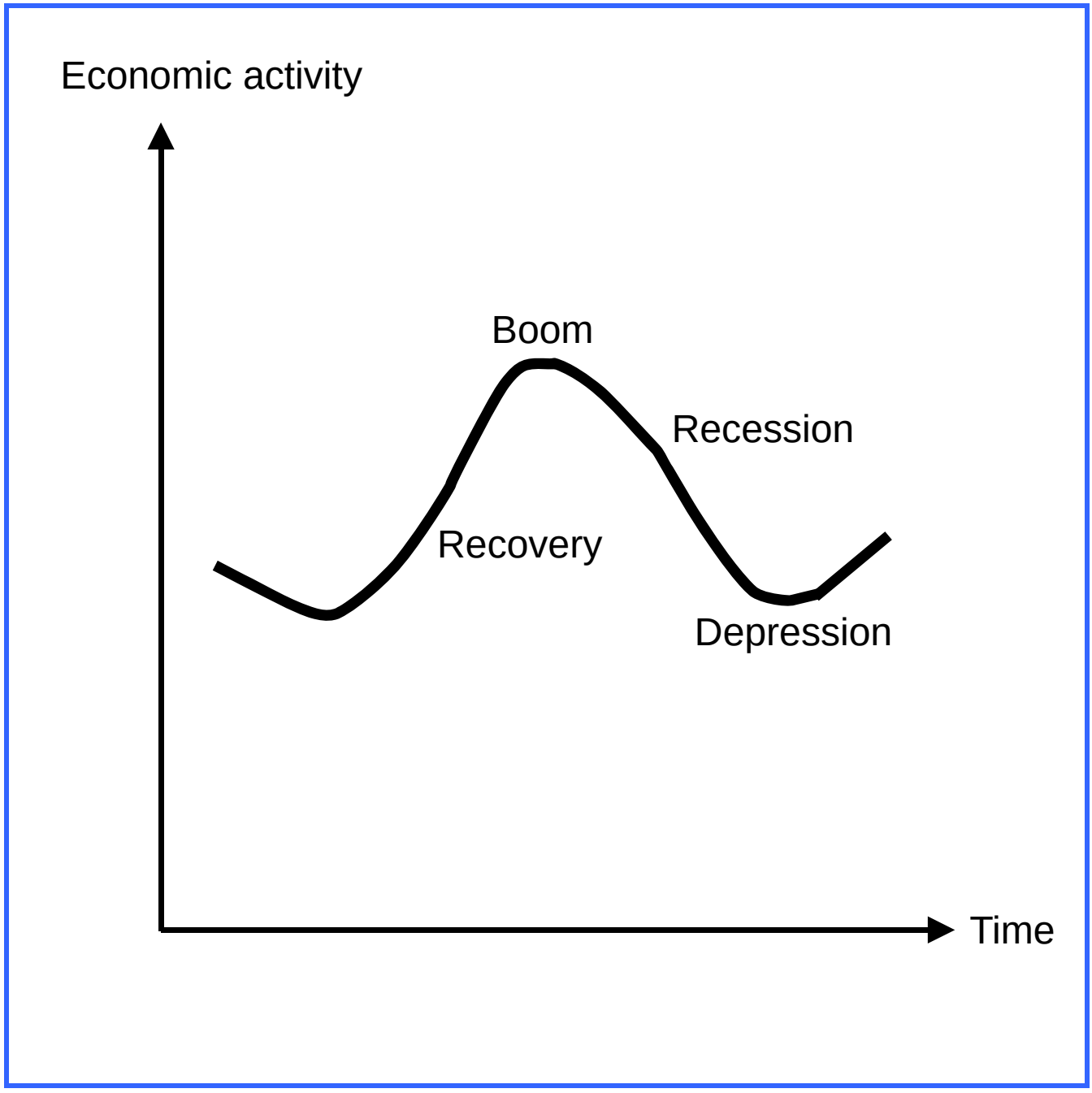
① Increasing or decreasing **income**
(here: increasing income)



② Rising or falling **price**
(here: rising price of good A, unchanged price of good B)



Business cycle



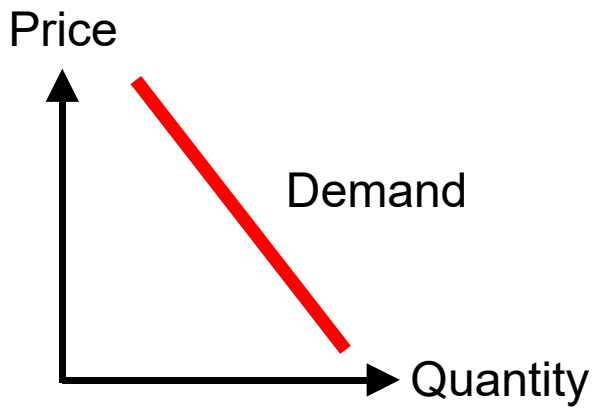
Ceteris paribus

1 Description

Ceteris paribus means that 'other things remain the same' or 'all else is constant'. This assumption allows the representation of the relationship between two variables in a XY-diagram, for example, the relationship between price and quantity. Please note that in this example the quantity is not only dependent on the price, but on many other variables ('all else'). According to the ceteris paribus-clause, these are considered constant.

2 Examples

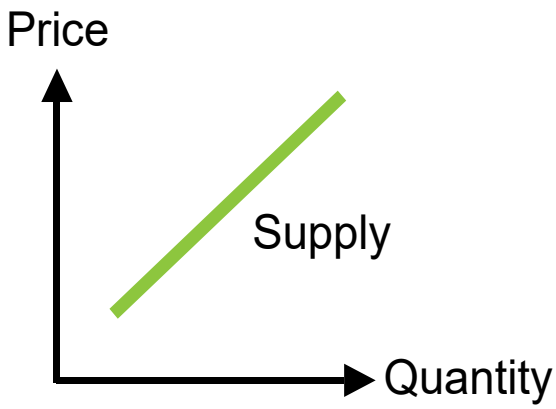
2.1 Demand



Constant variables:

- Income
- Prices of other goods
- Preferences
- Number of buyers

2.2 Supply

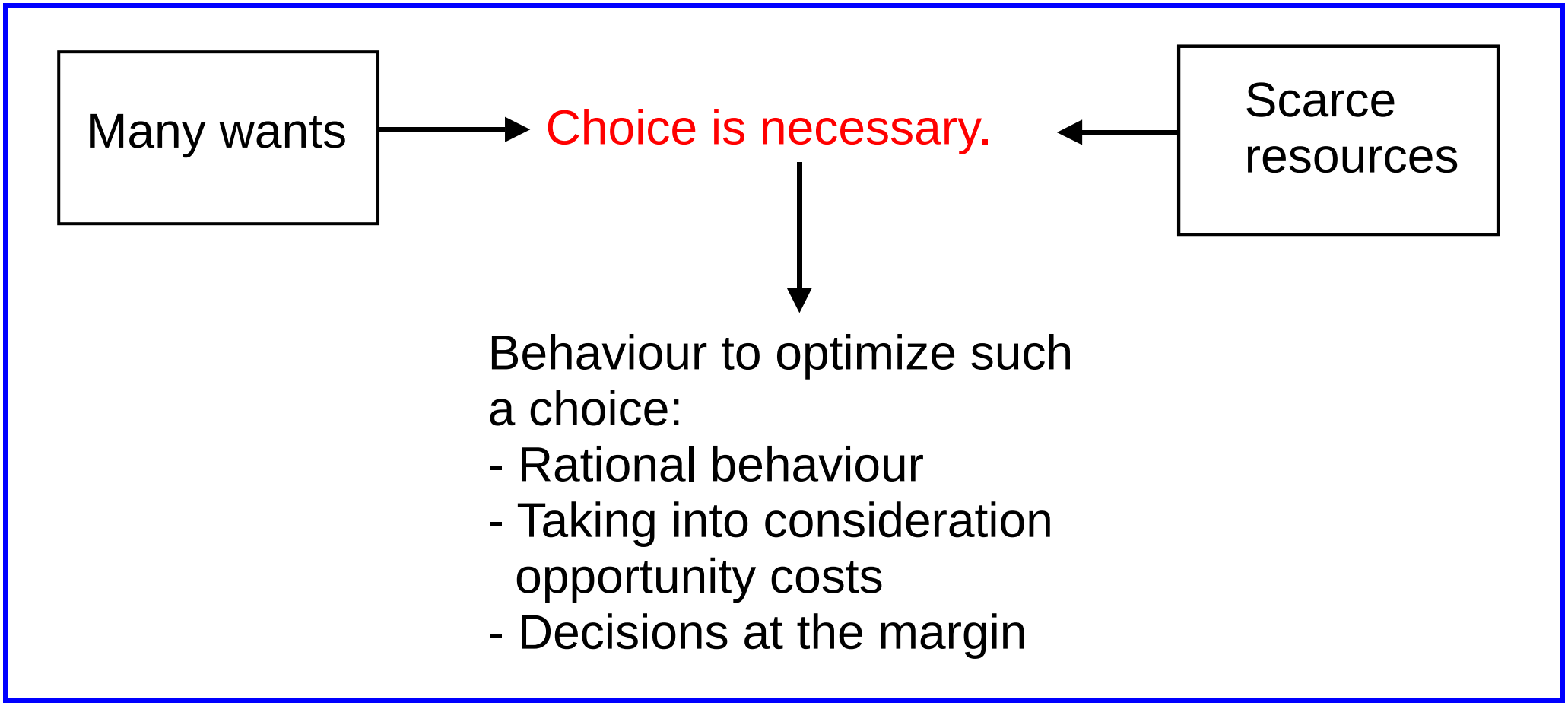


Constant variables:

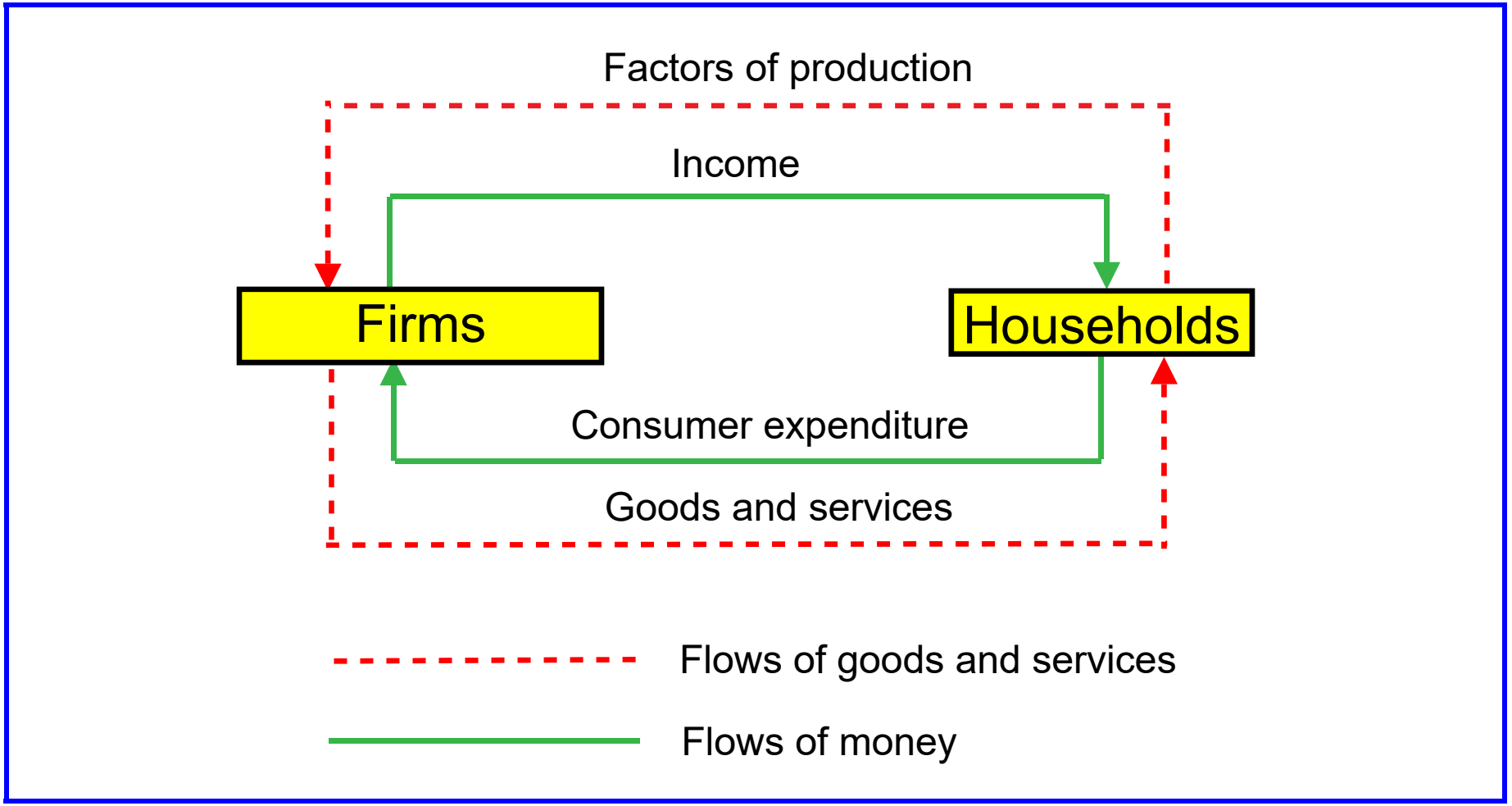
- Input prices
- Productivity
- State intervention
- Number of sellers

If these variables are no longer constant, the shown curves shift to the right or to the left.

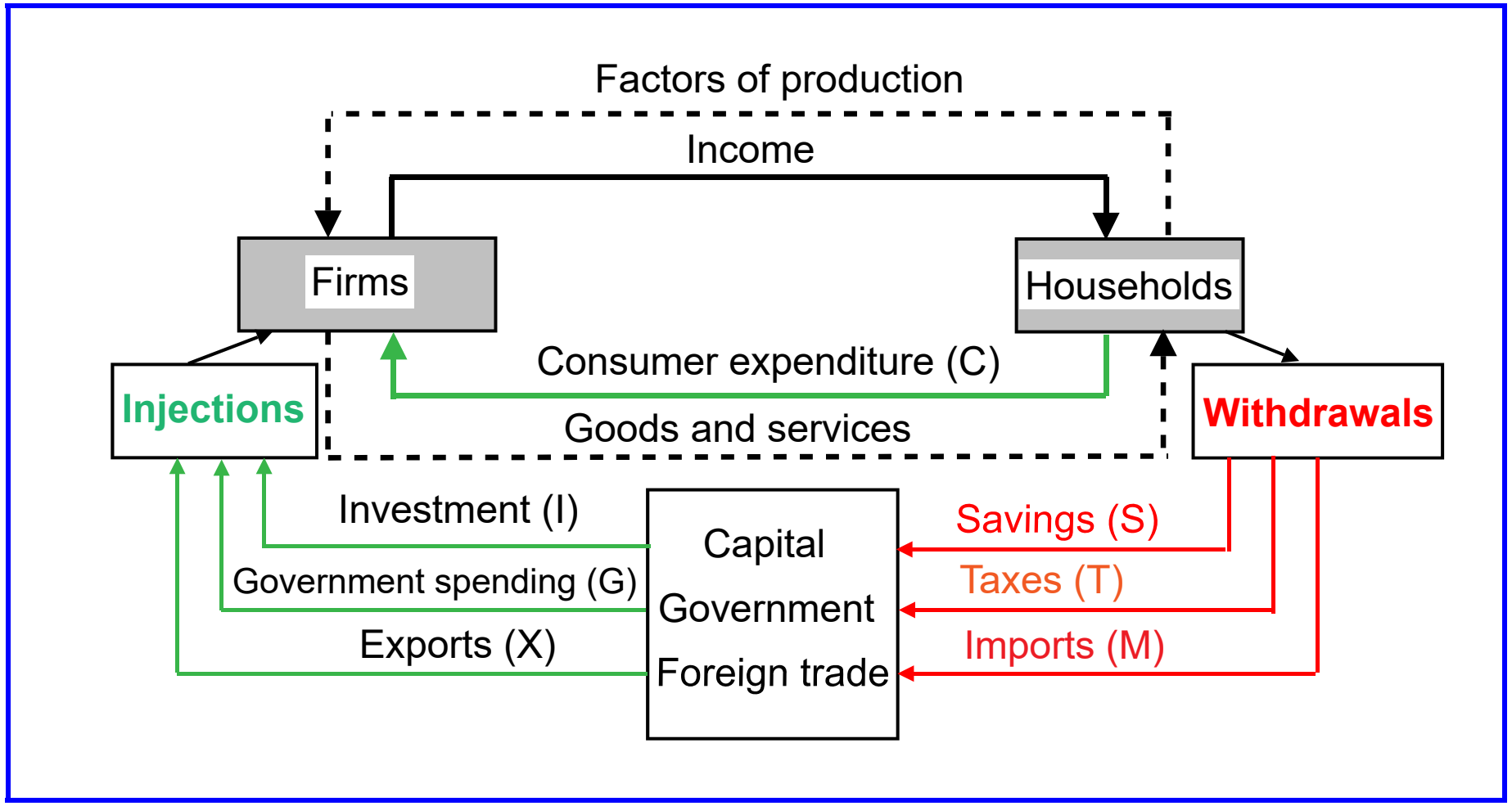
Choice


Many wants
Choice is necessary.
Scarce resources
Behaviour to optimize such a choice:
- Rational behaviour
- Taking into consideration opportunity costs
- Decisions at the margin

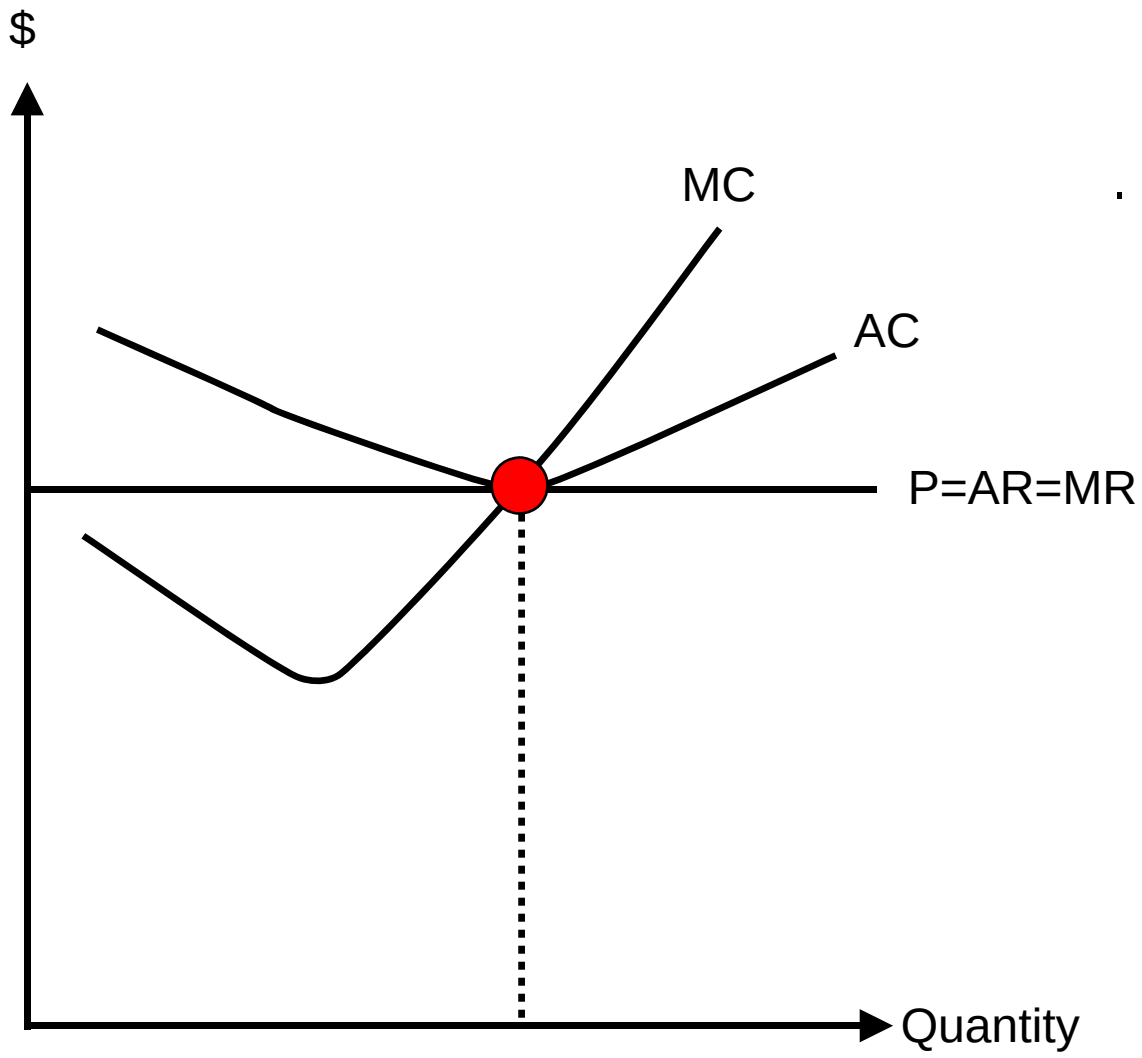
Circular flow 1 - with two sectors



Circular flow 2 - with injections and withdrawals



Competitive firm - long run

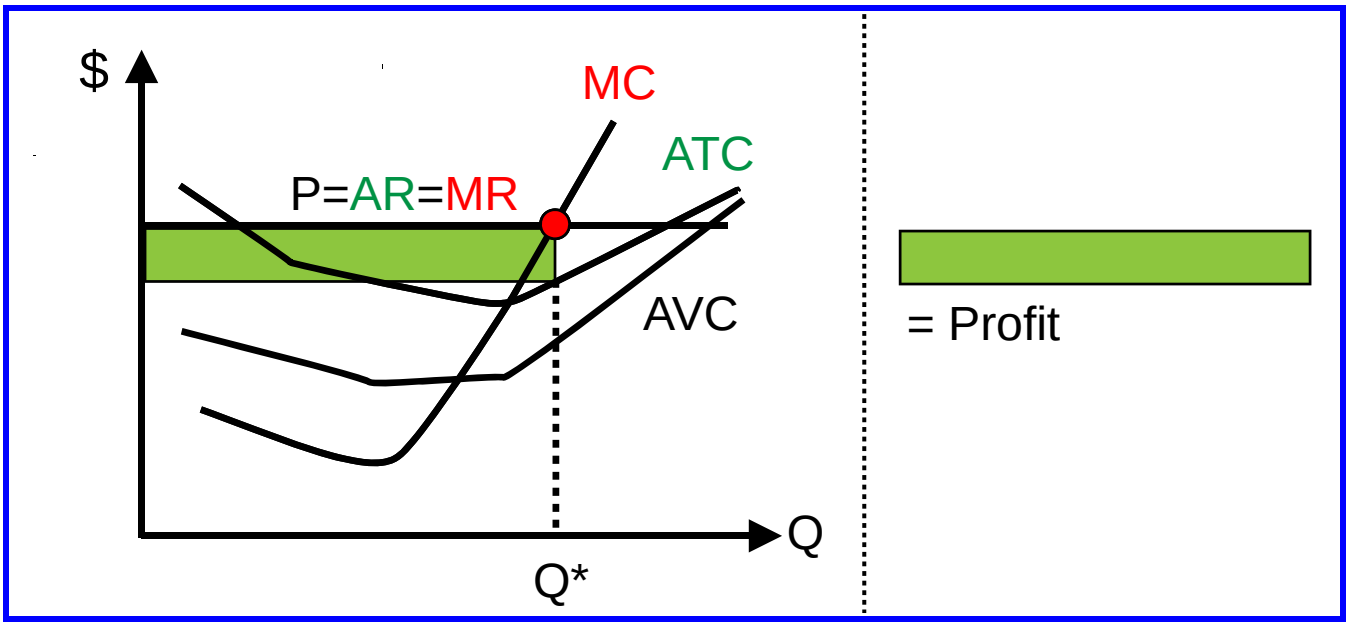


>>> Profit = 0 (because AR = AC)

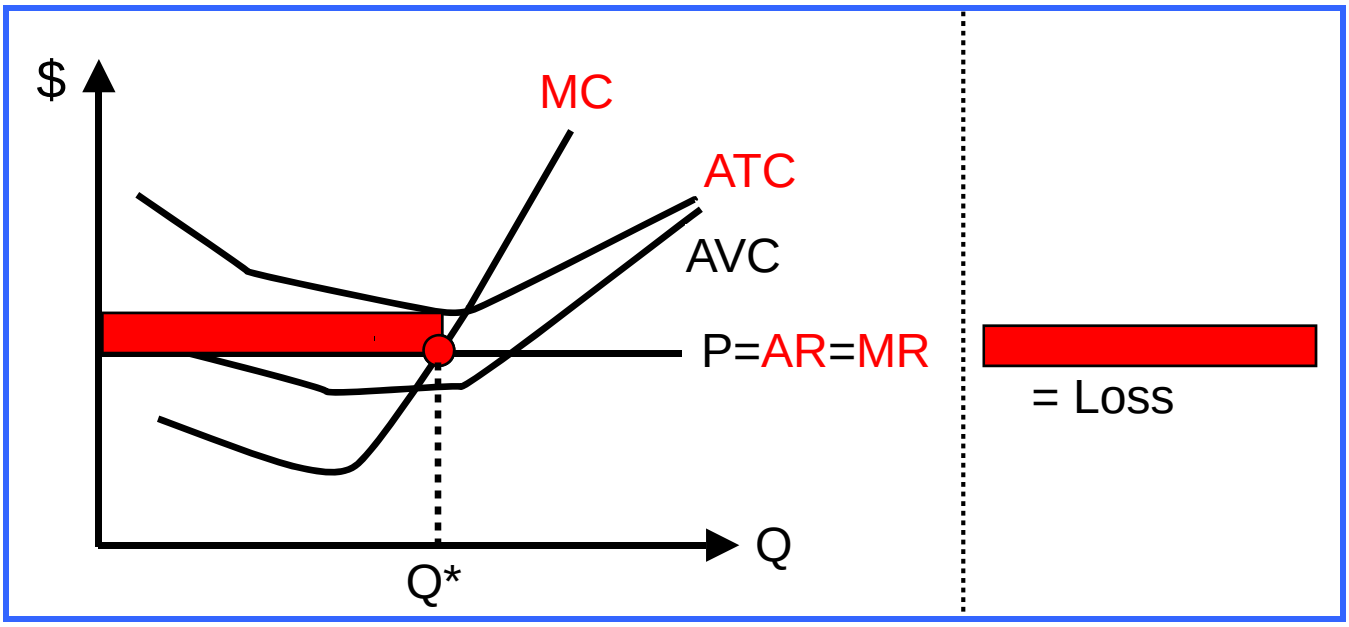
P = Price	
AC = Average cost	AR = Average revenue
MC = Marginal cost	MR = Marginal revenue

Competitive firm - short run

① Situation of a **profit**



② Situation of a **loss**

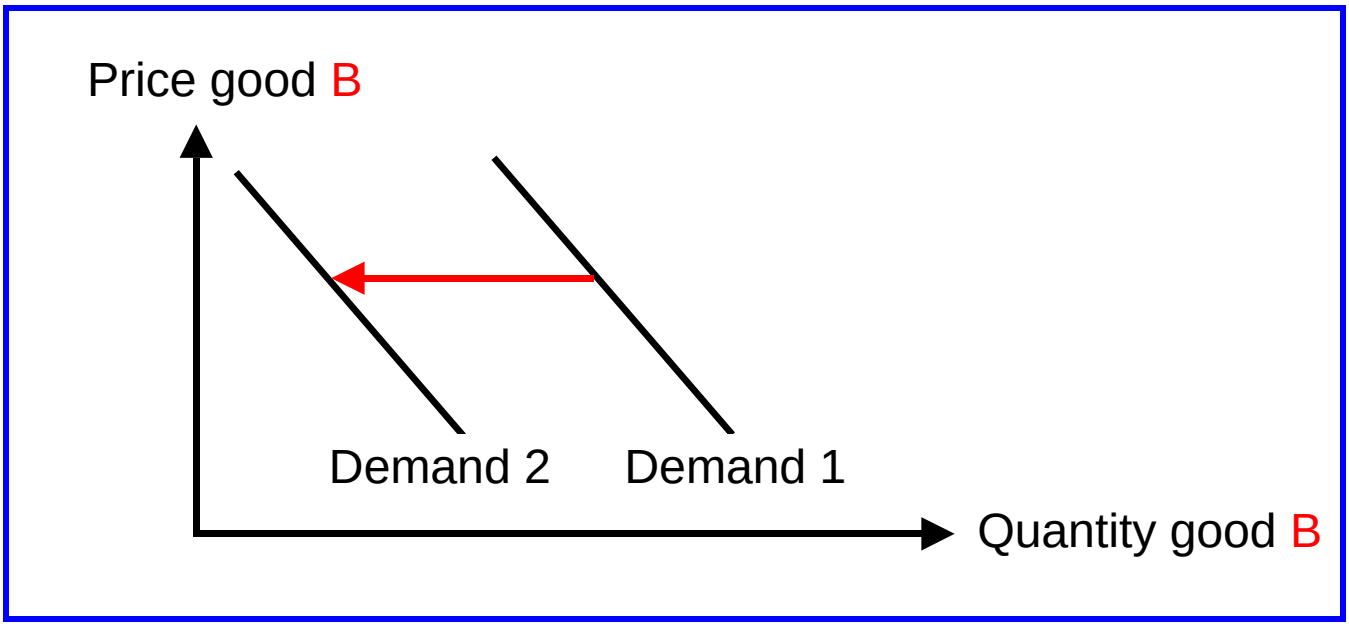


P = Price	Q = Quantity
ATC = Average total cost	AR = Average revenue
AVC = Average variable cost	MR = Marginal revenue
MC = Marginal cost	

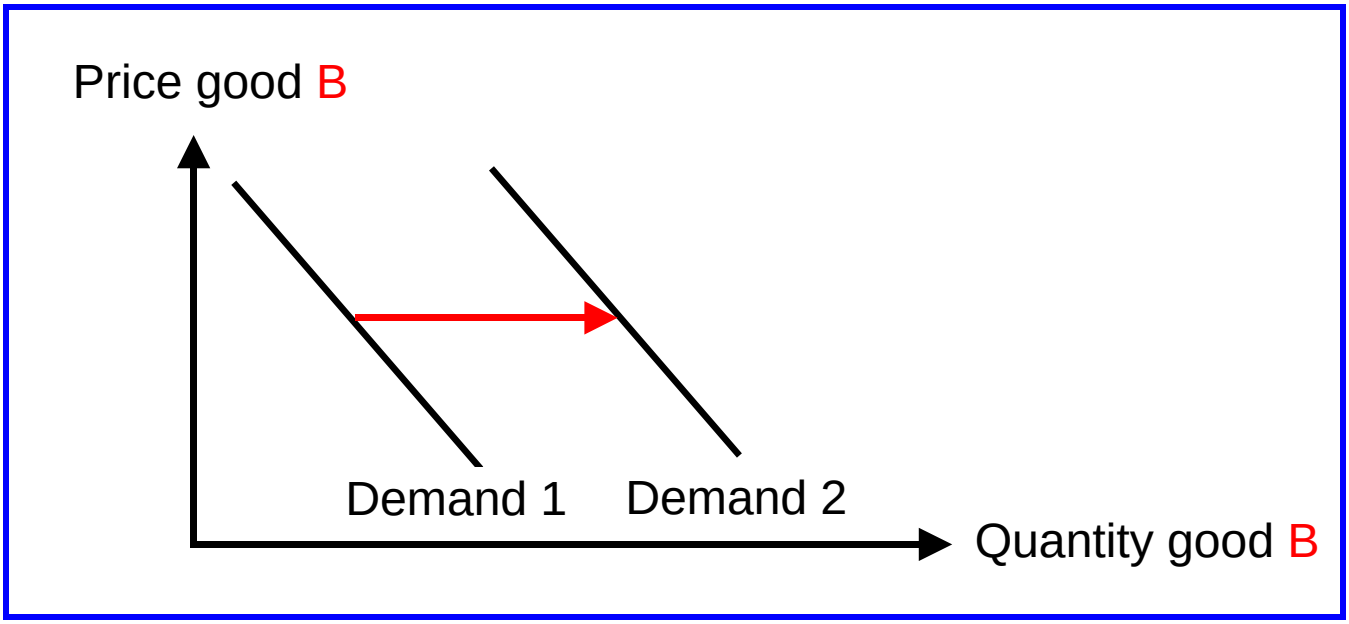
Complements

The goods A and B are complements.

① **The price of good A rises.**



② **The price of good A falls.**

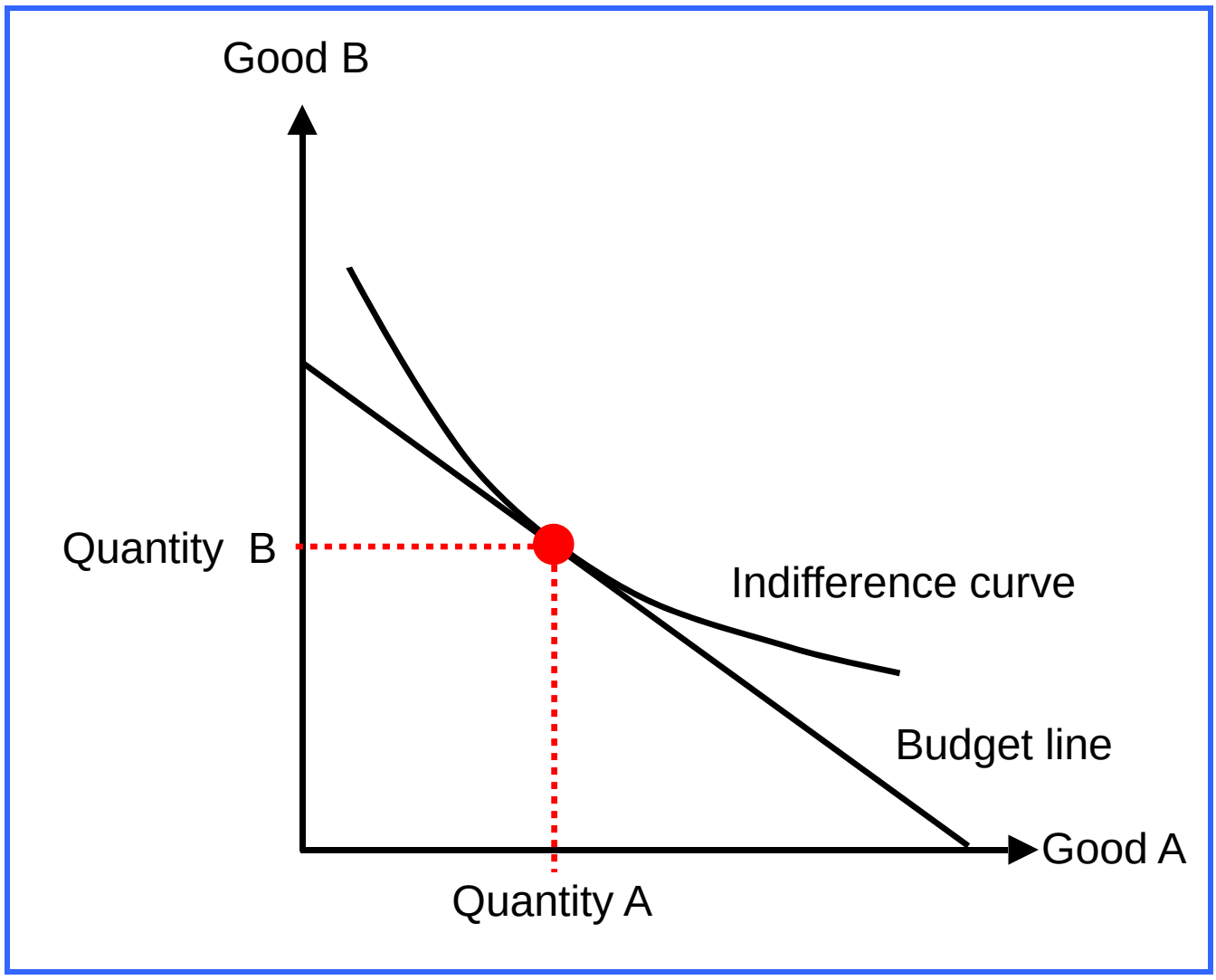


Consumer choice

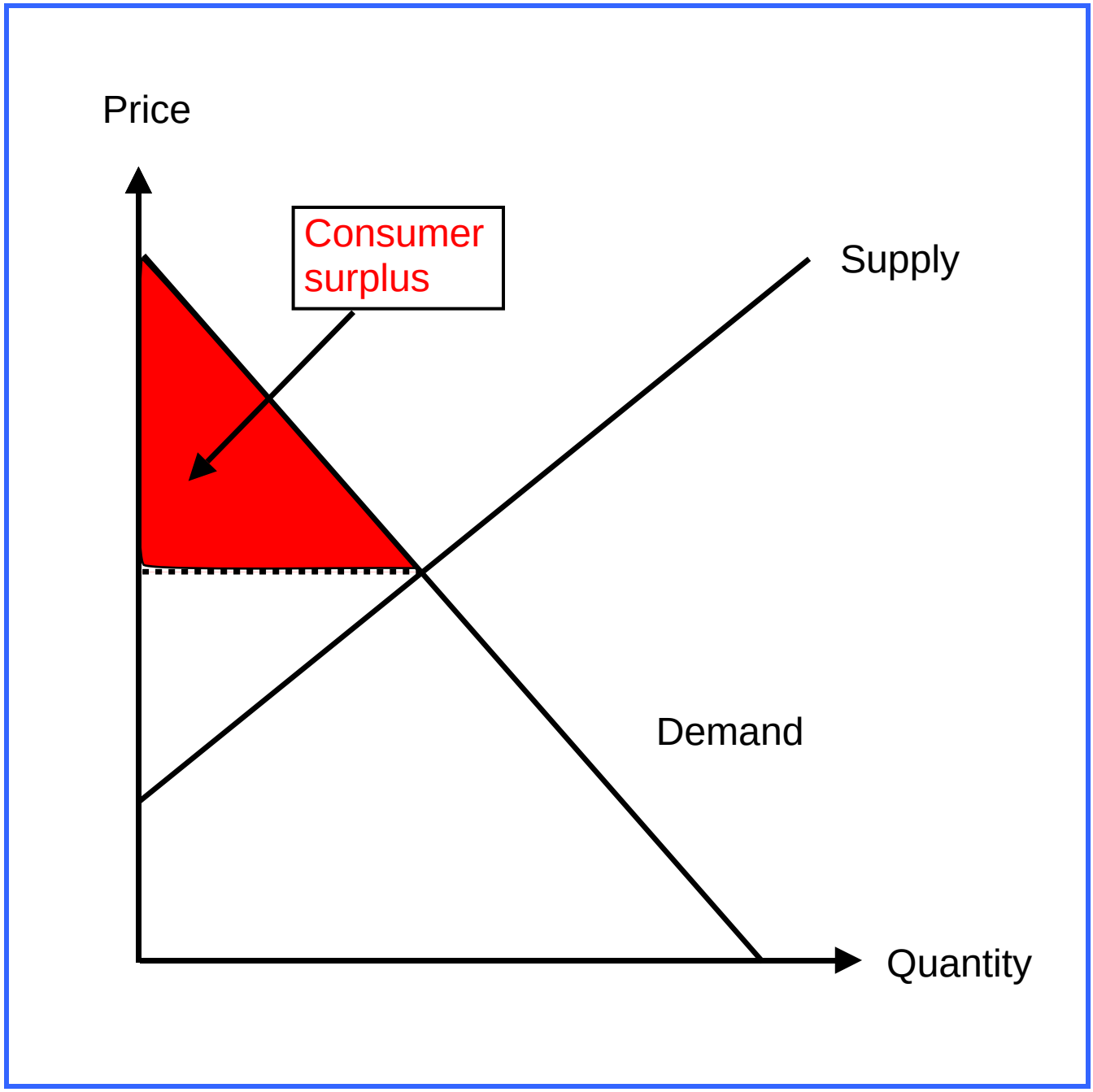
The consumer chooses the highest possible indifference curve. This is the case where the budget line touches this indifference curve.

Information about

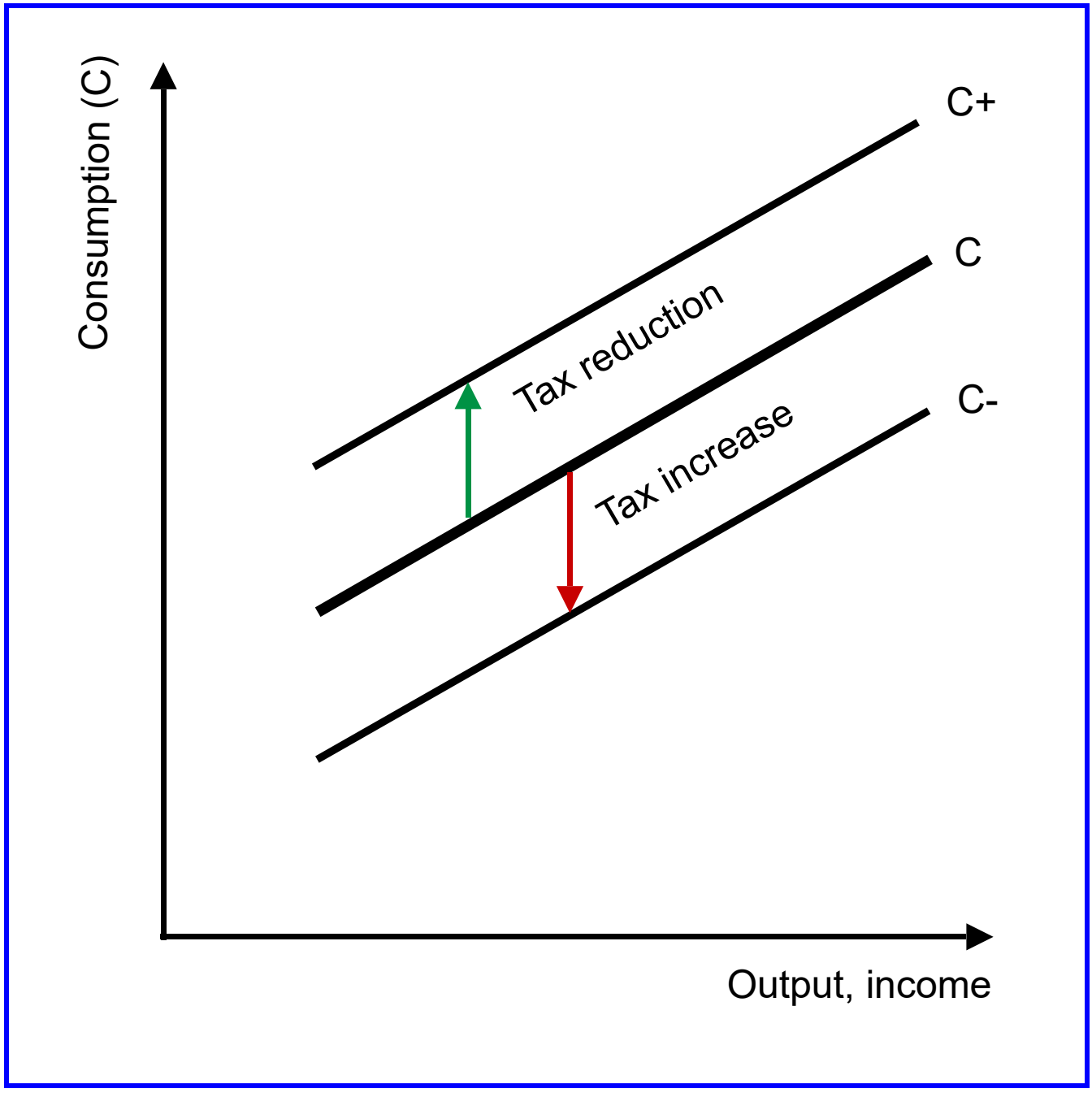
- the budget line. Click here!
- the indifference curve. Click here!



Consumer surplus



Consumption and taxes



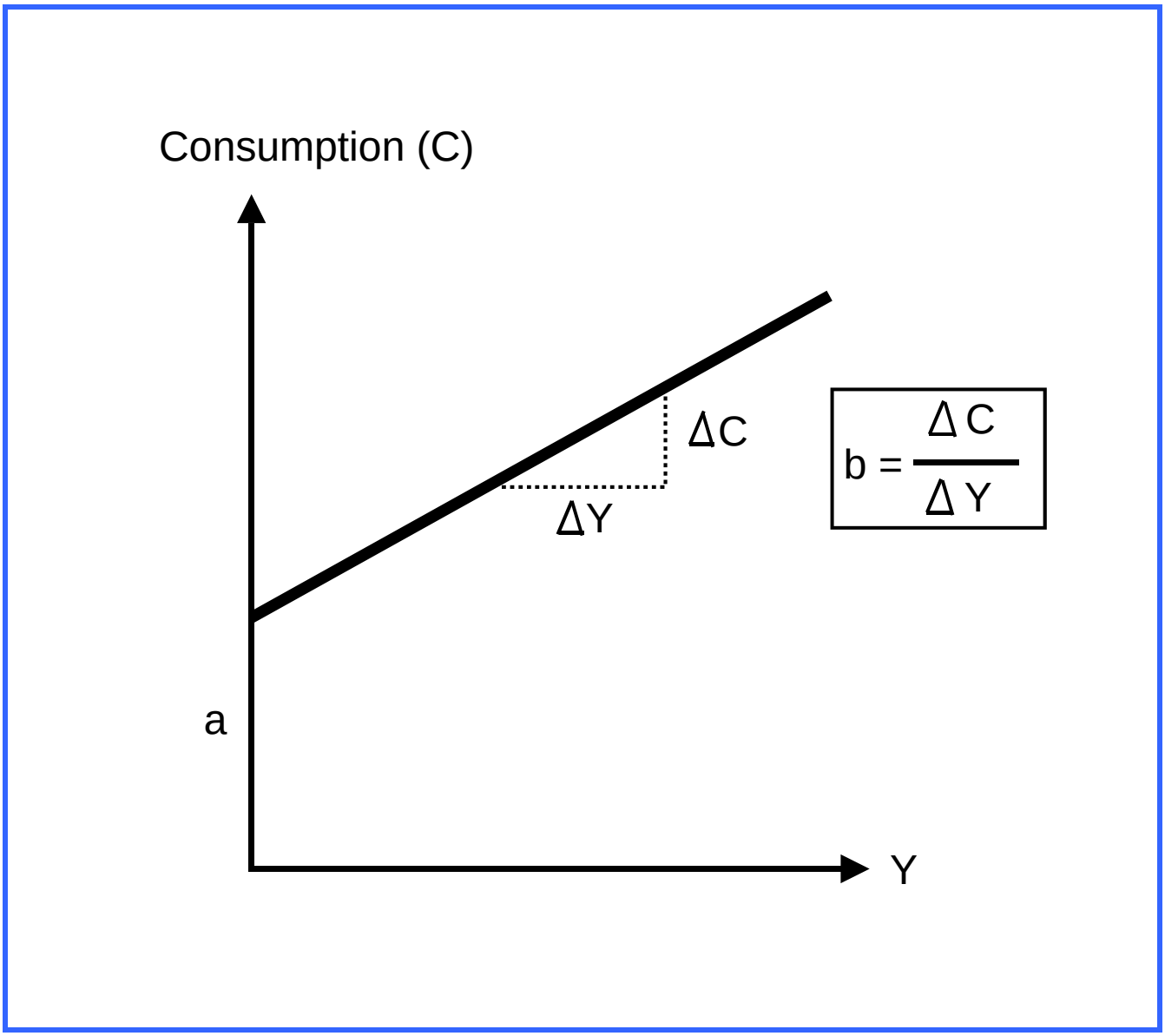
The disposable income is influenced by the tax (e.g. income tax).

C+ : Disposable income is increased by tax.
C- : Disposable income is reduced by tax.

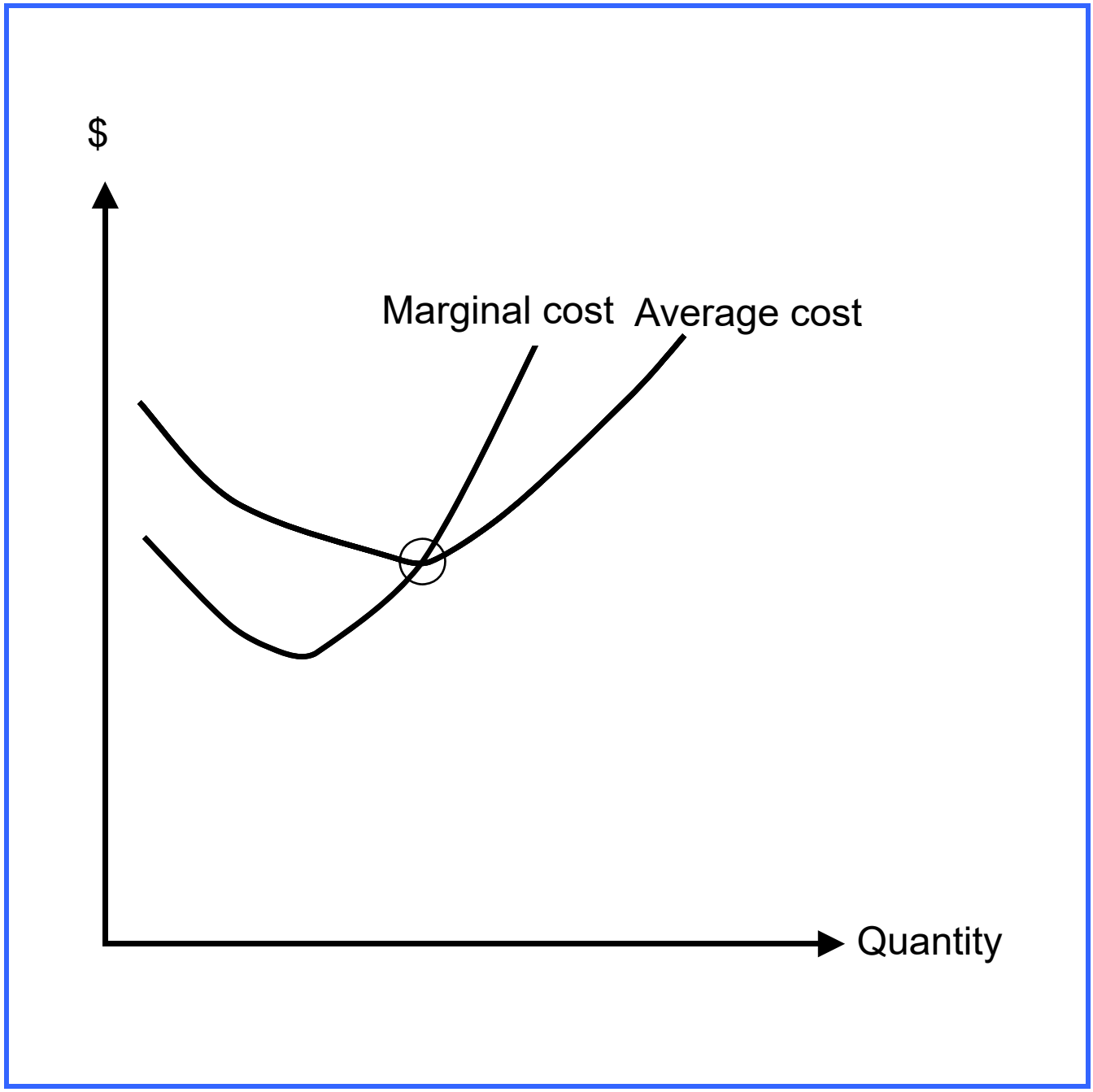
Consumption function

Consumption function: $C = a + bY$

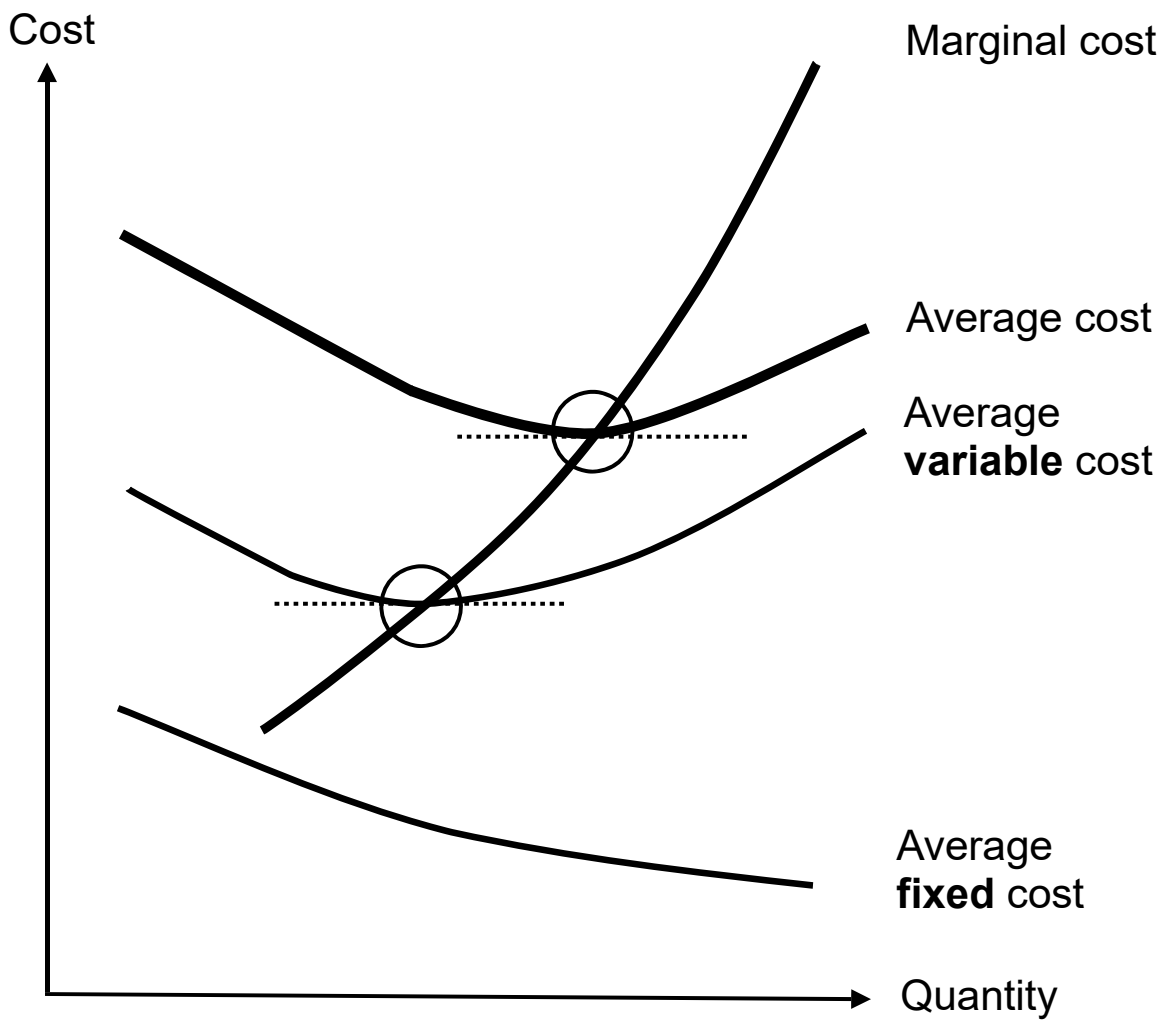
a = Autonomous consumption (C if Y = 0)
b = Marginal propensity to consume
Y = Output, income



Cost - average and marginal 1



Cost - average and marginal 2



Average cost = $\frac{\text{Total cost}}{\text{Quantity}}$

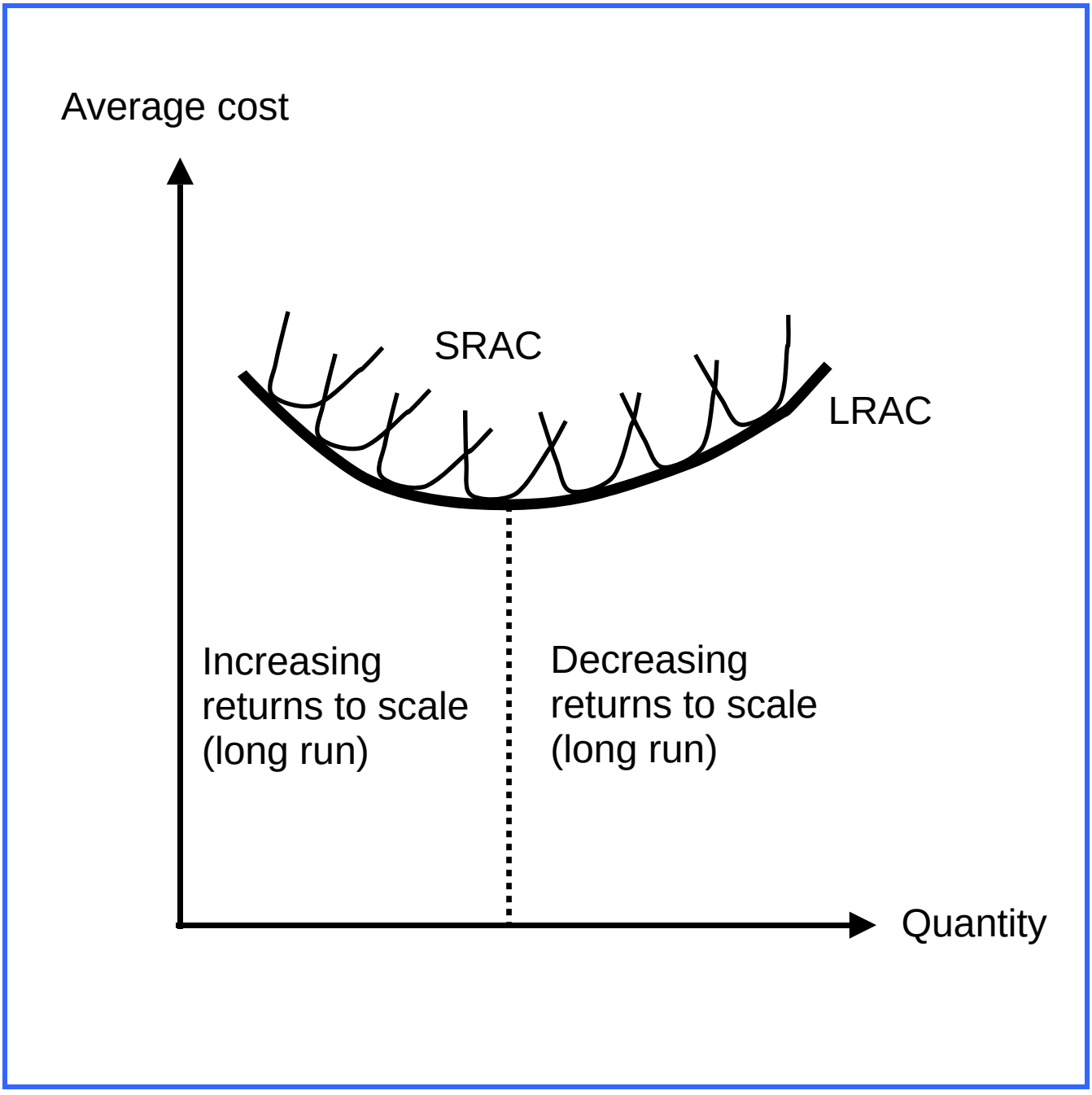
Average fixed cost = $\frac{\text{Total fixed cost}}{\text{Quantity}}$

Average variable cost = $\frac{\text{Total variable cost}}{\text{Quantity}}$

Marginal cost = $\frac{\text{Change in total cost}}{\text{Change in quantity}}$

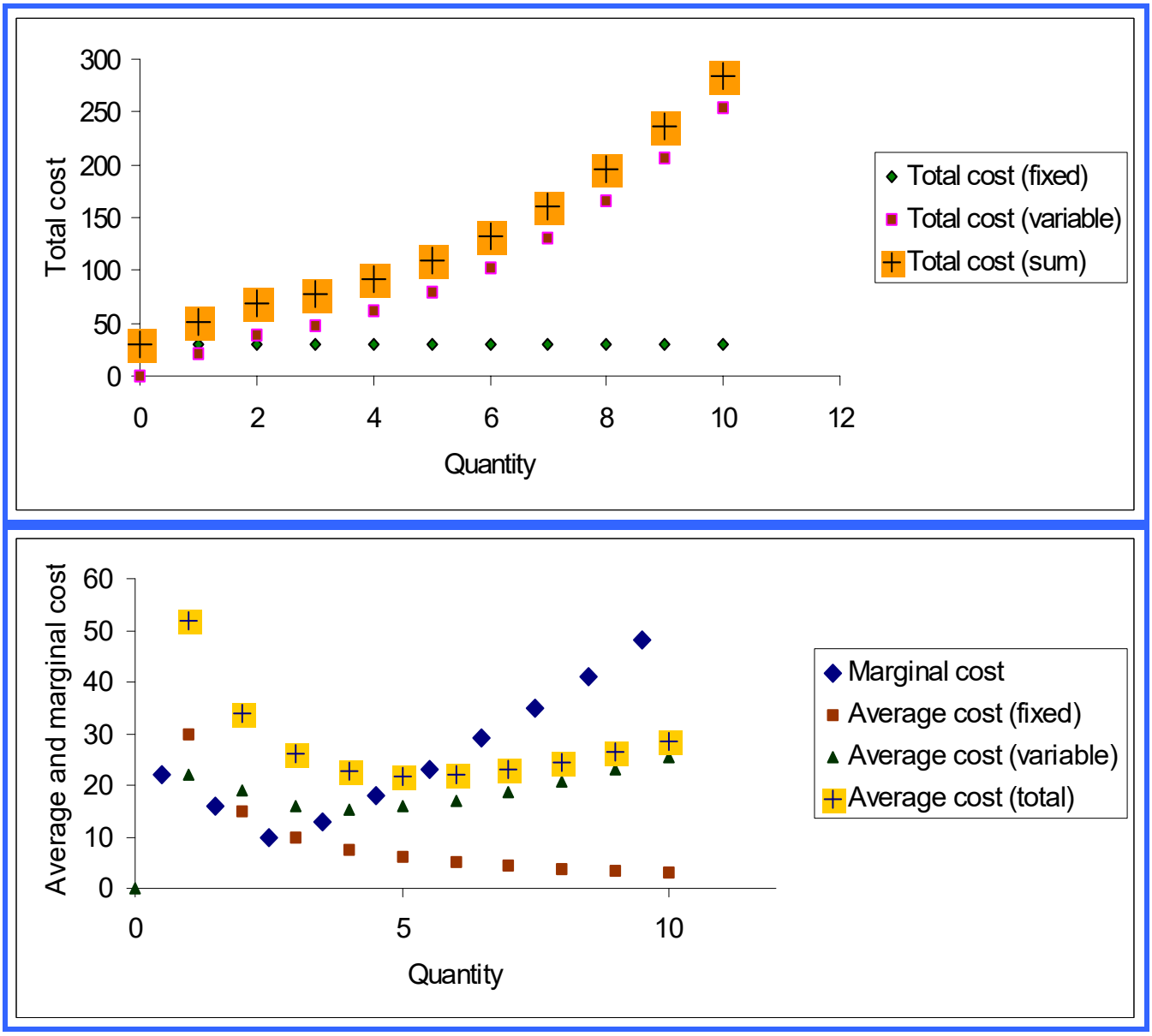
→ The marginal cost curve cuts the average variable cost curve and the average cost curve at their minimum.

Cost curves - short run and long run



SRAC = Short run average cost
LRAC = Long run average cost

Costs



Total cost (fixed)

They are independent of the quantity.

Total cost (variable)

They are dependent on the quantity.

Total cost

= Total cost (fixed) + total cost (variable)

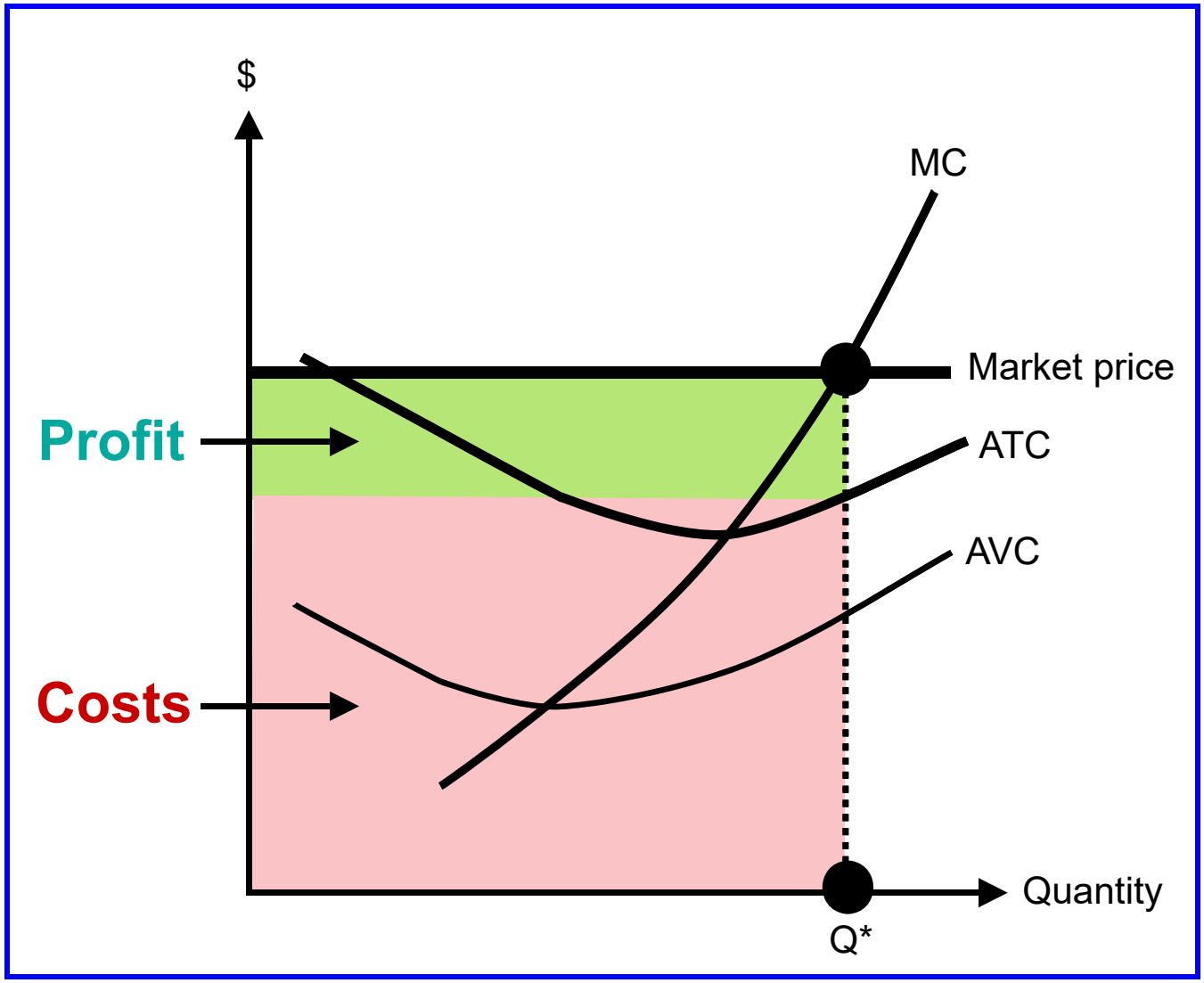
Average cost

$$= \frac{\text{Total cost}}{\text{Quantity}}$$

Marginal cost

$$= \frac{\text{Change in total cost}}{\text{Change in quantity}}$$

Costs and profit

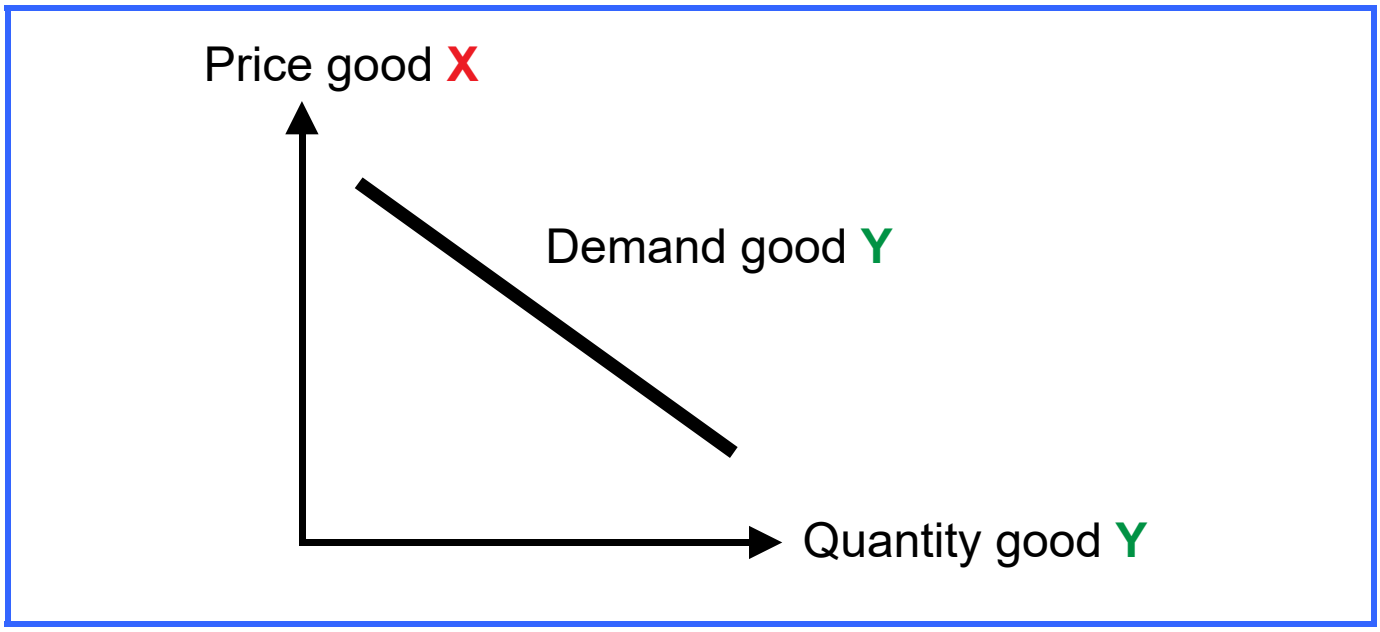


MC = Marginal cost
ATC = Average total cost
AVC = Average variable cost
Q* = quantity of the highest profit

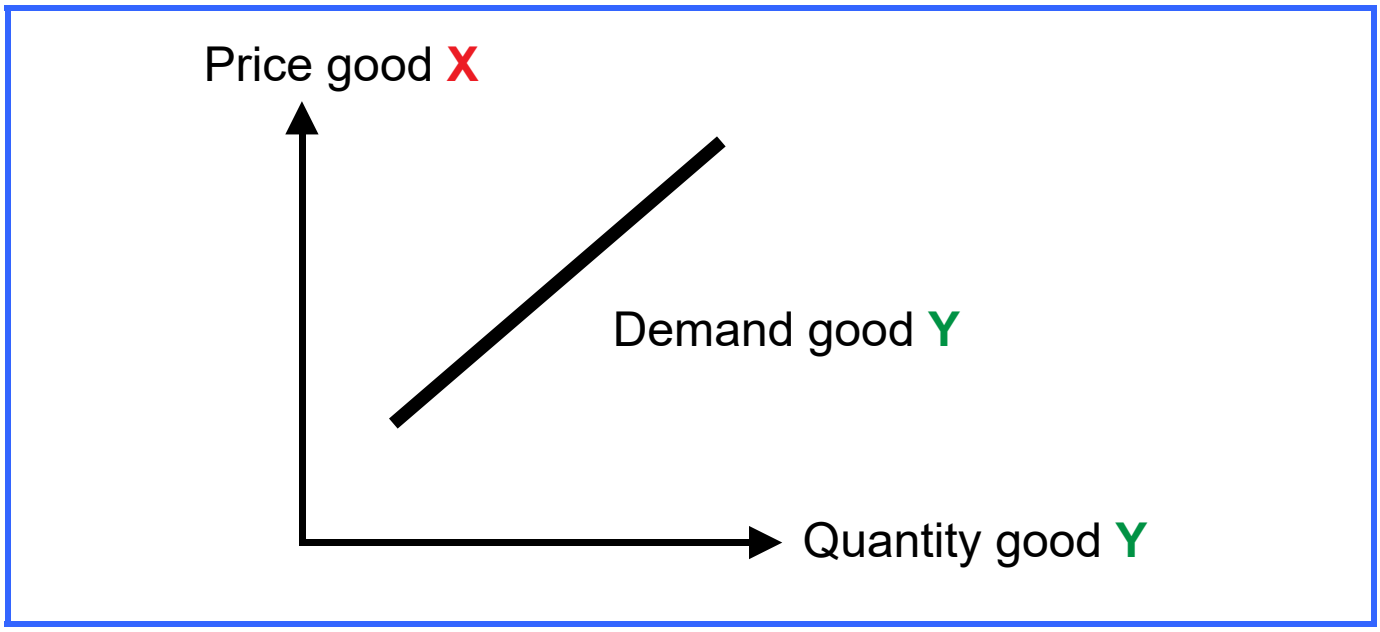
The profit is highest at the point where MC meets the market price.

Cross-price elasticity of demand

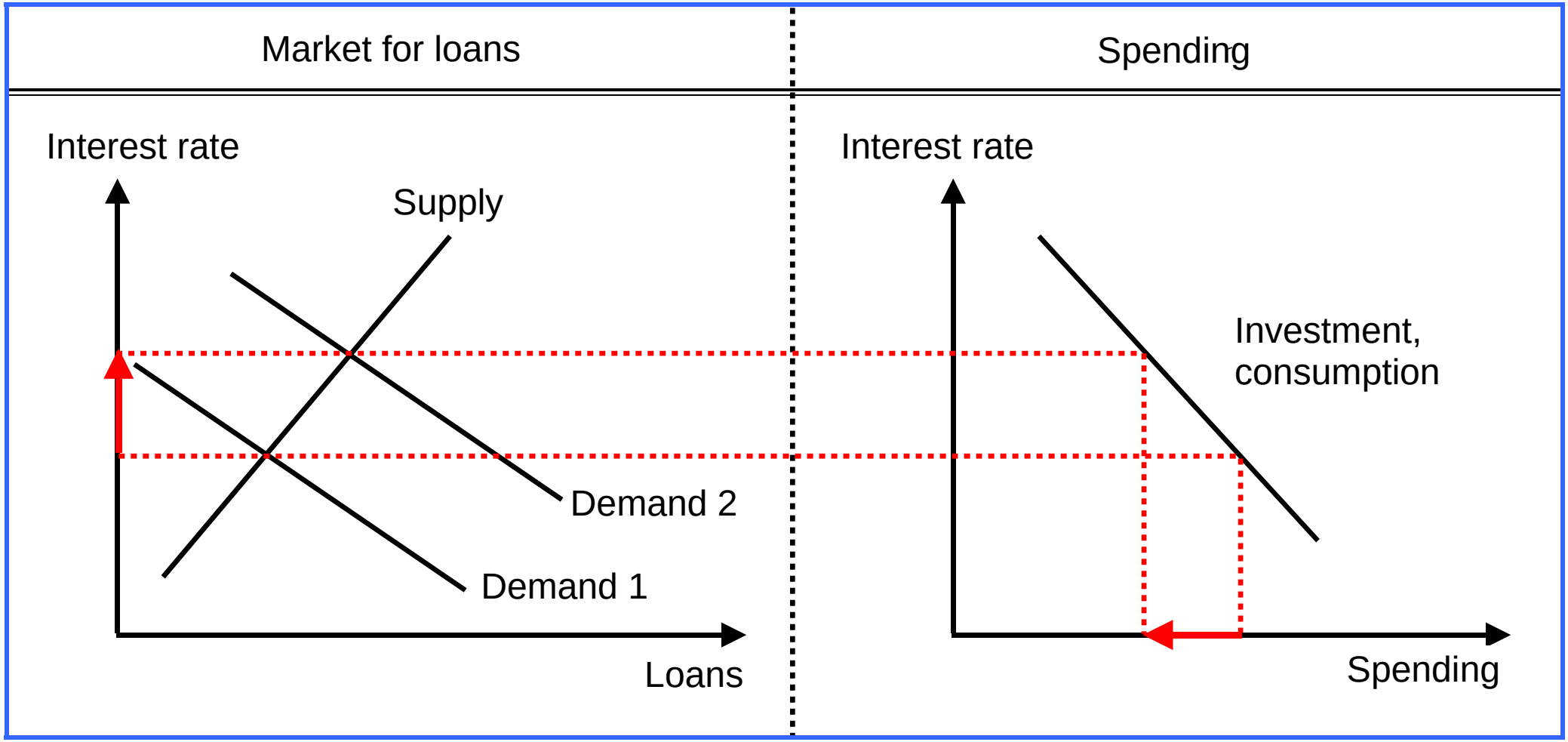
① Cross-price elasticity of demand **<** 0
→ Goods X and Y are **complements**.



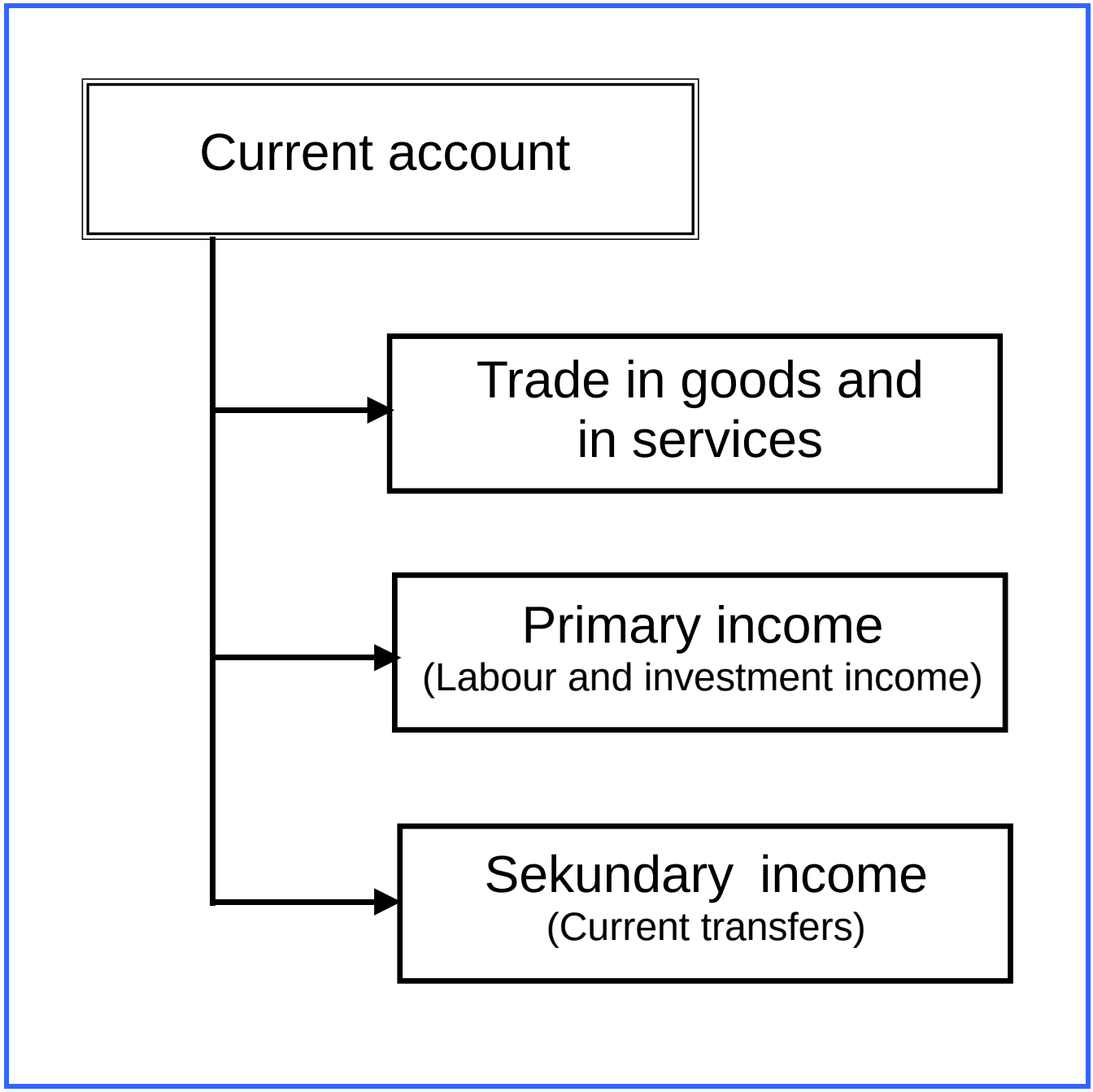
② Cross-price elasticity of demand > 0
→ Goods X and Y are **substitutes**.



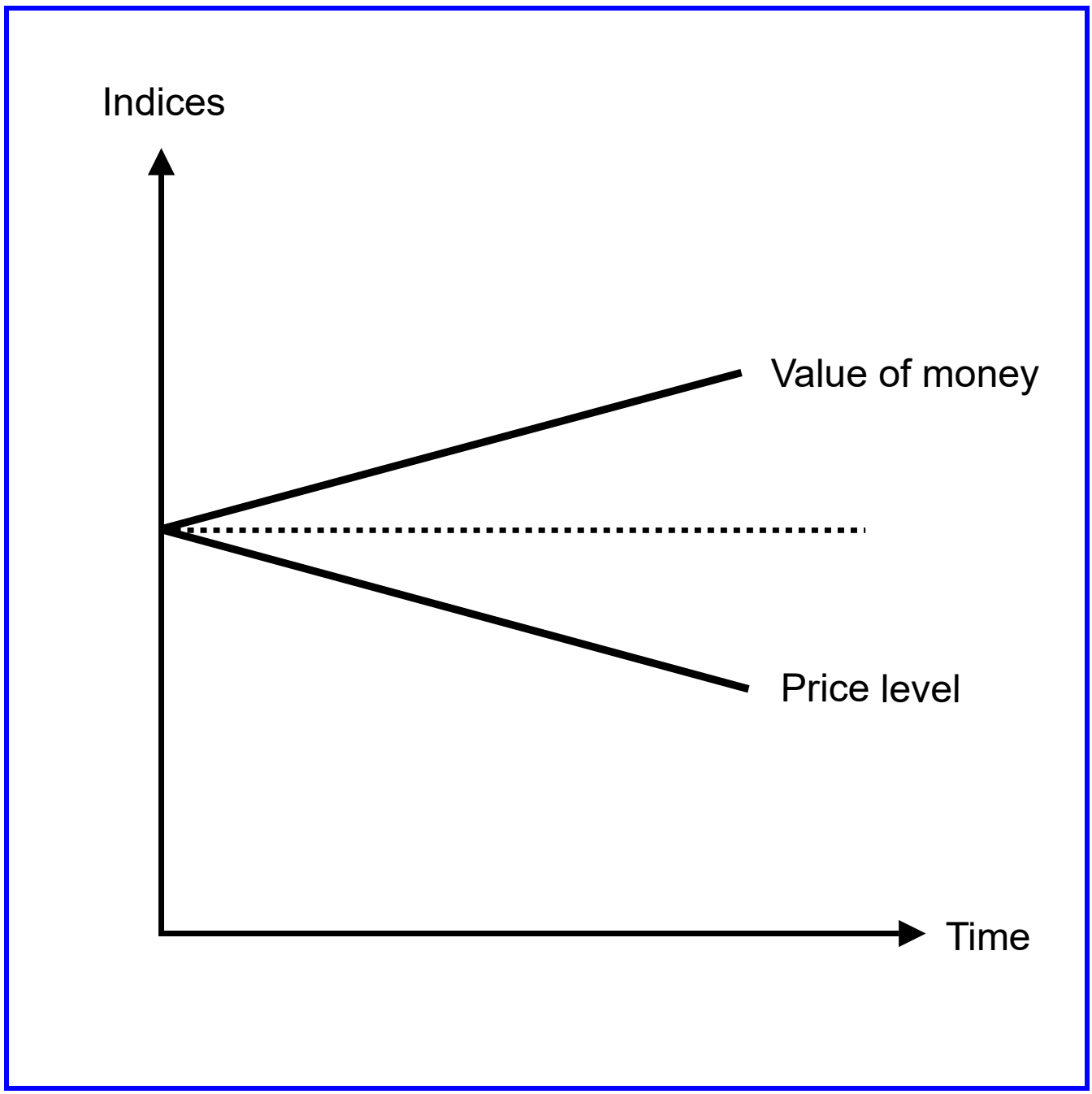
Crowding-out effect



Current account

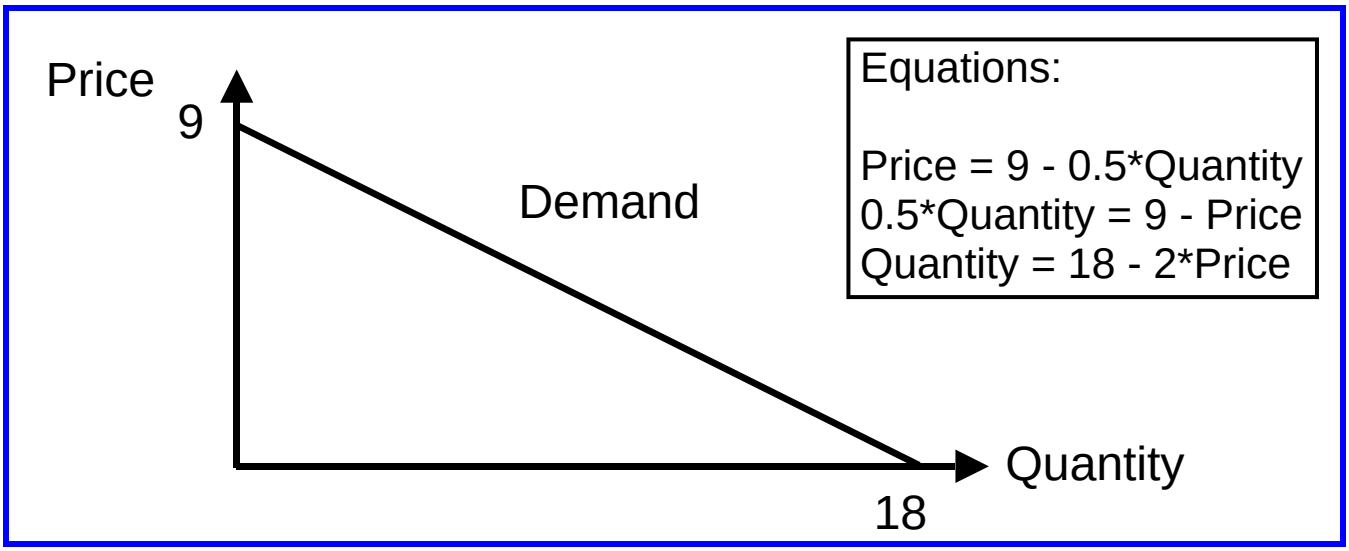


Deflation - characteristics

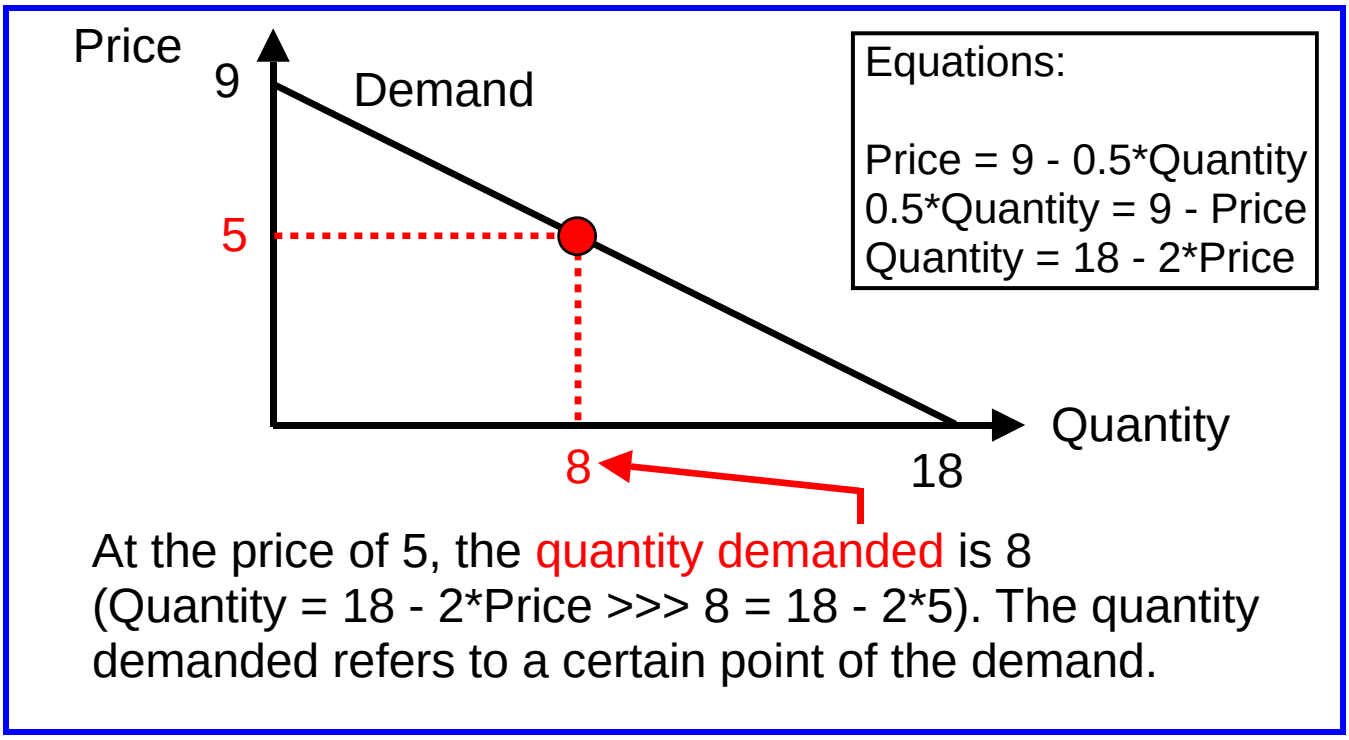


Demand and quantity demanded

① Demand



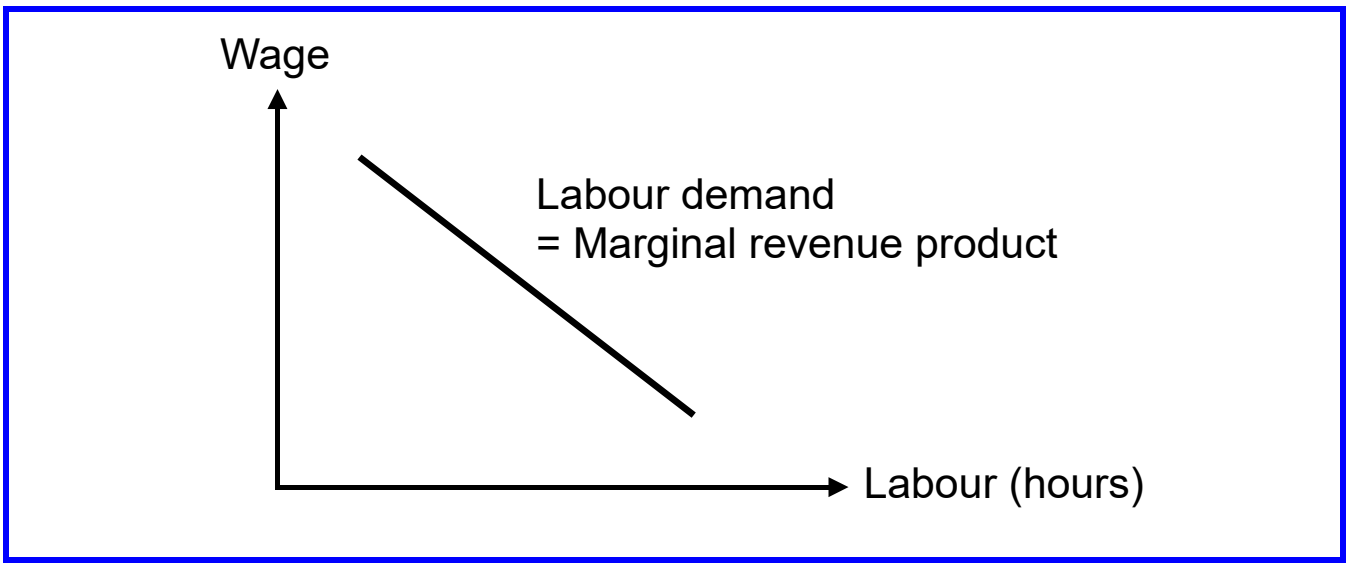
② Quantity demanded



At the price of 5, the quantity demanded is 8 (Quantity = 18 - 2*Price >>> 8 = 18 - 2*5). The quantity demanded refers to a certain point of the demand.

Demand for labour

① Course

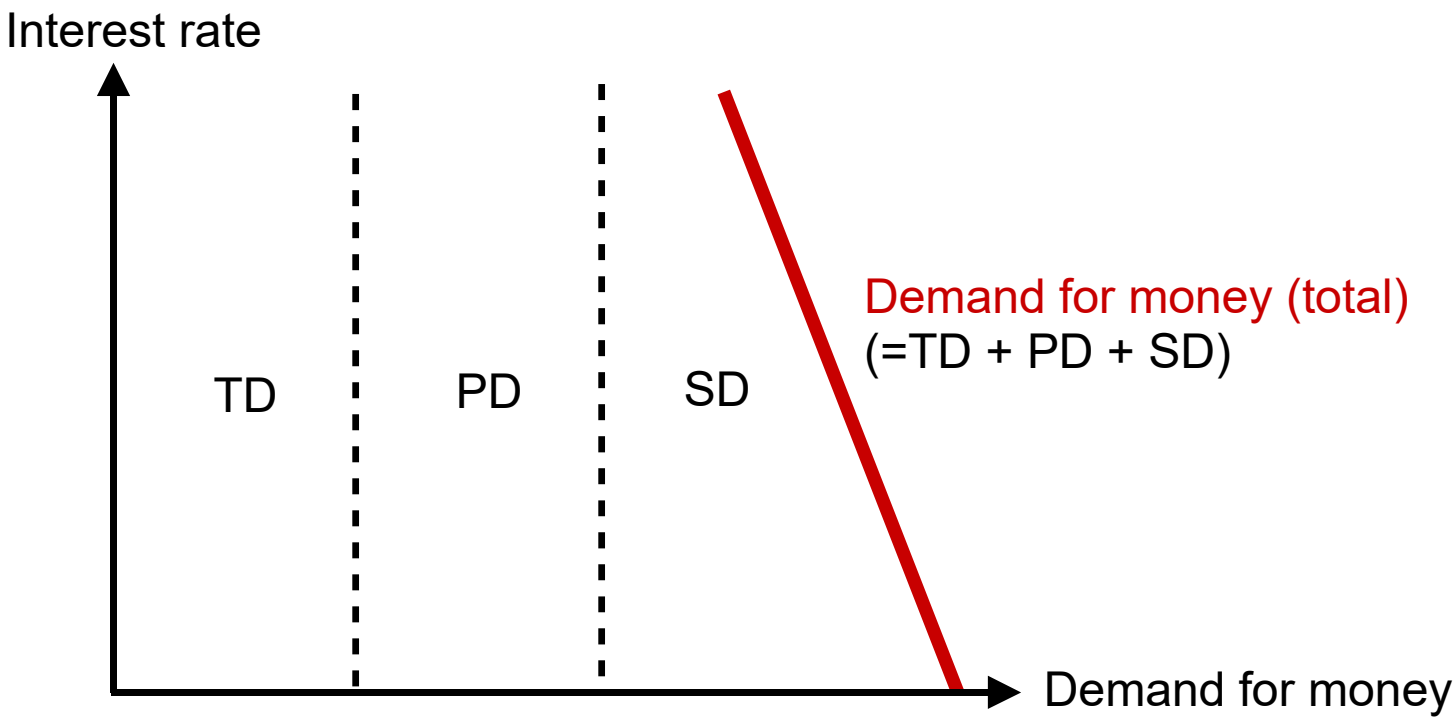


② The demand for labour is a **derived demand** because it depends on the demand on the goods market.

→ **Marginal revenue product = Marginal product * marginal revenue**

(in perfect competition on the goods market:
Marginal revenue = price)

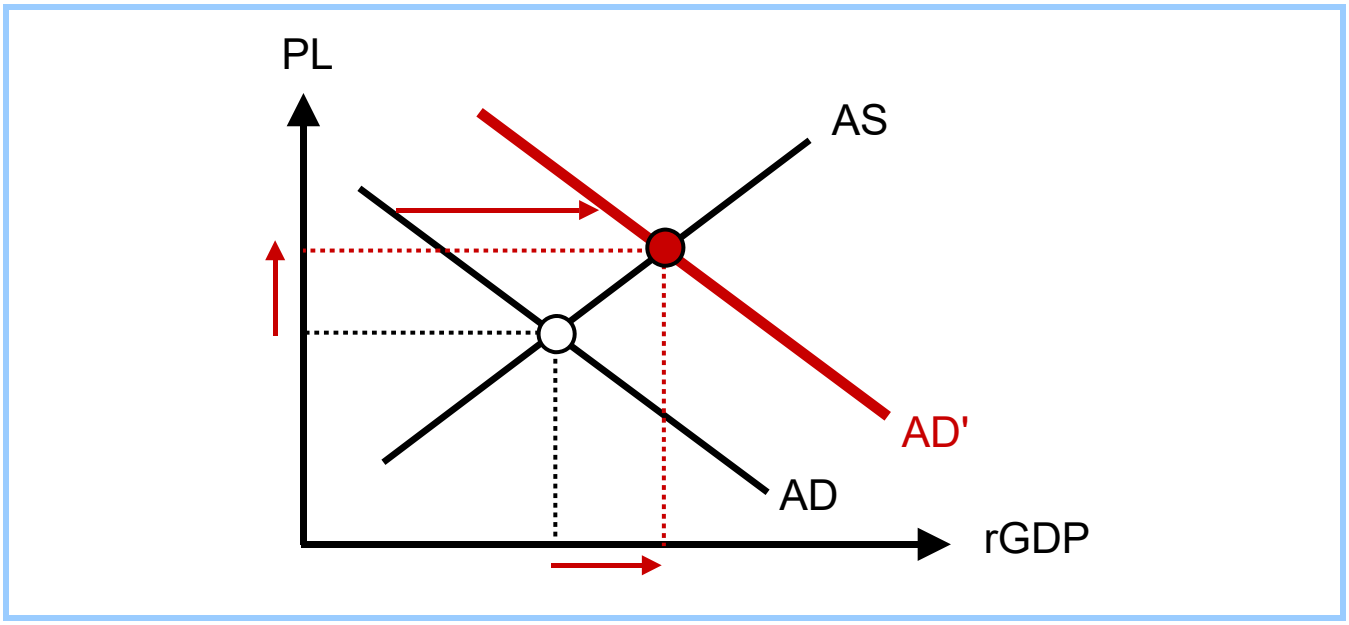
Demand for money (motives)



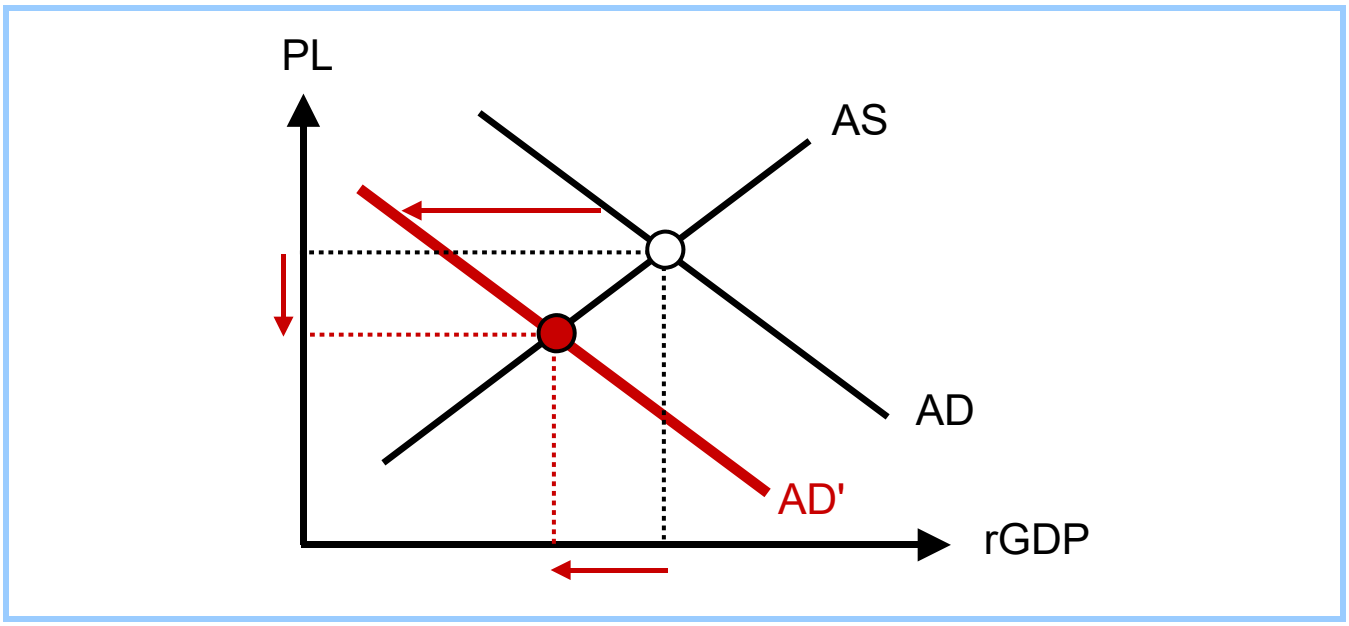
TD = Transactions demand
PD = Precautionary demand
SD = Speculative demand

Demand shocks

① *Positive* demand shock

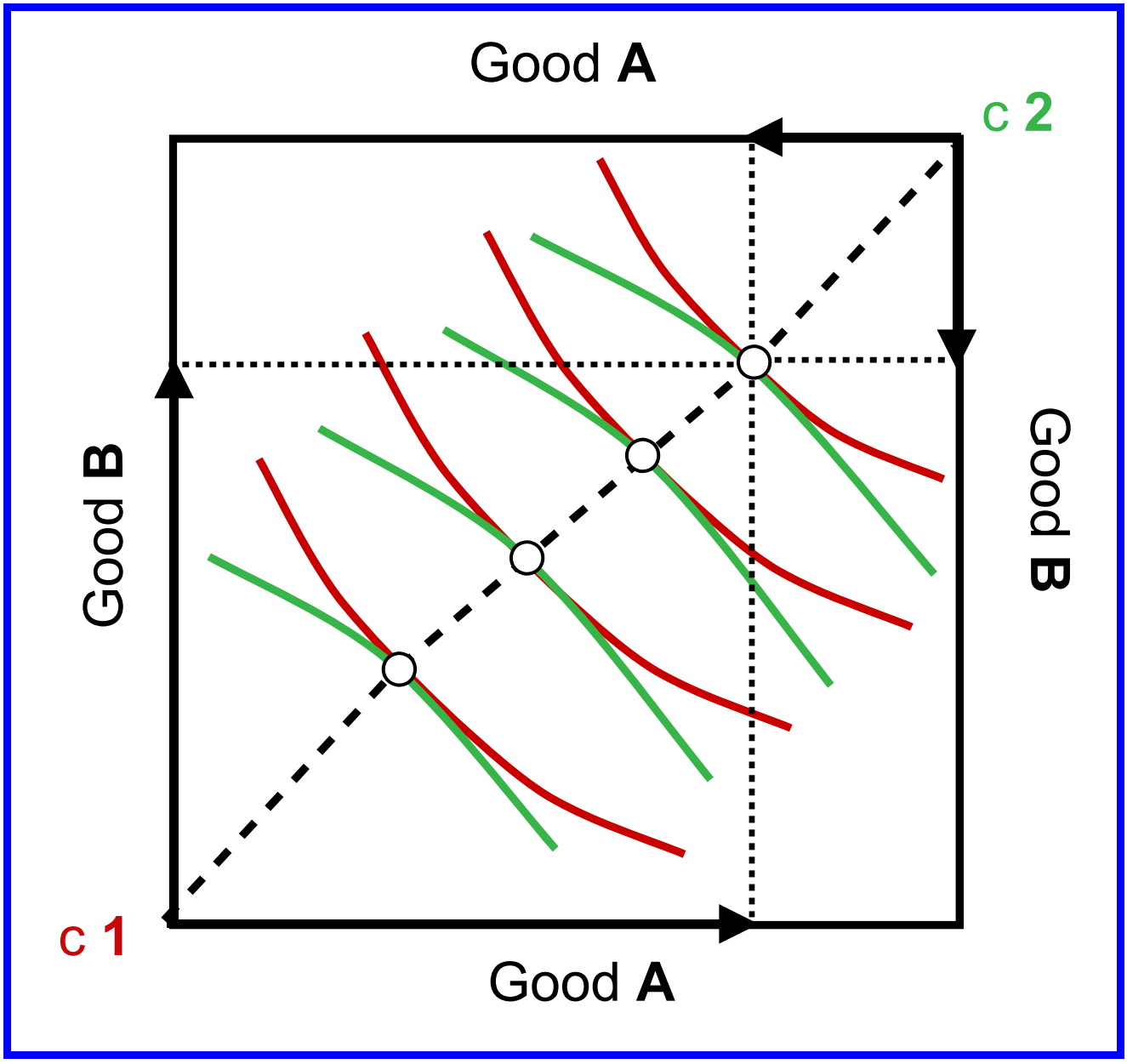


② *Negative* demand shock



AS = Aggregate supply	PL = Price level
AD = Aggregate demand	rGDP = real gross domestic product

Edgeworth box

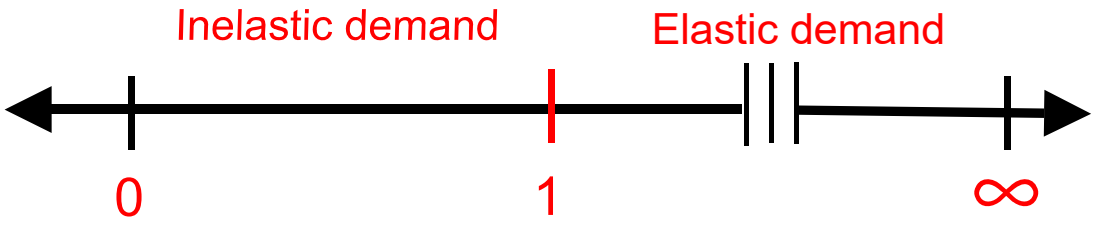


This box represents a situation with **2 goods** (A; B) and **2 consumers** (c 1; c 2). Any point of tangency of the green and red indifference curves is a possible distribution. The final combination depends on the initial endowments and the incomes of c 1 and c 2.

Contract curve:
all points of tangency on the dotted line from c 1 to c 2

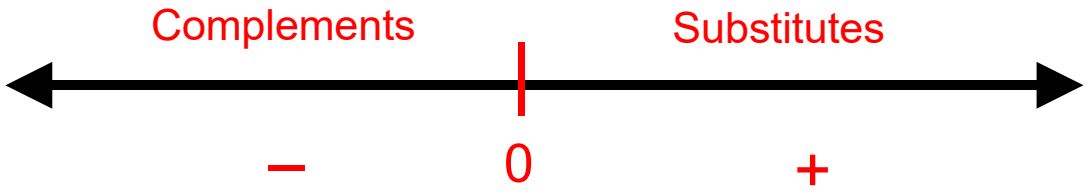
Elasticity and type of goods

1 Price elasticity of demand

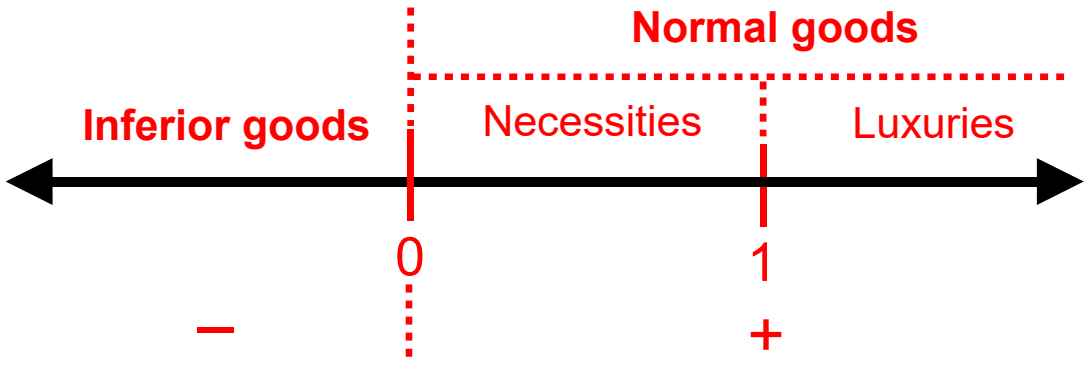


0	Perfectly inelastic demand
1	Unit elastic demand
∞	Perfectly elastic demand

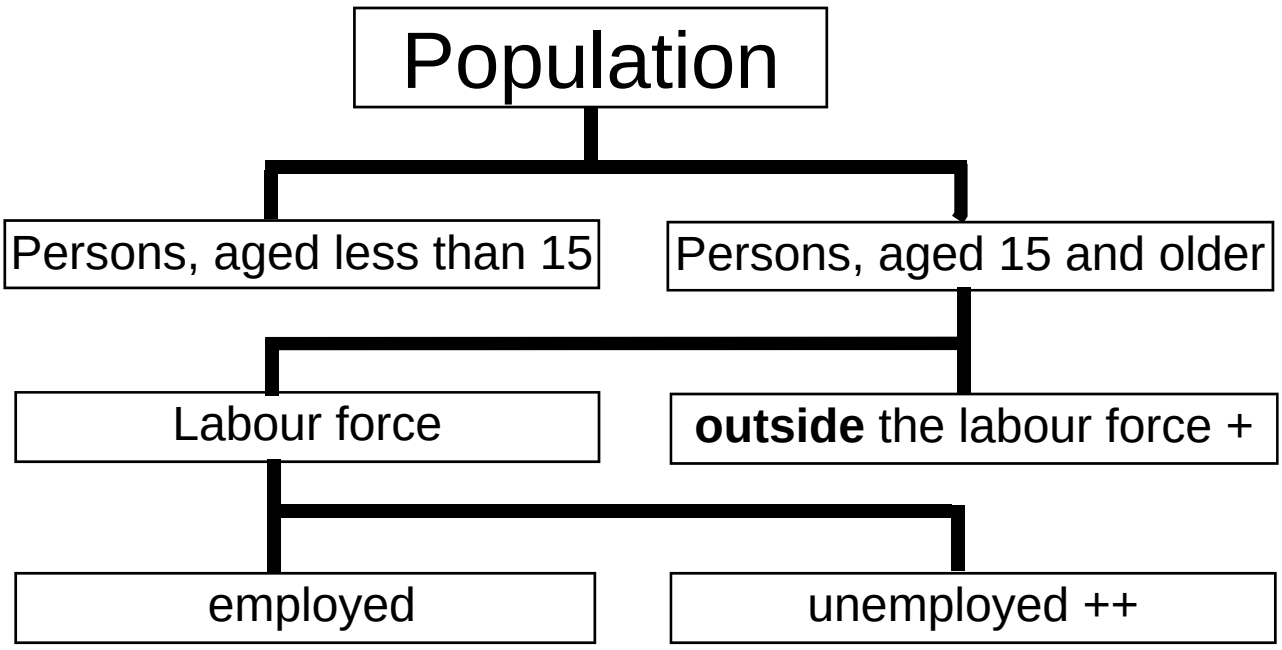
2 Cross-price elasticity of demand



3 Income elasticity of demand



Employment and unemployment (ILO)



Labour force participation rate (%) =

$$\frac{\text{Employed and unemployed}}{\text{Working-age population}} * 100$$

Unemployment rate (%) =

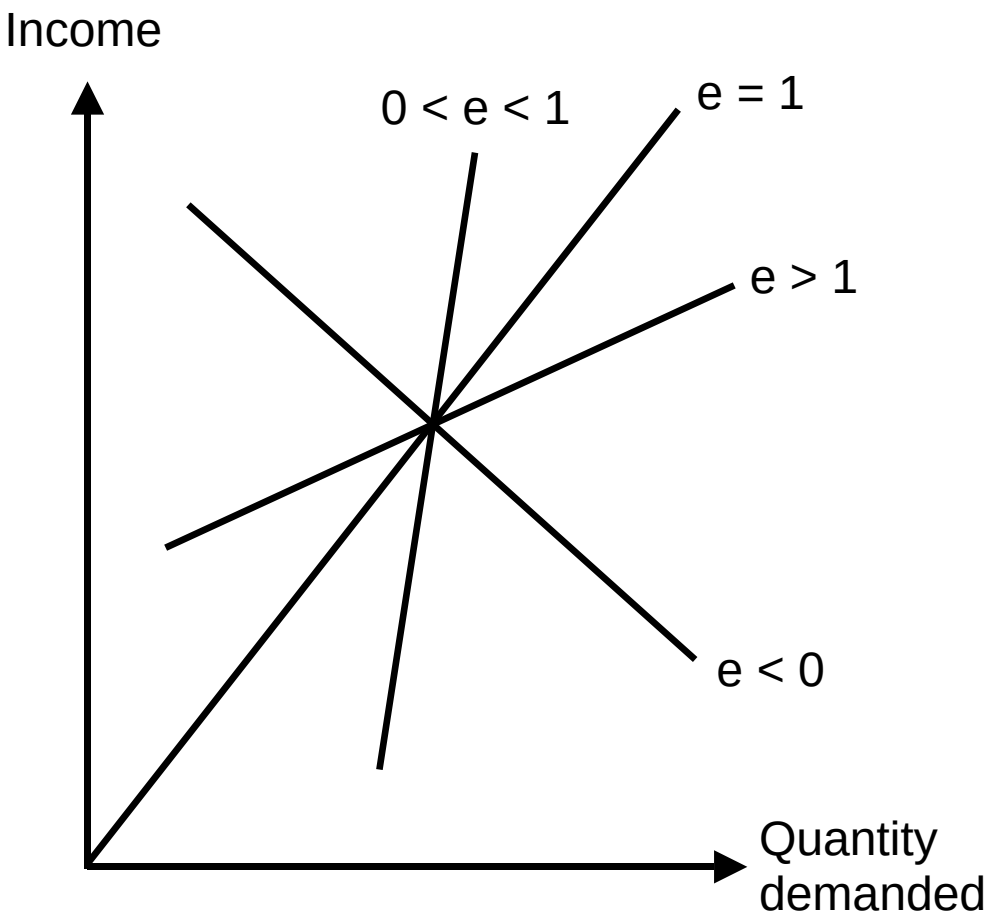
$$\frac{\text{Unemployed}}{\text{Labour force}} * 100$$

\+ - students
- retired persons
- sick persons
- persons without a job, not looking any more for one

++ persons without a job, but actively looking for one

There are countries using upper age limits.

Engel curves



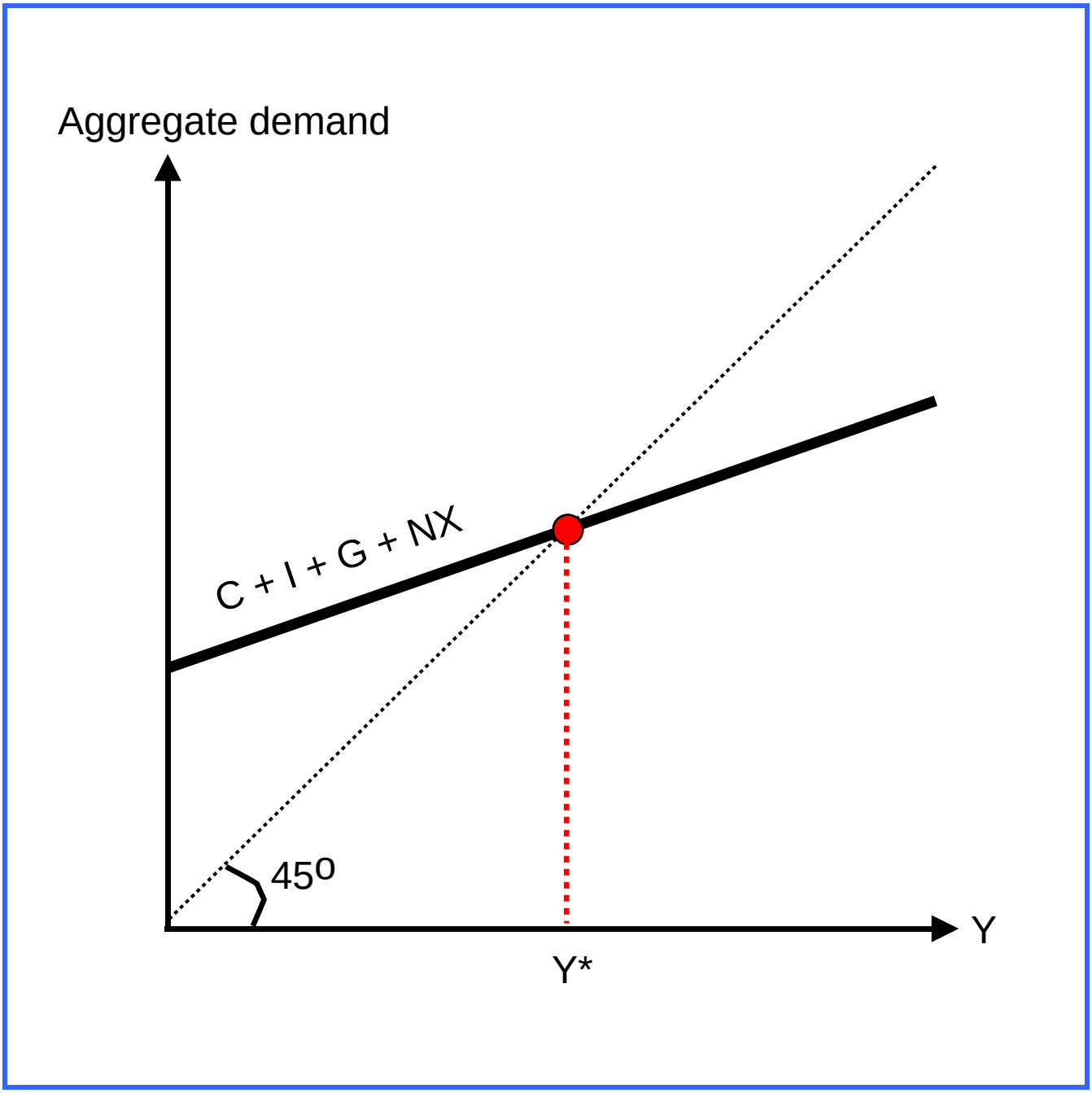
e = Income elasticity of demand

$$= \frac{\text{\% change in quantity demanded}}{\text{\% change in income}}$$

Types of goods:

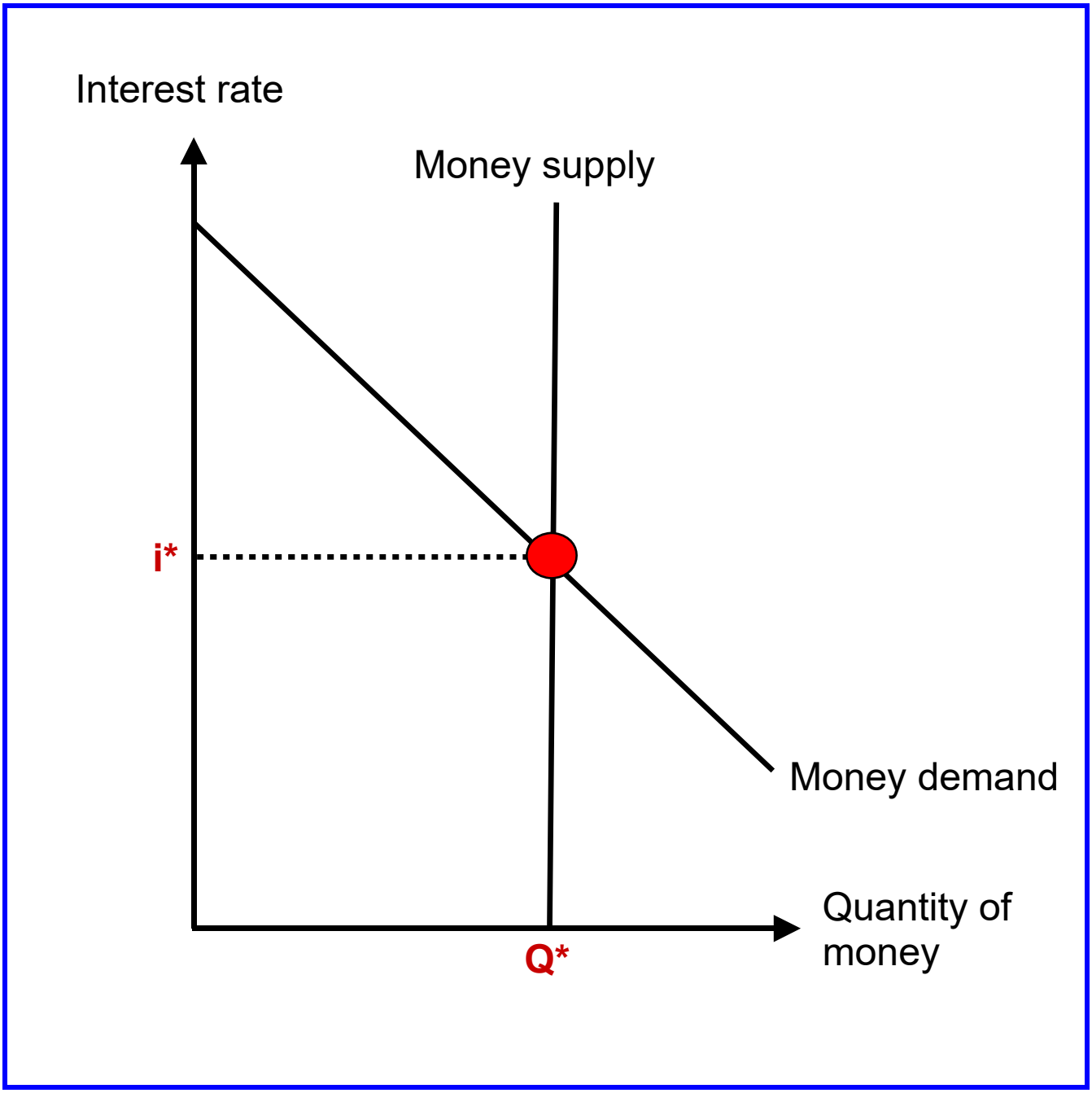
- Luxuries: e > 1
- Necessities: 0 < e < 1
- Inferior goods: e < 0

Equilibrium - Keynes



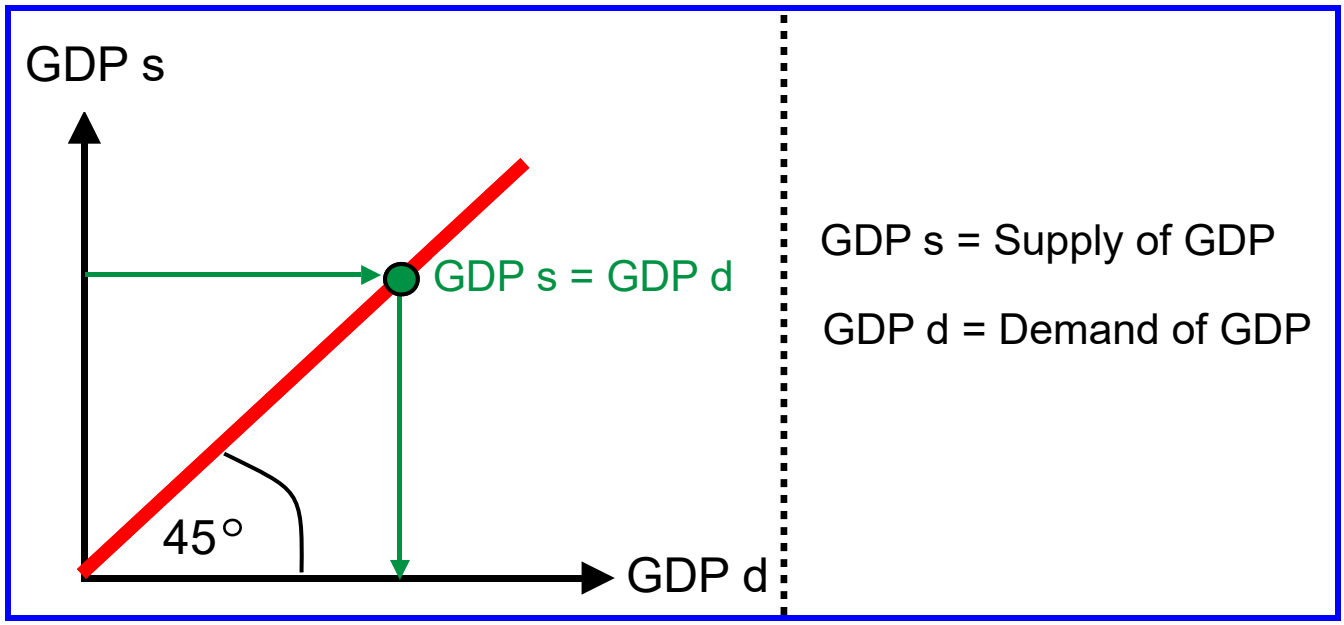
Y = Output, income	I = Investment
Y* = Equilibrium of Y	G = Government spending
C = Consumption	NX = Net exports

Equilibrium - Money market



Q* = Quantity of money in equilibrium
i* = Interest rate in equilibrium

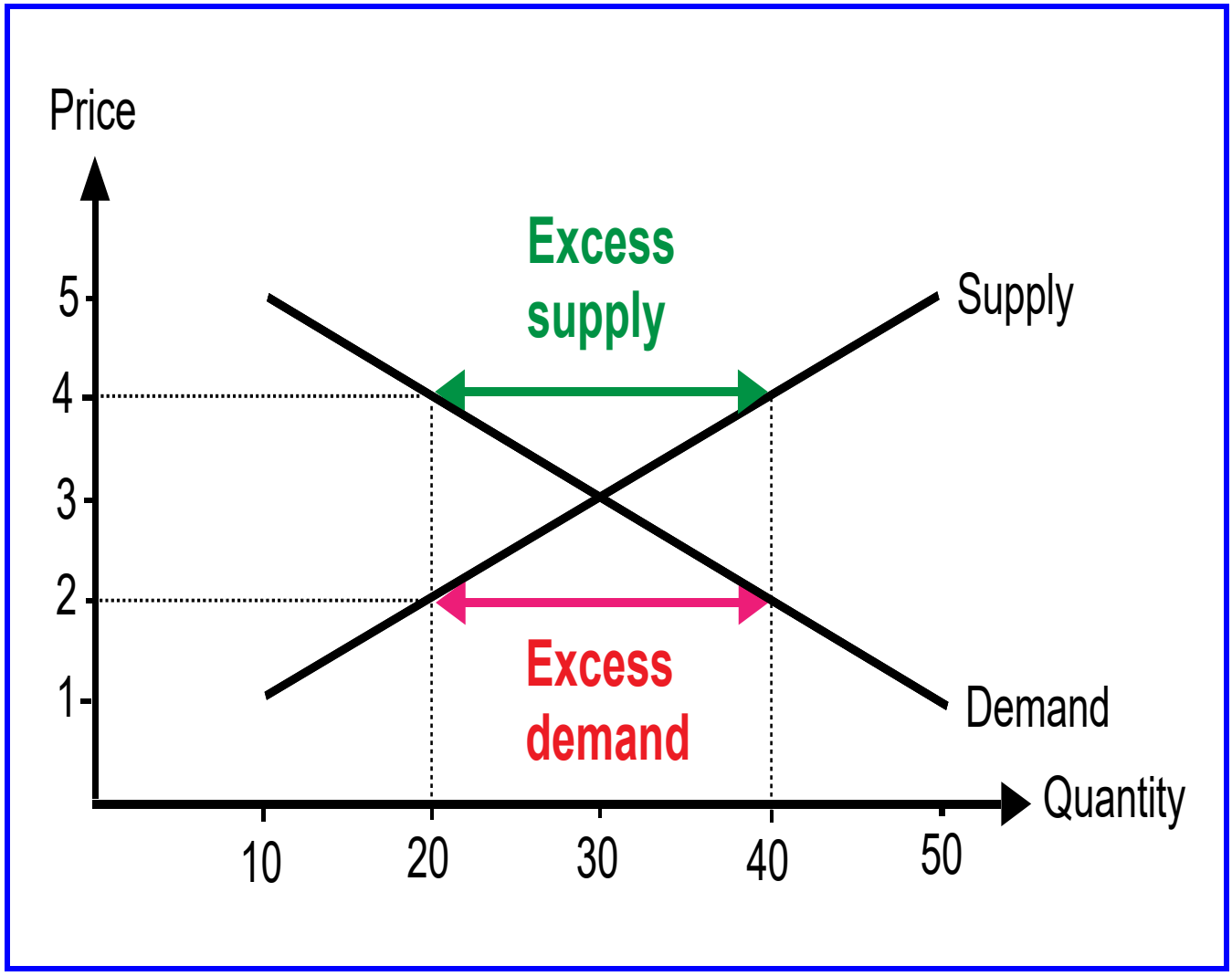
Equilibrium - Say (classic)



According to **Say**, **supply** determines demand, employment and gross domestic product (GDP). The production of supply generates income, which leads to demand. Short-term supply surpluses or deficits in individual markets would be eliminated by the price mechanism, so that full employment would prevail in the long run.

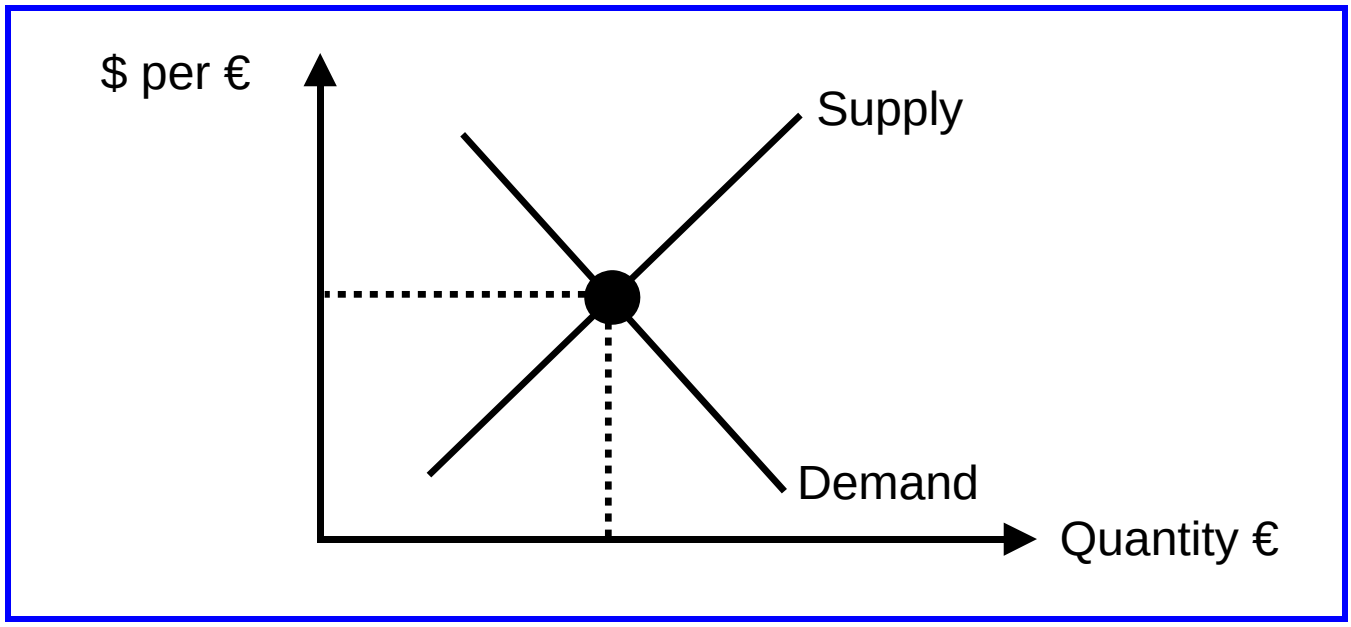
Keynes later argued the other way round: **Demand** determines supply, GDP and employment.

Excess demand and excess supply

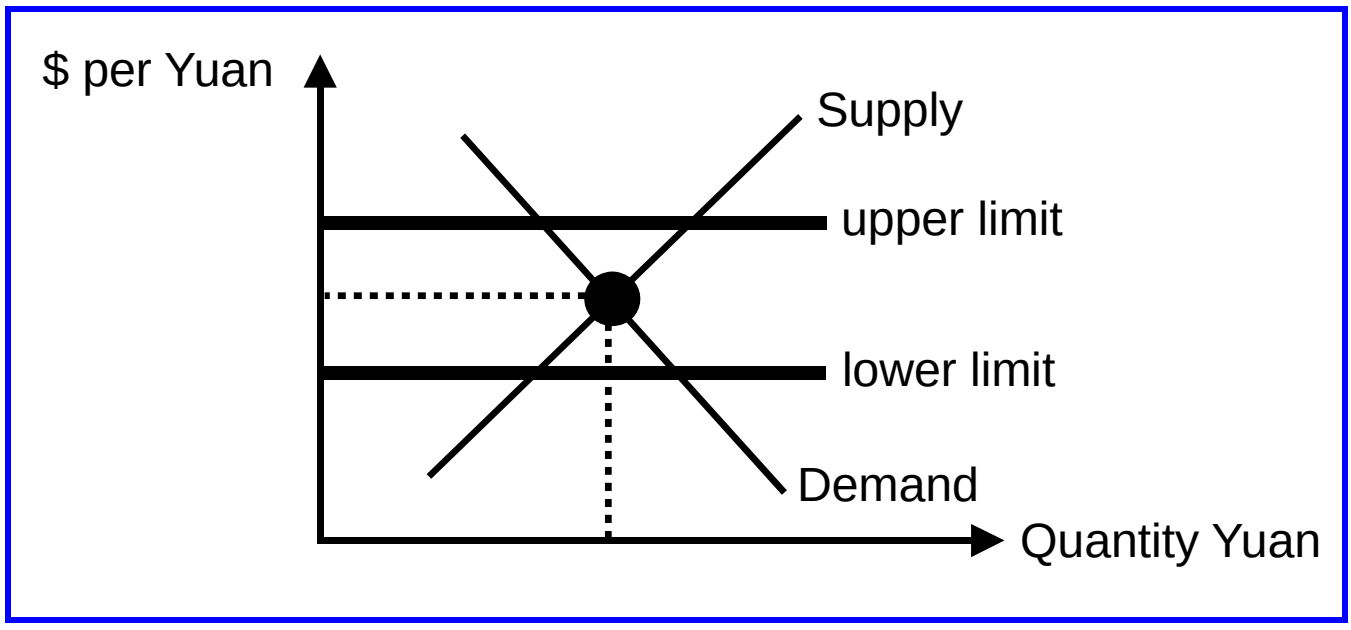


Exchange rate

① **Flexible** exchange rate

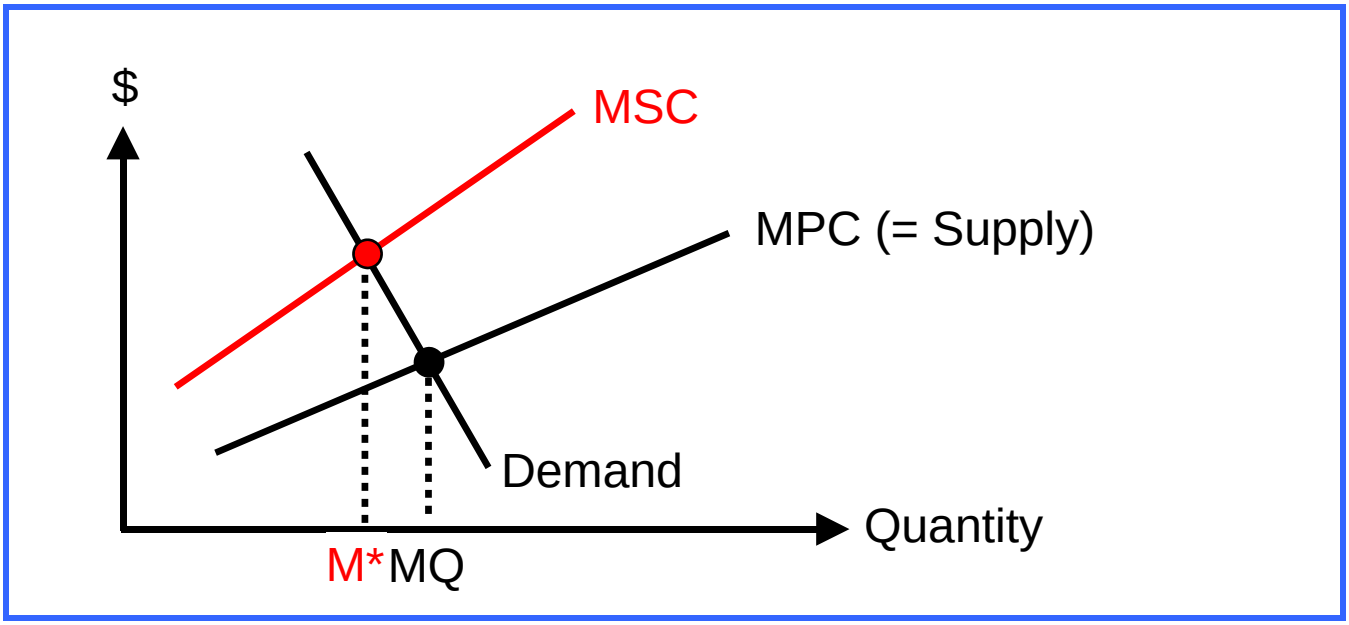


② **Fixed** exchange rate

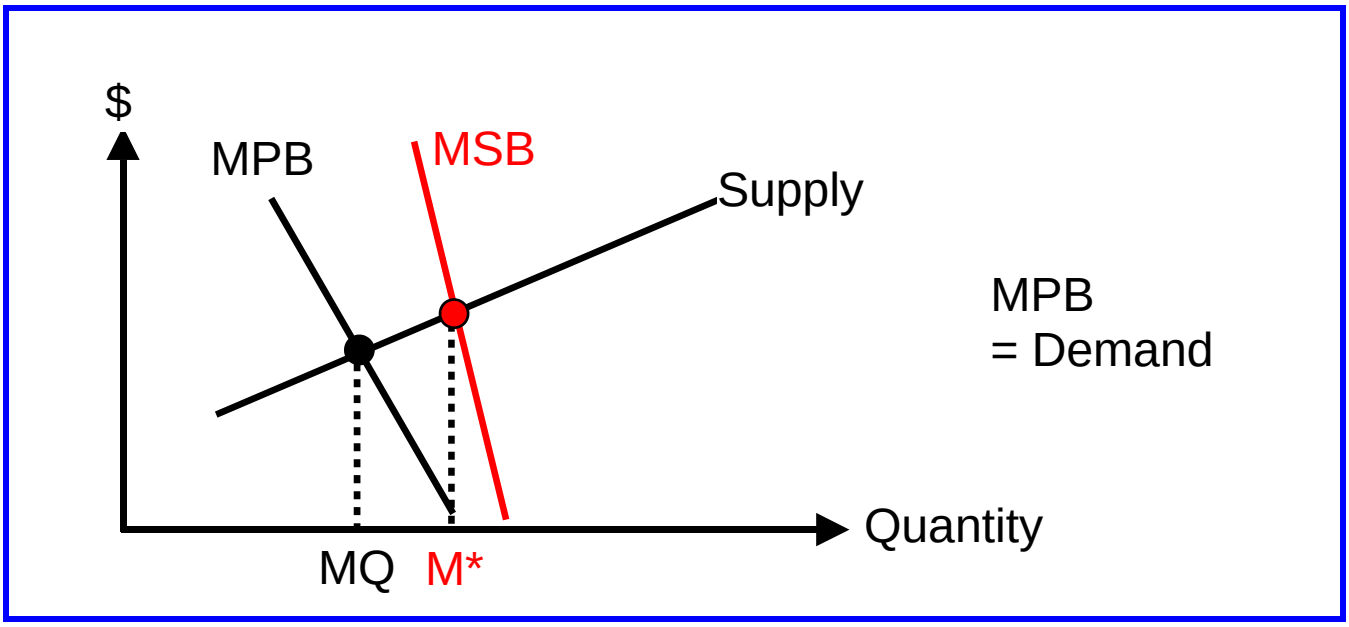


Externality

① **Negative** externality (with external costs)



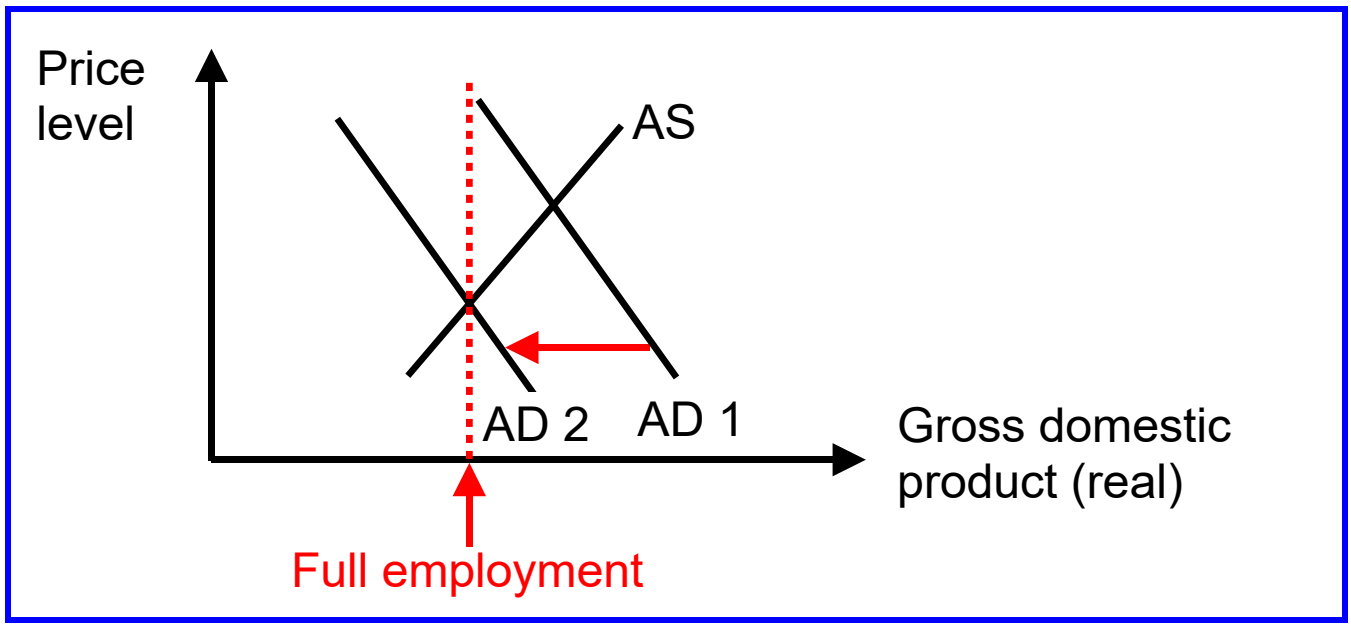
② **Positive** externality (with external benefits)



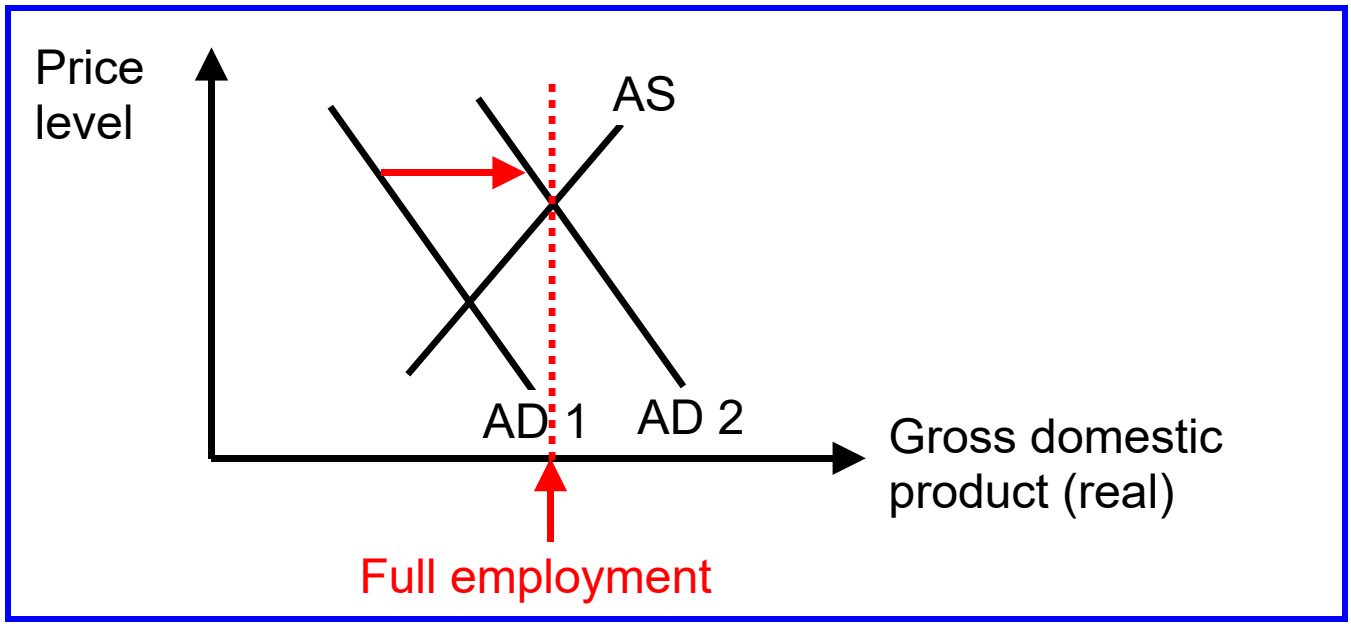
MPC = Marginal private costs	MSB = Marginal social benefits
MPB = Marginal private benefits	MQ = Market quantity
MSC = Marginal social costs	M* = Optimal quantity

Fiscal policy - AD-AS model

① Situation of a **boom**



② Situation of a **recession**



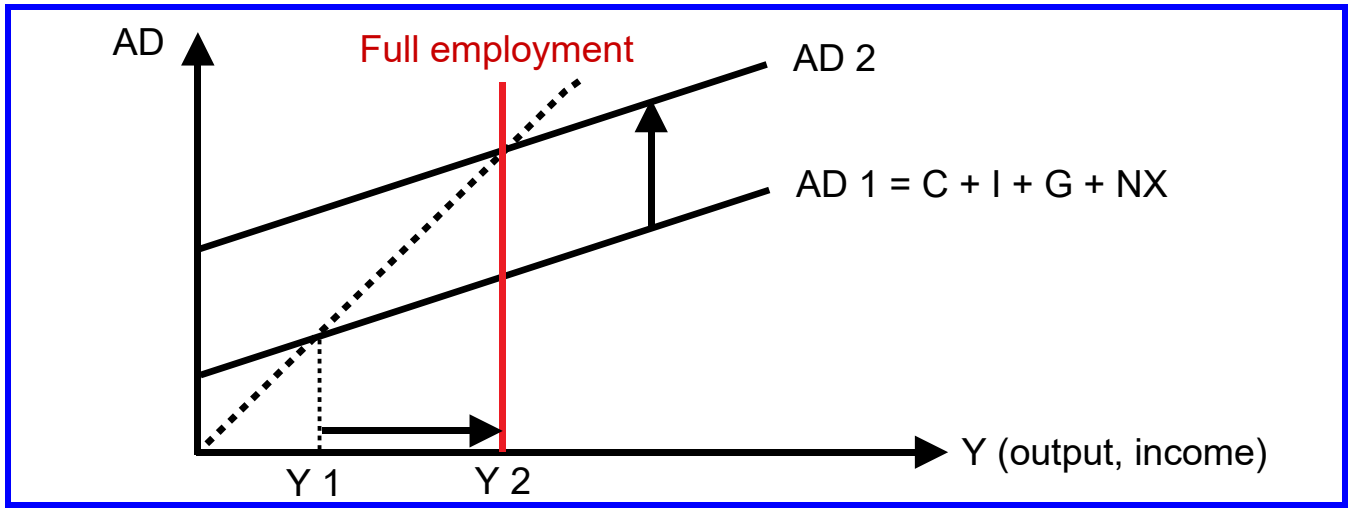
AD = Aggregate demand (Consumption, investment, government spending, net exports)

AS = Aggregate supply

Fiscal policy - Keynes

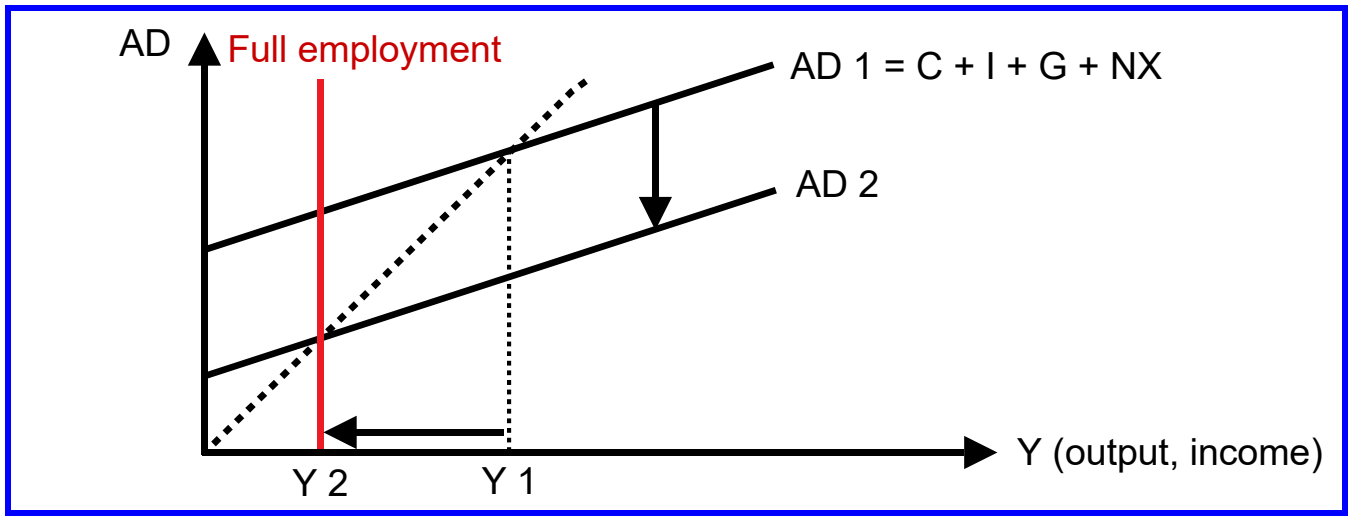
① **Expansionary** fiscal policy (recession)

→ *G+ or taxes-*



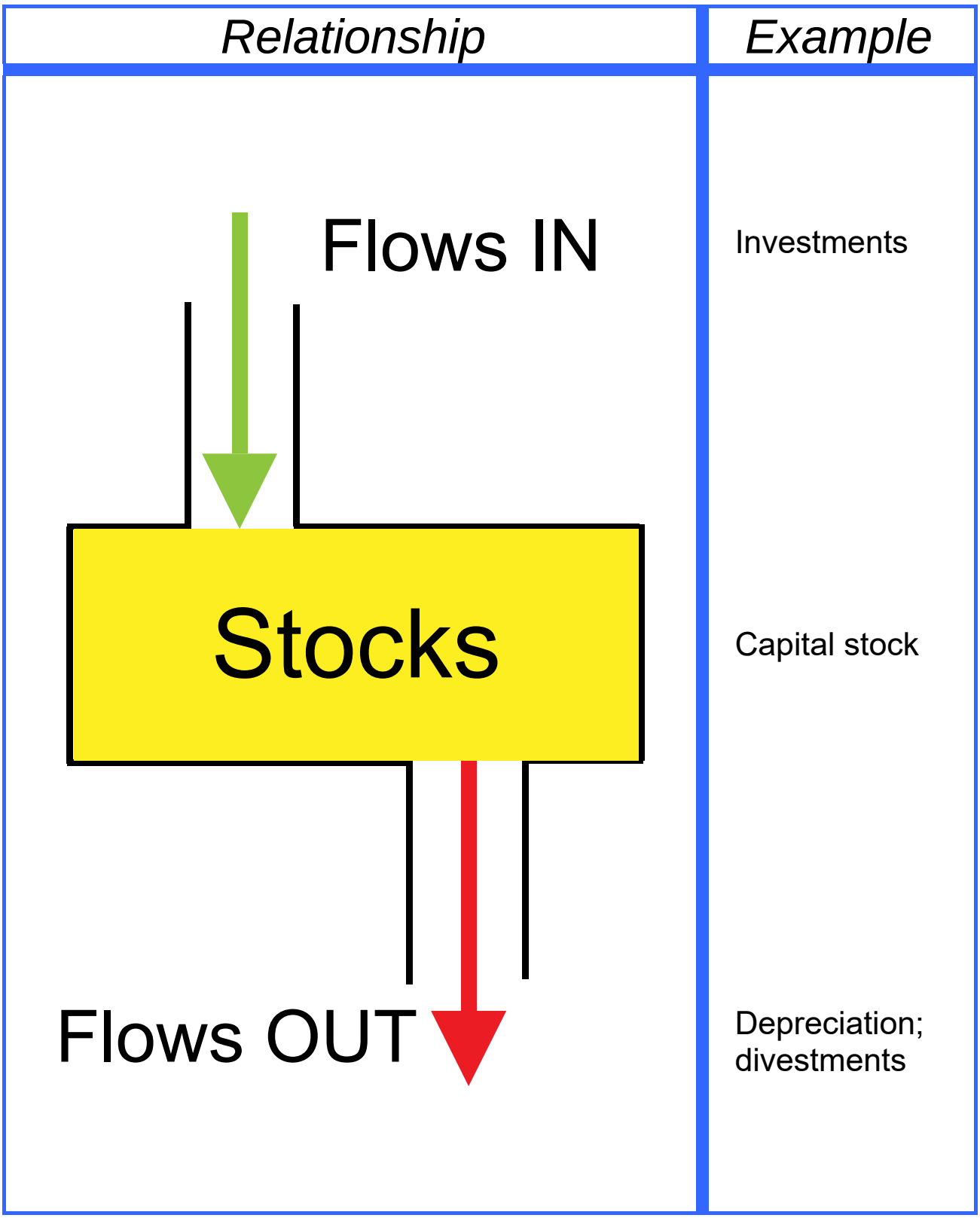
② **Contractionary** fiscal policy (boom)

→ *G- or taxes+*

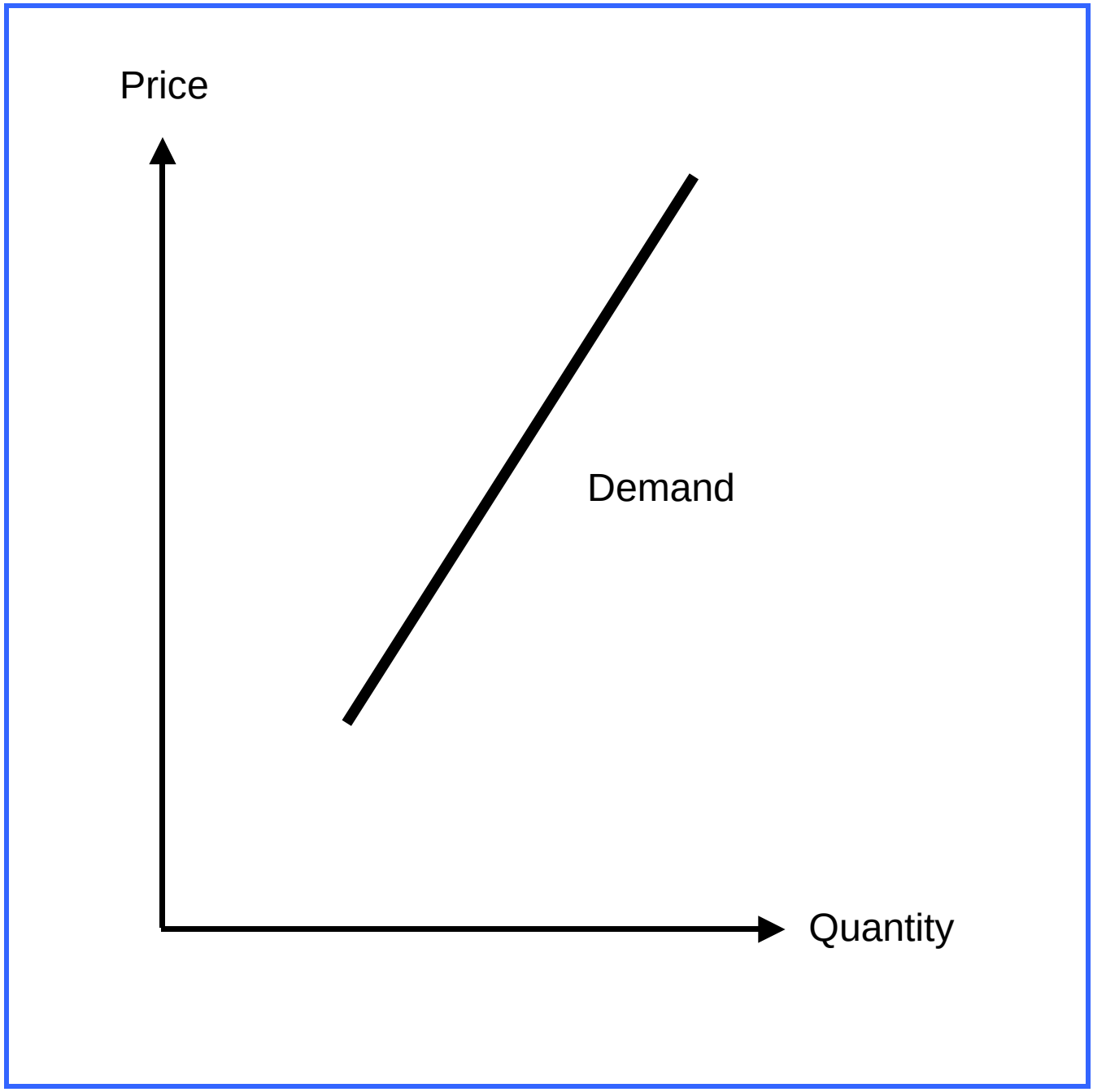


AD = Aggregate demand	C = Consumption
I = Investment	G = Government spending
NX = Net exports (= exports - imports)	

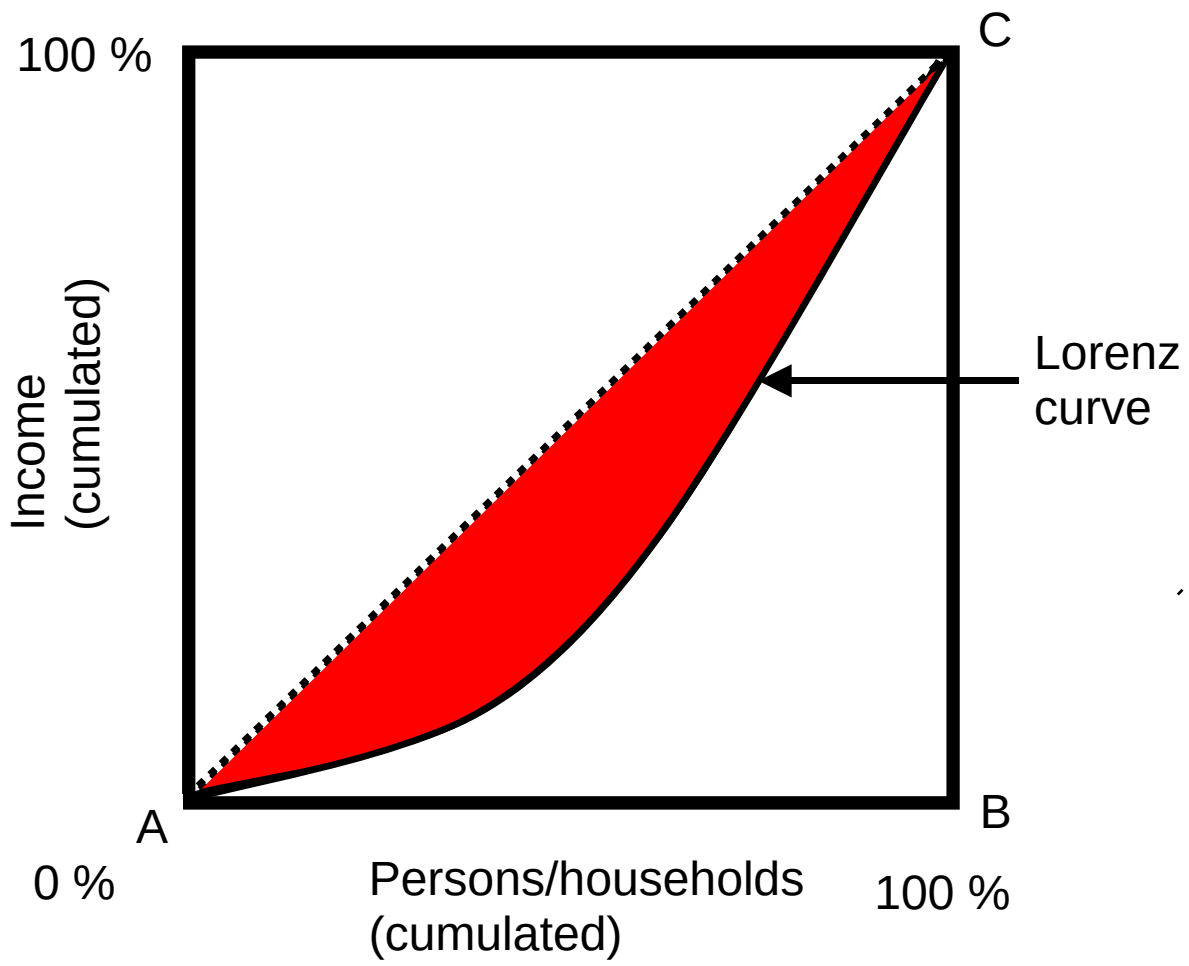
Flows and stocks



Giffen good



Gini coefficient



Gini coefficient =

$$\frac{\text{Red area*}}{\text{Triangle ABC}}$$

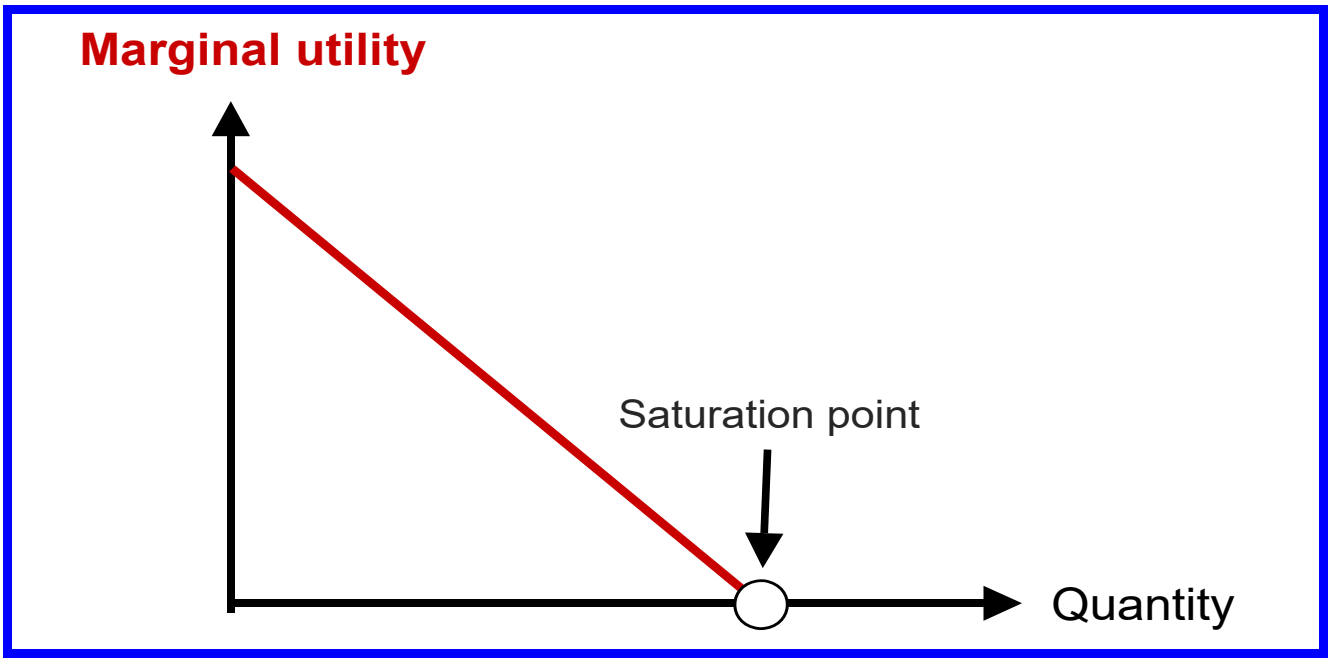
* Red area = Area between the Lorenz curve and the 45^{o}-diagonal line

Goods - private and public

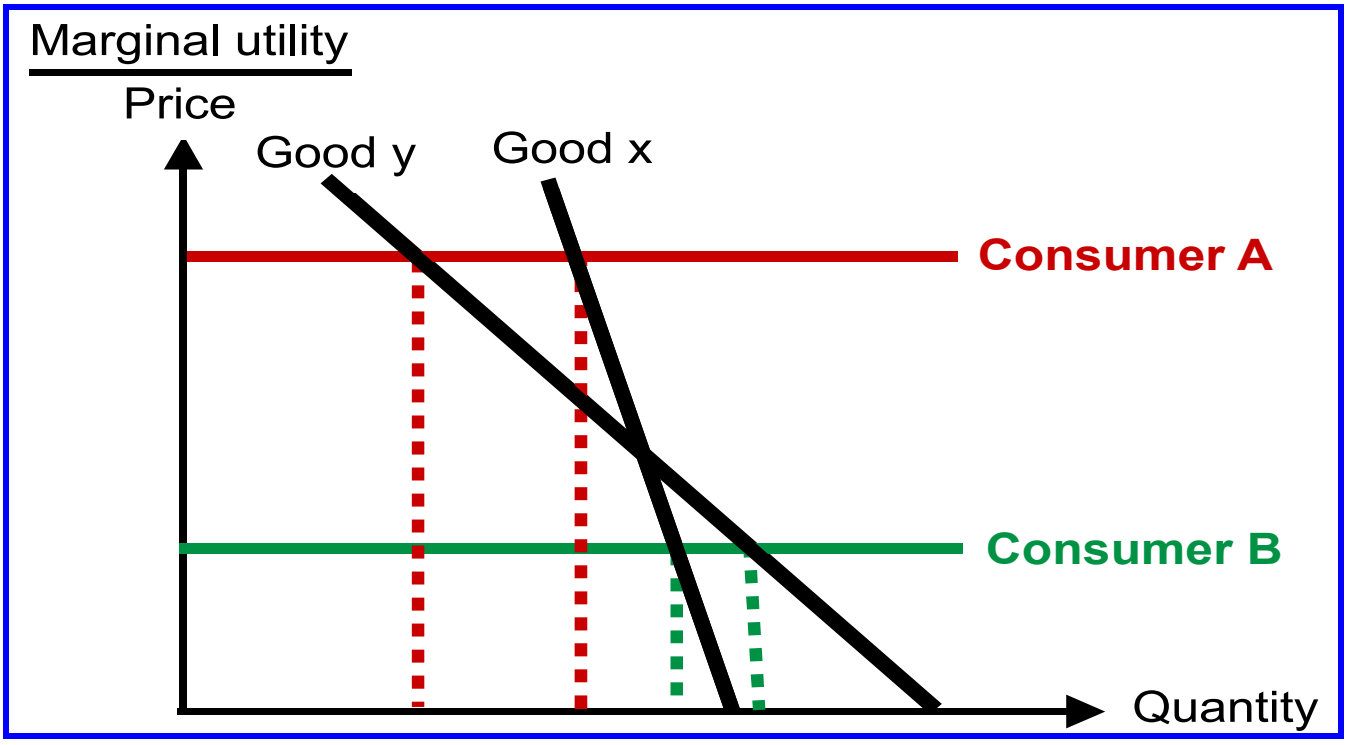
		Rival?	
		yes	**no**
Exclu-dable?	**yes**	Private goods	Goods by natural monopolies
	no	Common goods	Public goods

Gossen's laws

① Law of *diminishing marginal utility*

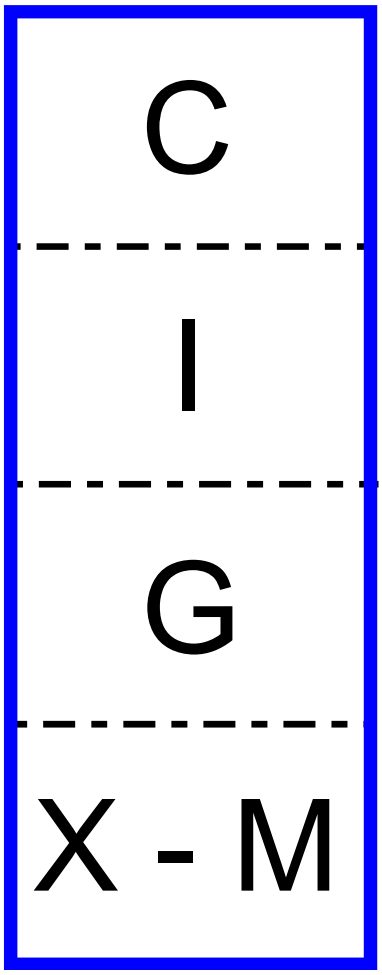


② The ratio of *marginal utility to price is the same for all goods of a consumer.*



Gross domestic product - expenditure

Components (where X > M)

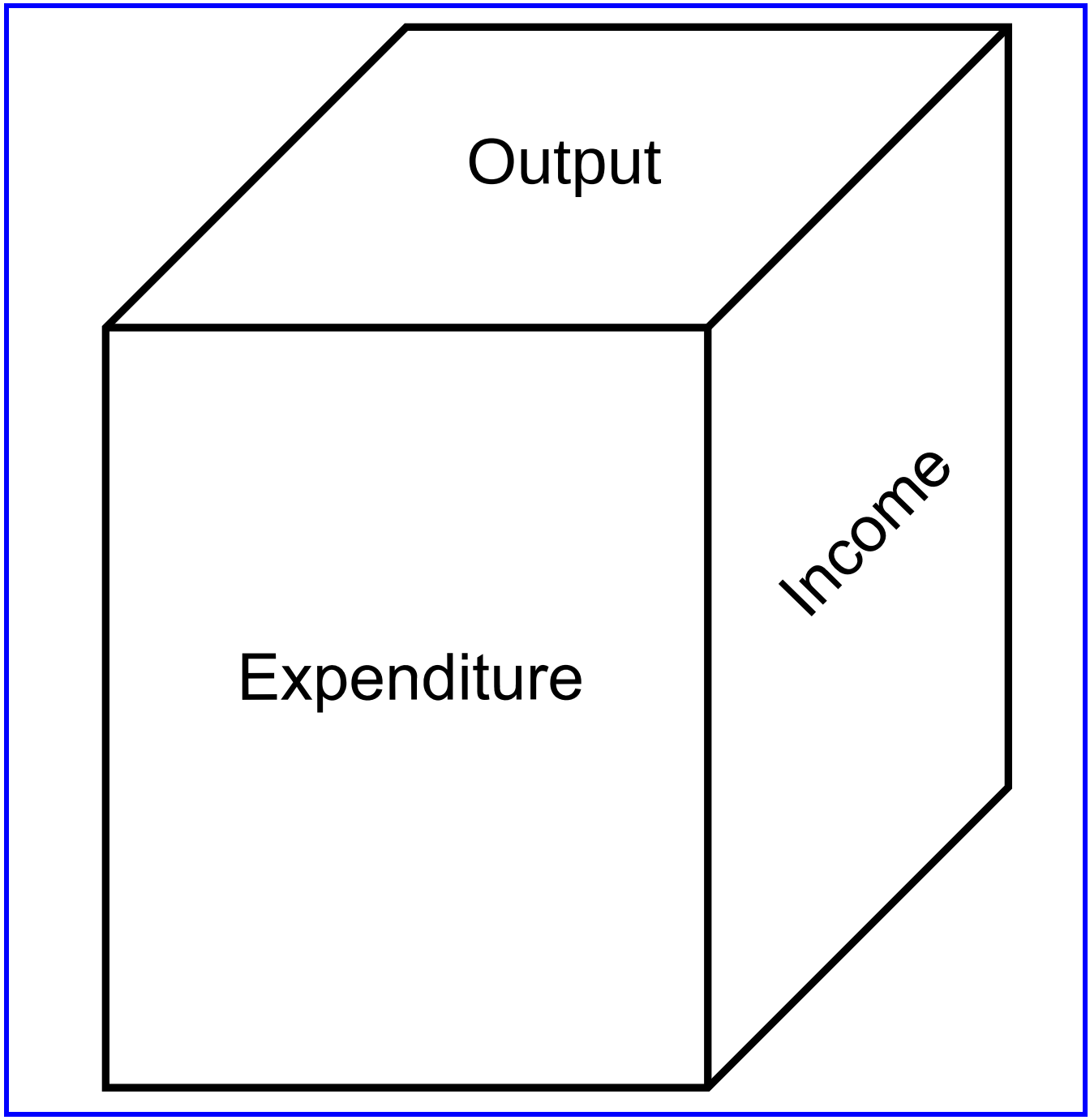


- If X = M, the gross domestic product consists of the sum of C, I and G.
- If X < M, the sum of C, I and G is reduced by 'X - M'.

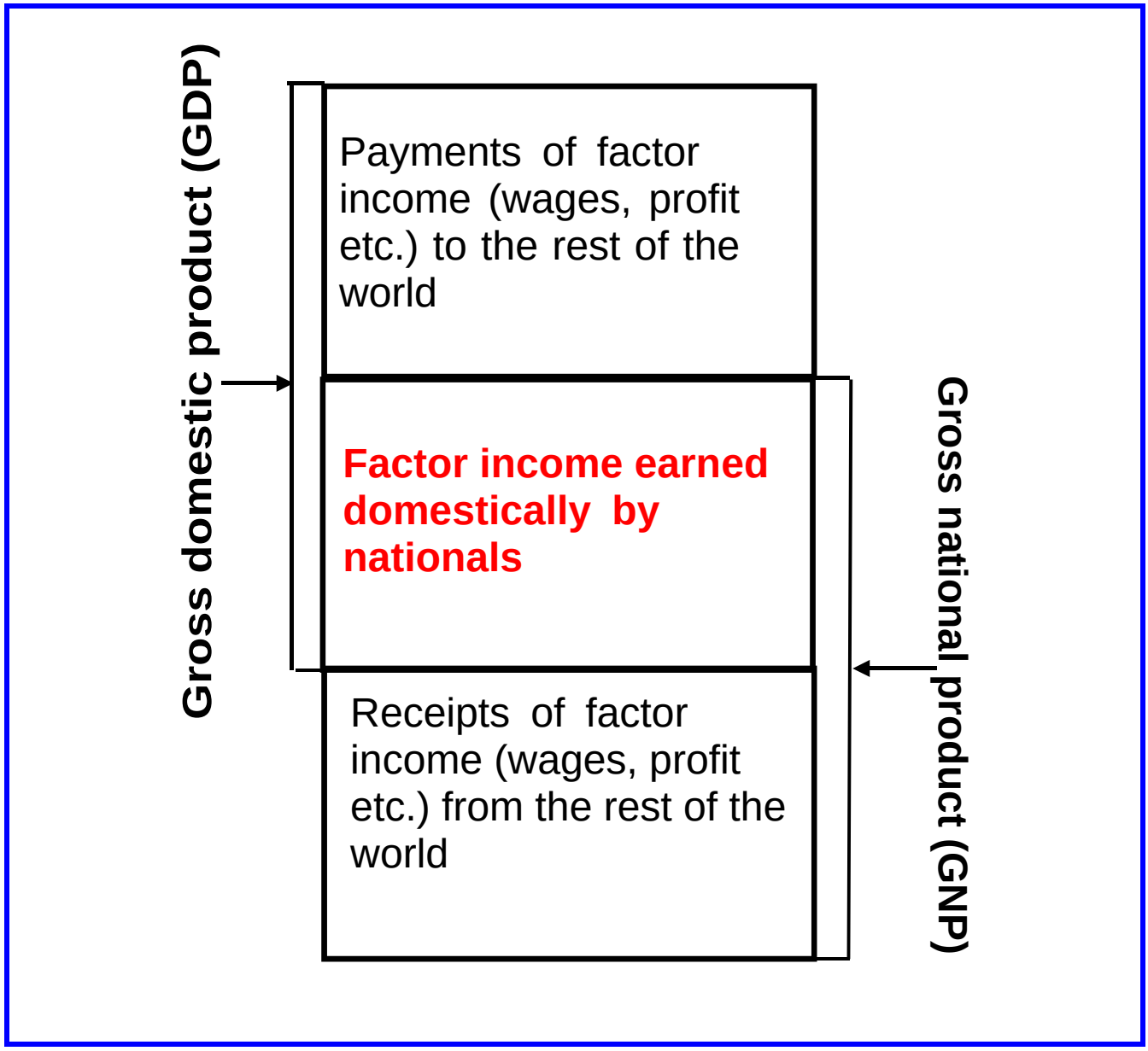
Abbreviations:

C	= Consumption
I	= Investment
G	= Government spending
X - M	= Exports - imports

Gross domestic product - methods of calculating



Gross domestic product and gross national product

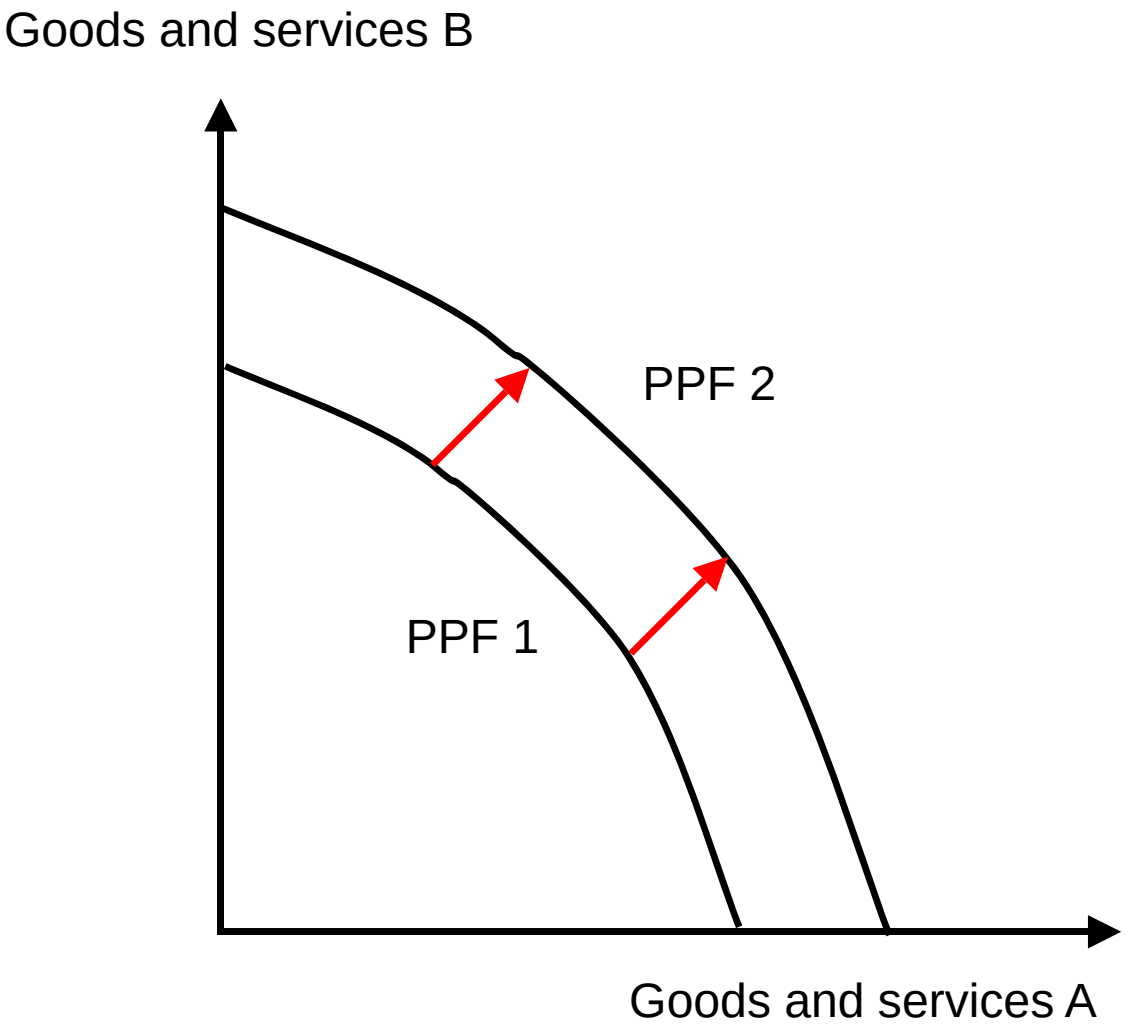


GDP → total income **produced domestically**
GNP → total income **earned by nationals**

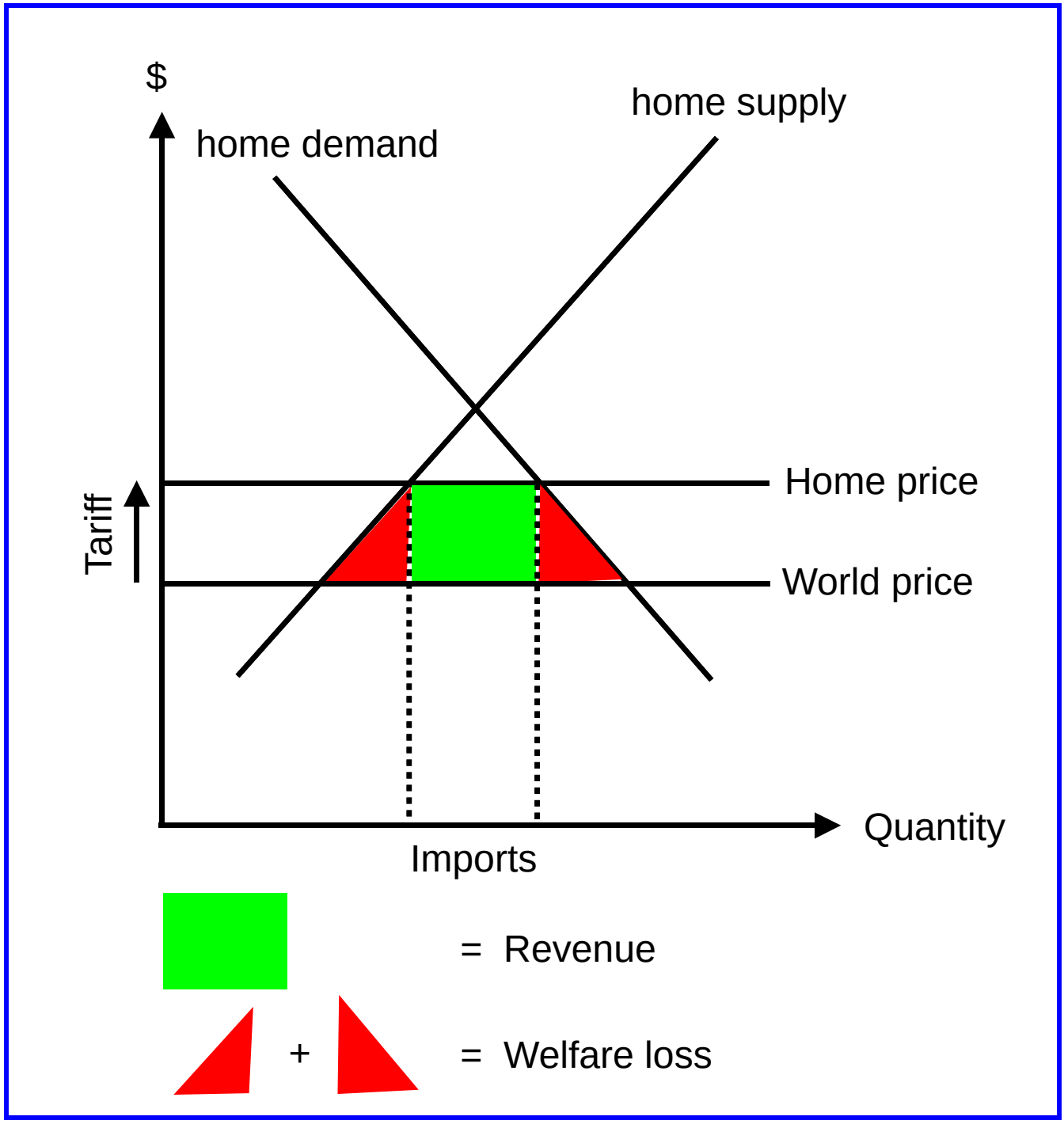
Growth

When there is economic growth, then the production possibilities frontier shifts outward.

Production possibilities frontier (PPF)



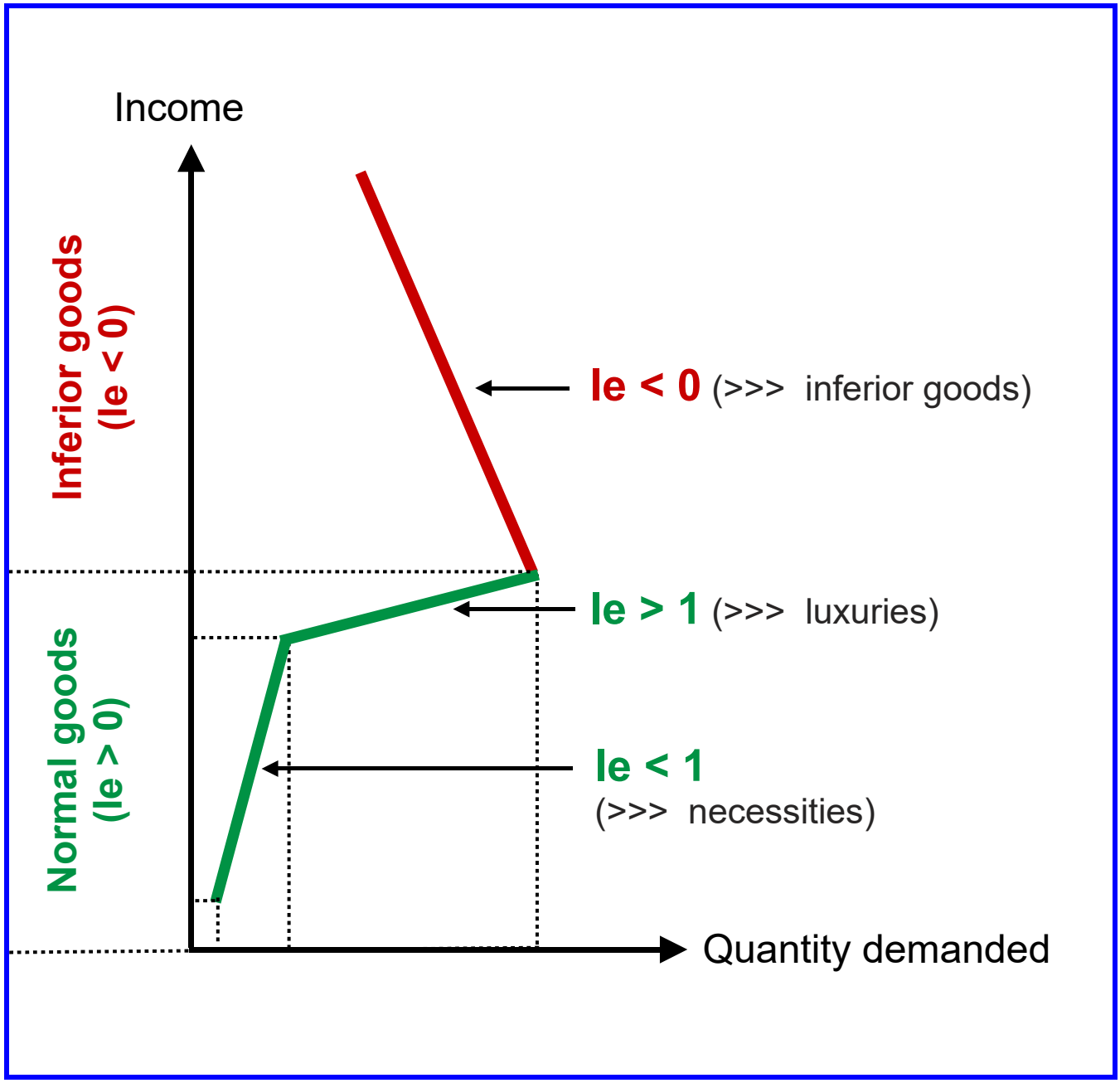
Import tariff - revenue and welfare loss



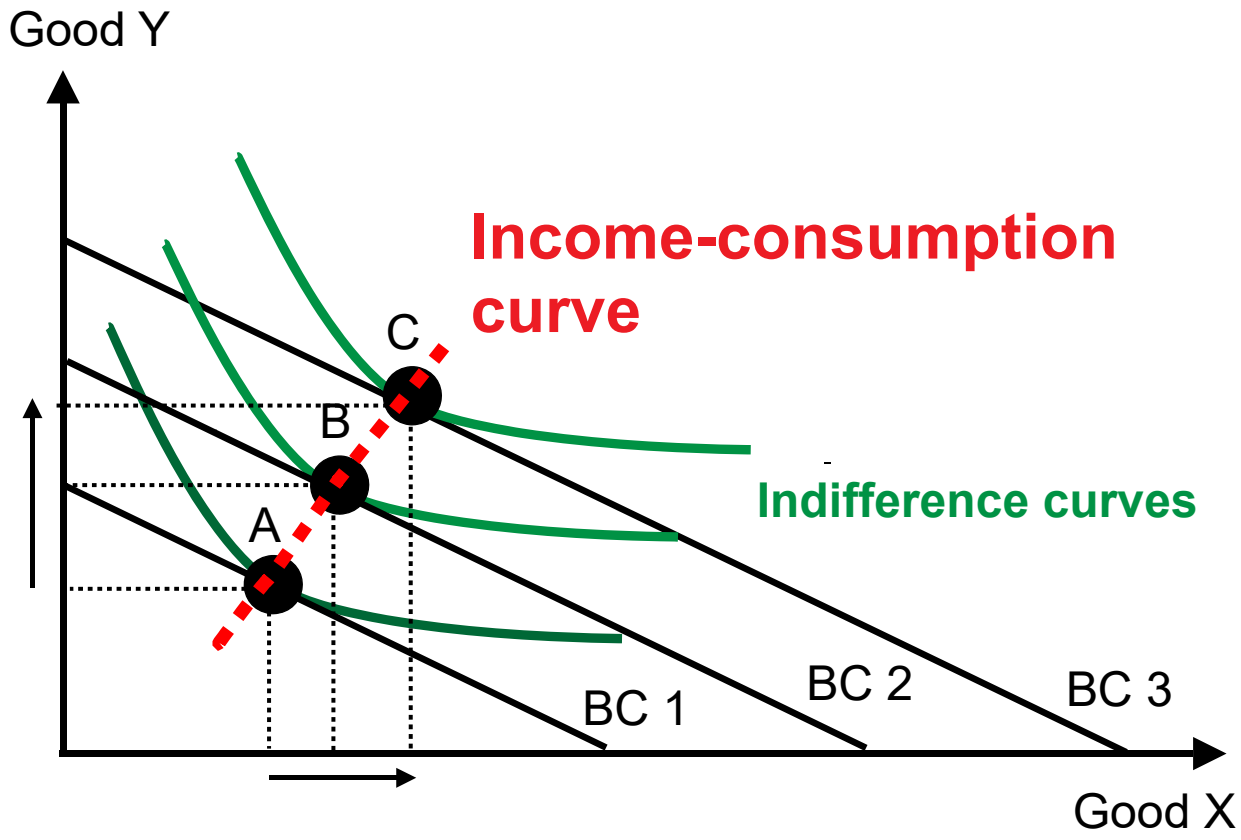
Income elasticity of demand

Income elasticity of demand (Ie) =

$$\frac{\text{\% change in quantity demanded}}{\text{\% change in income}}$$



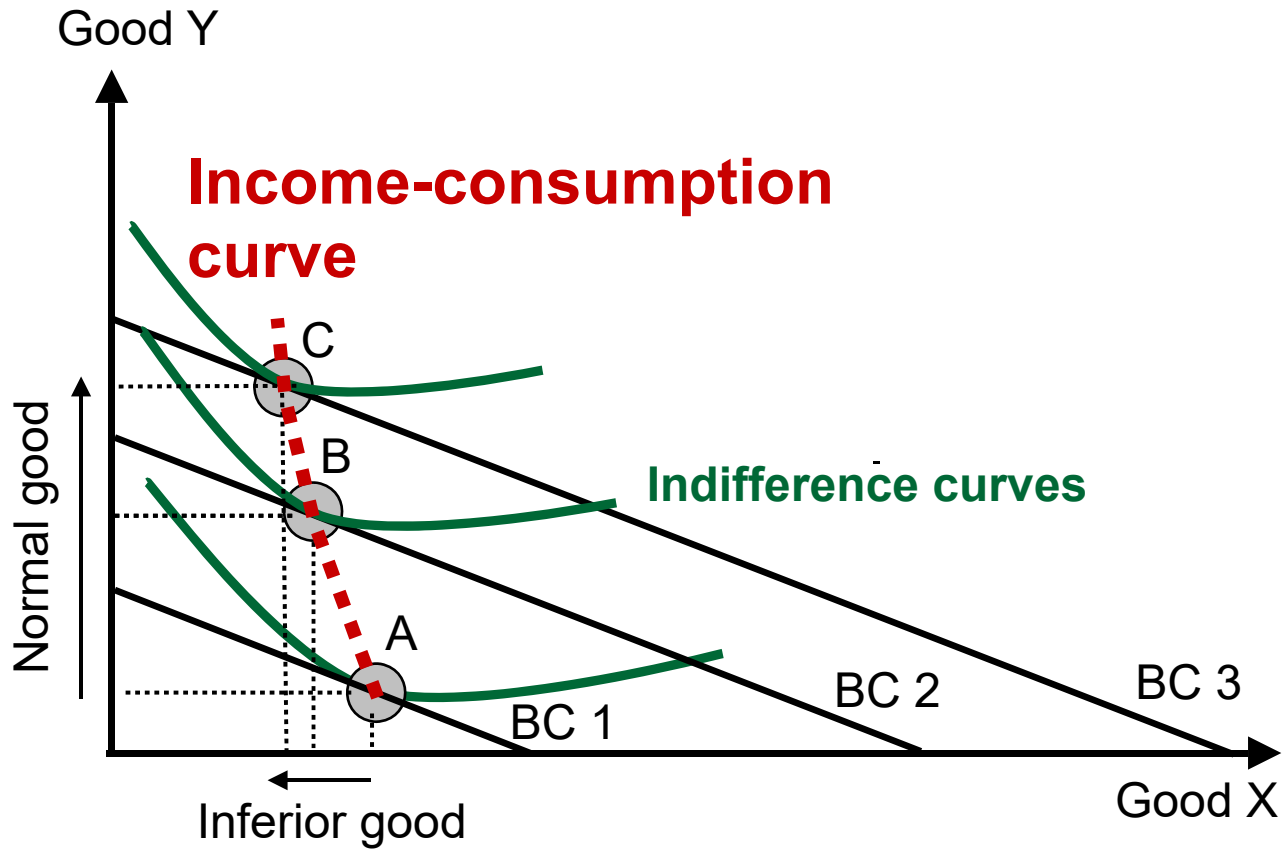
Income-consumption curve 1 - normal goods



BC = Budget constraint

Both goods (X, Y) are **normal** goods because as income increases (e.g. from BC 1 to BC 2 and then to BC 3), the quantity of both goods increases (income elasticity of demand > 0).

Income-consumption curve 2 - normal and inferior good

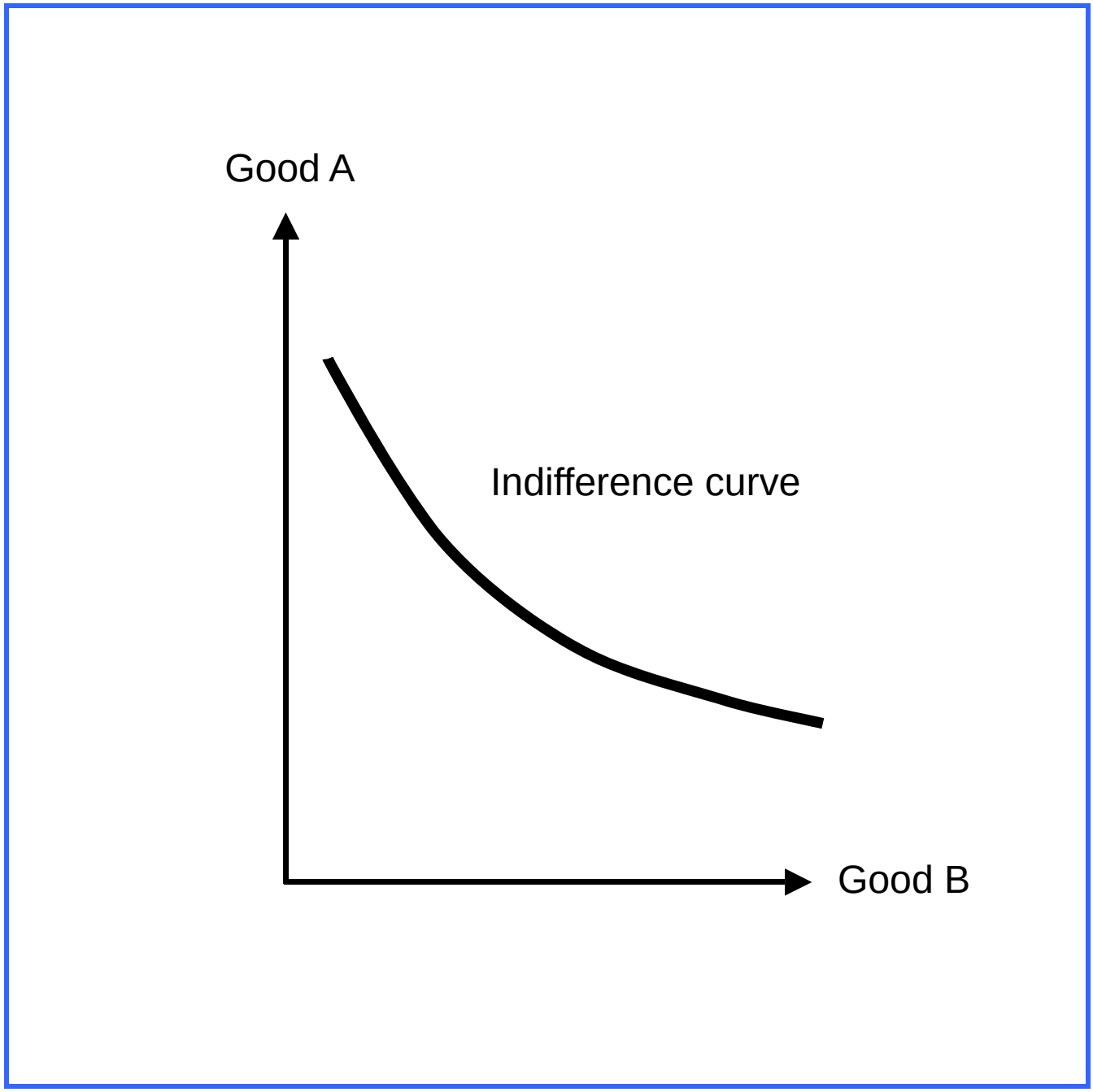


BC = Budget constraint

Good **X** is an **inferior** good, as income increases (e.g. from BC 1 to BC 2 and then to BC 3), quantity demanded decreases (income elasticity of demand < 0), whereas good **Y** is a **normal** good, as income increases, quantity demanded increases (income elasticity of demand > 0).

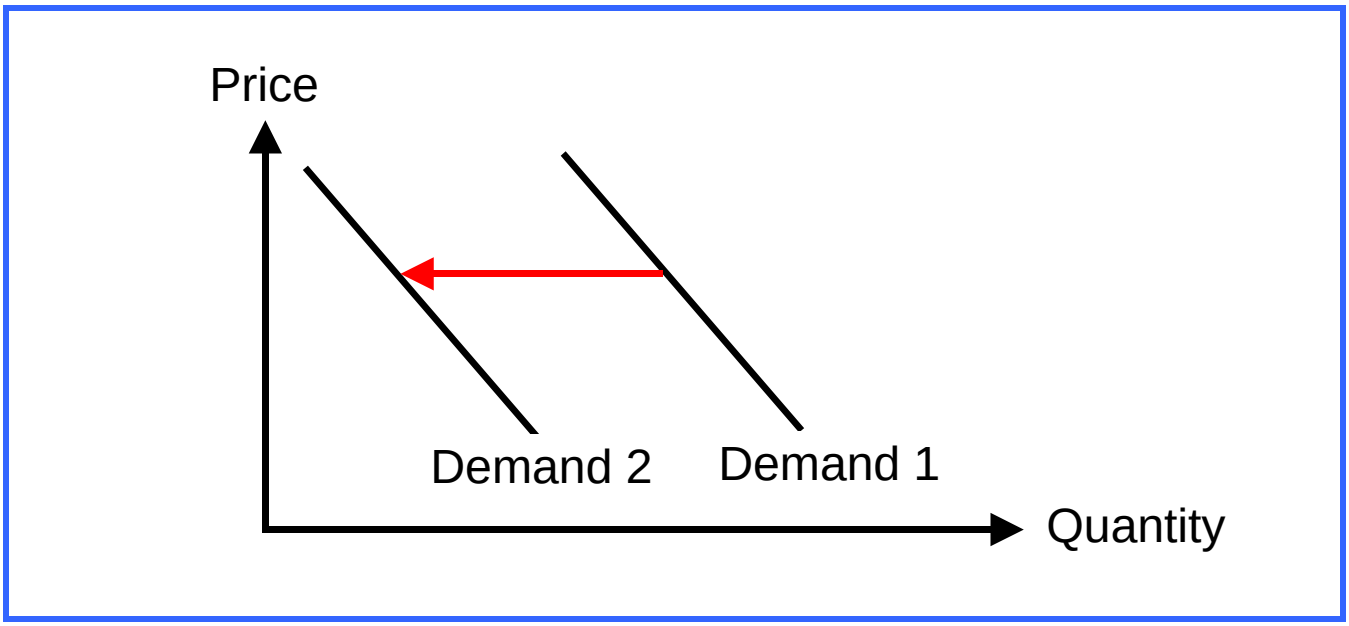
Indifference curve

An indifference curve shows the combinations of 2 divisible goods, A and B, which result in the same utility for the consumer. Along an indifference curve **total utility** is thus **constant**.

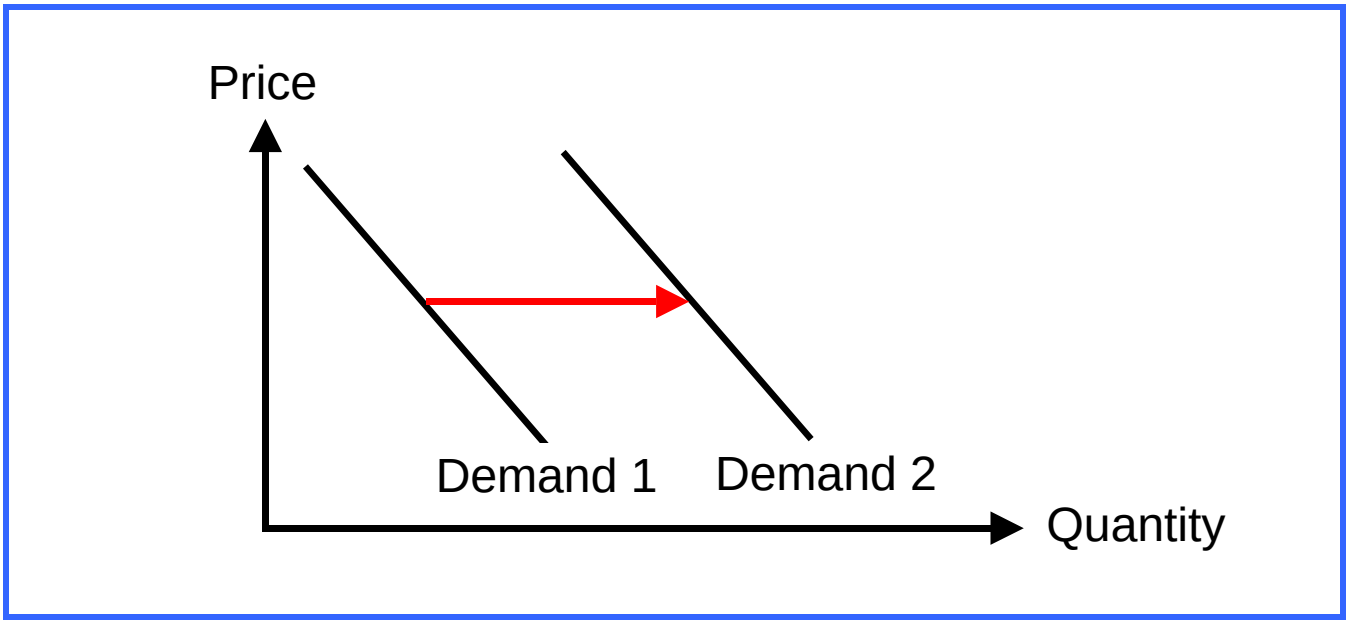


Inferior good

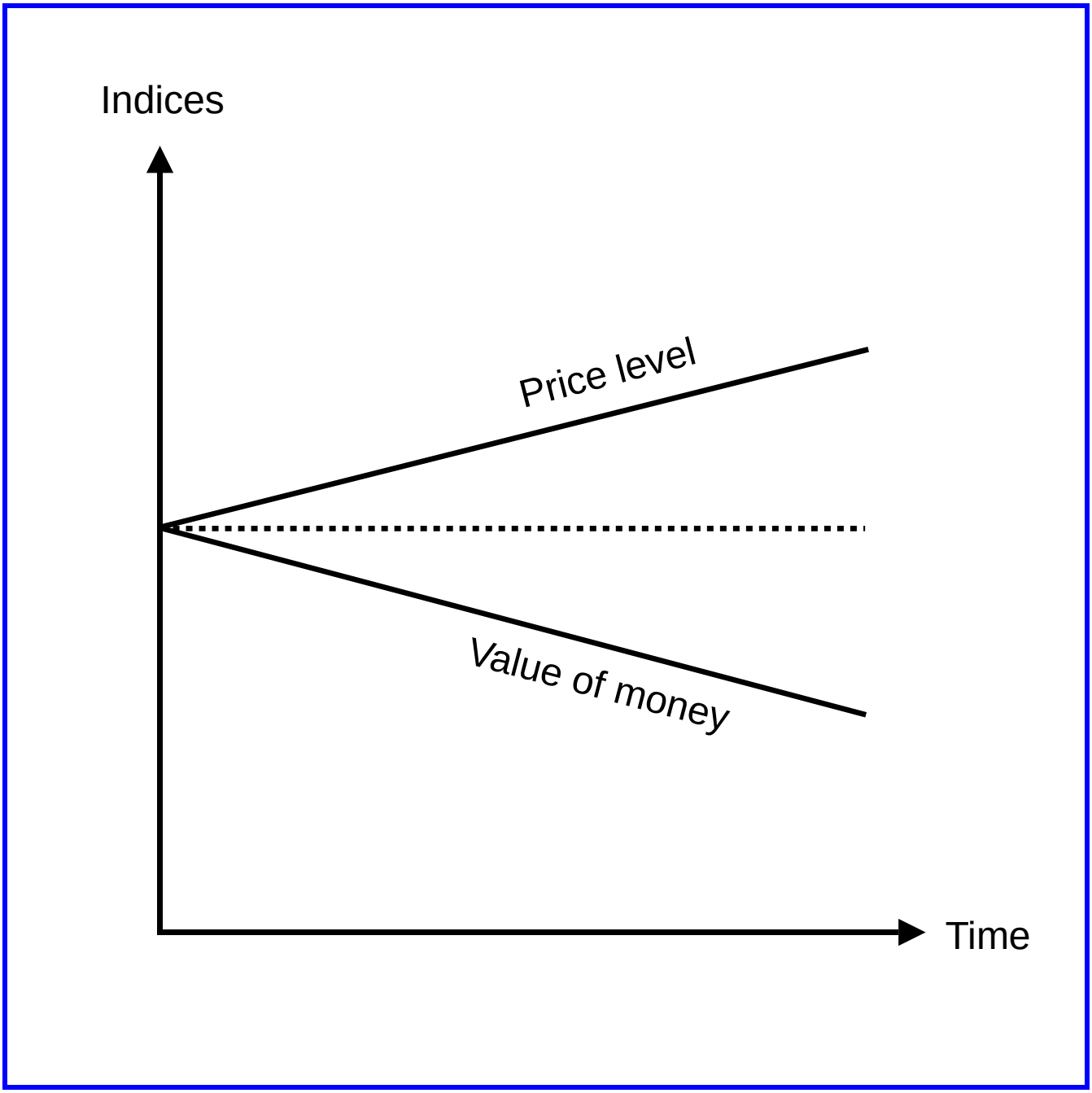
① **Income rises.** What happens to an inferior good?



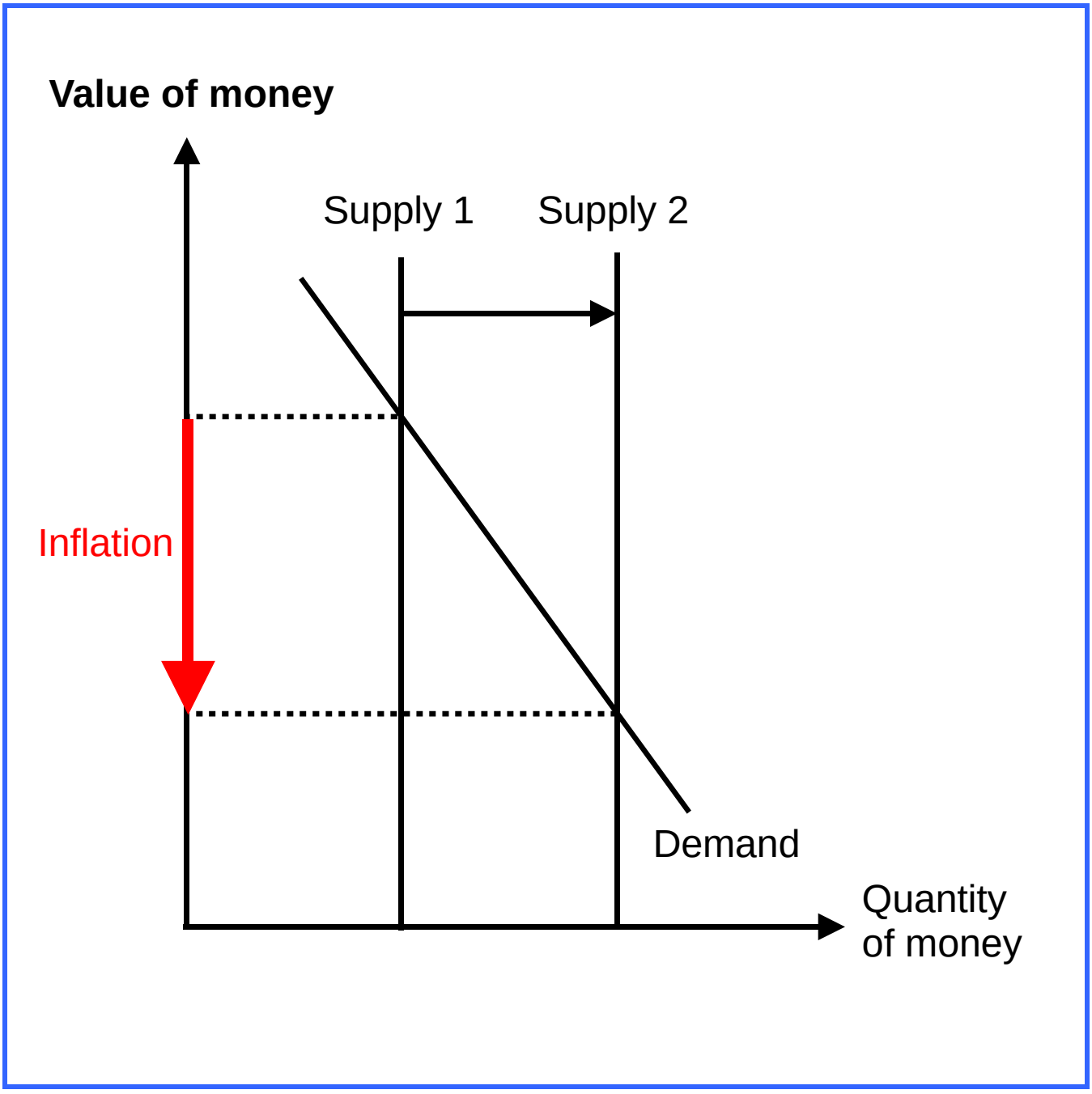
② **Income falls.** What happens to an inferior good?



Inflation 1 - characteristics

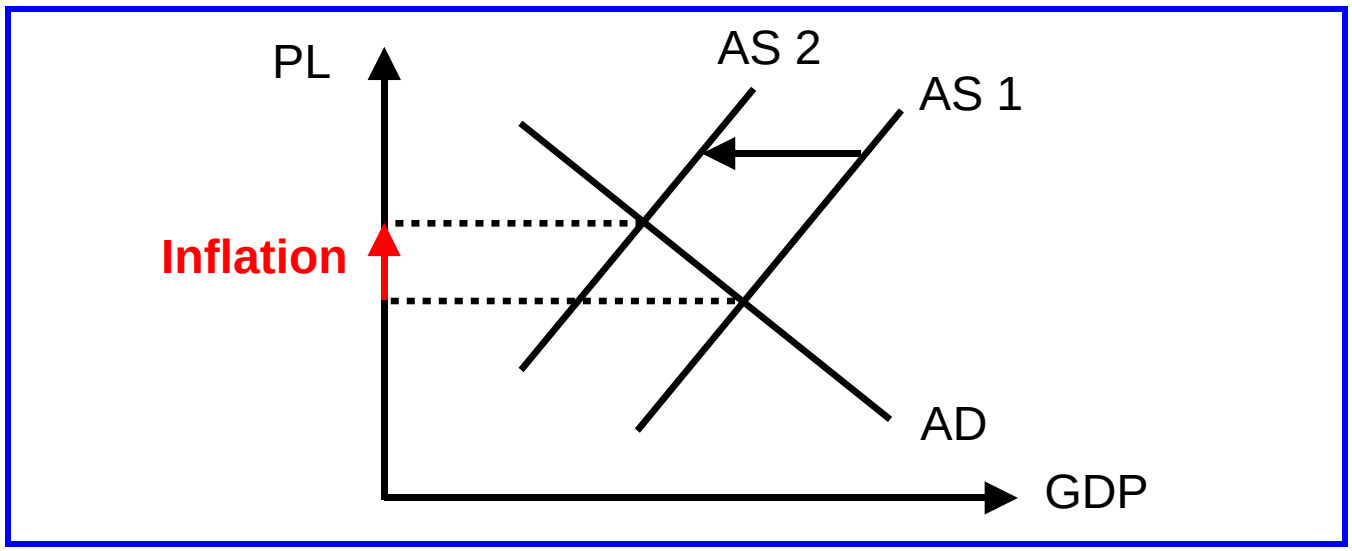


Inflation 2 - monetary inflation

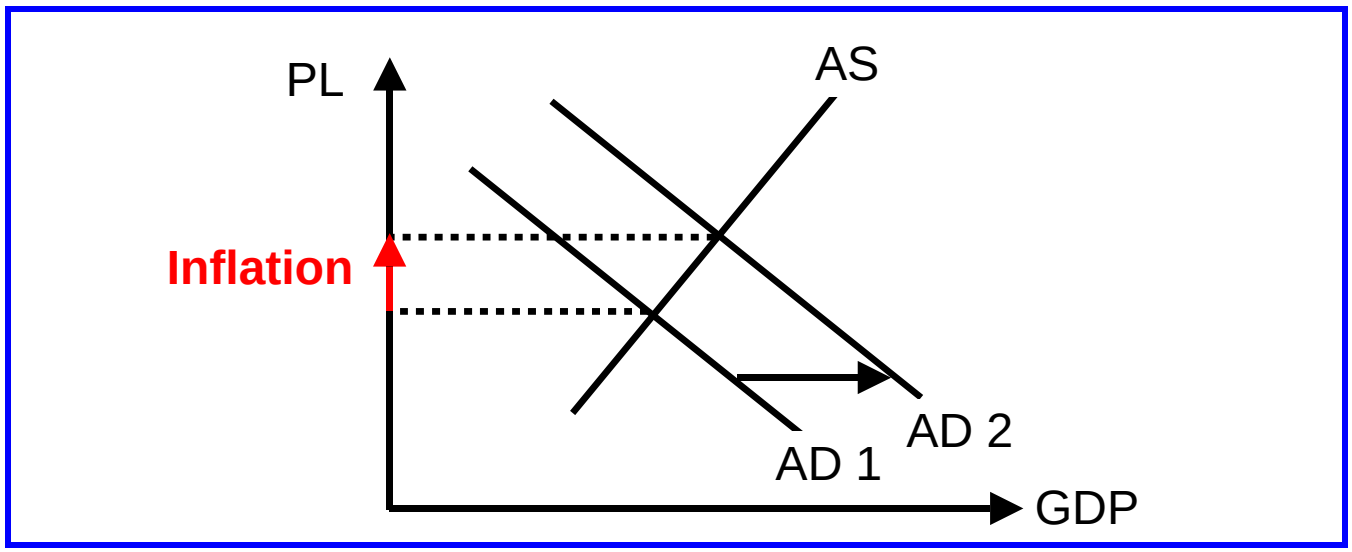


Inflation 3 - cost-push inflation and demand-pull inflation

① **Cost-push** inflation

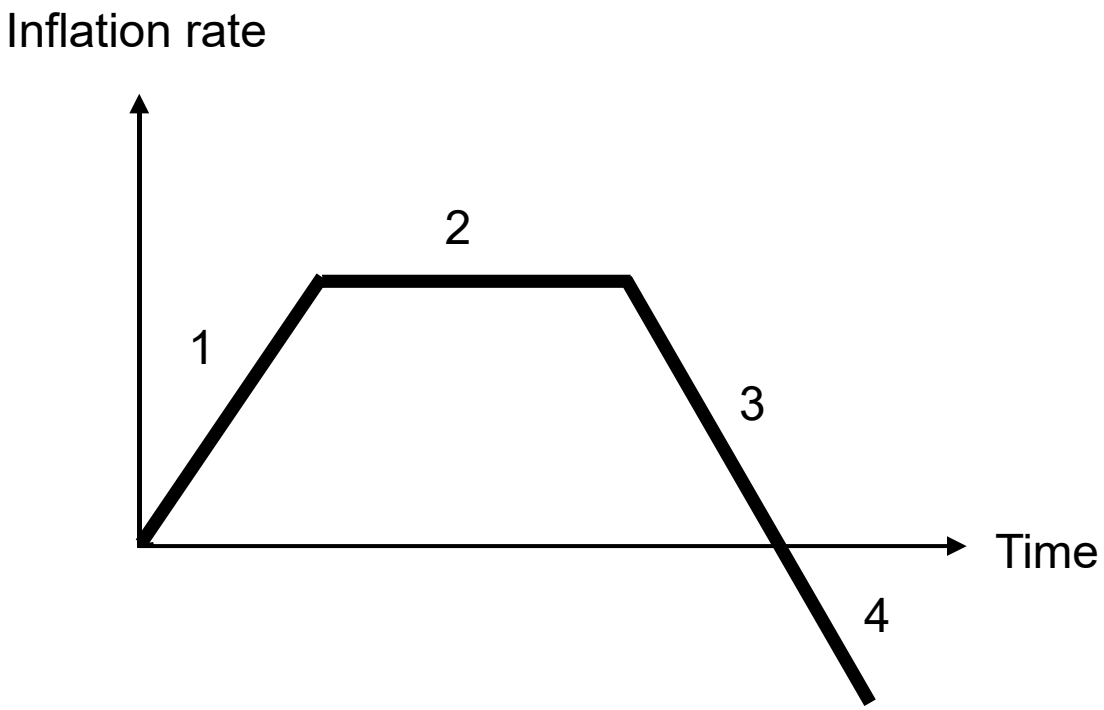


② **Demand-pull** inflation



AS = Aggregate supply	PL = Price level
AD = Aggregate demand	GDP = Gross domestic product

Inflation, Disinflation and Deflation



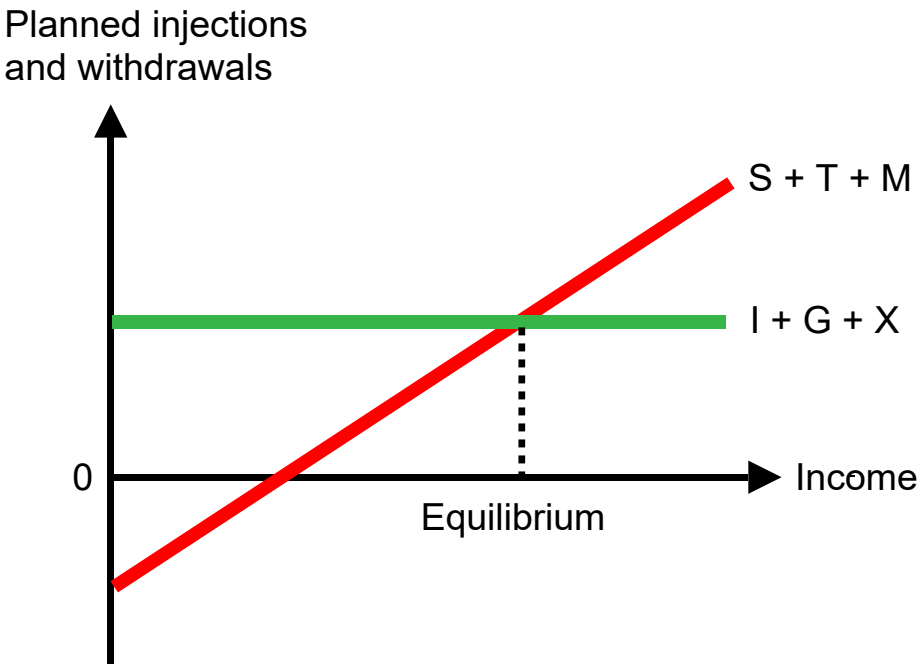
1,2 Inflation
3 Disinflation
4 Deflation

Injections and withdrawals

1 *Assumptions*

- **Independent** of income: Injections = I + G + X
- **Dependent** on income: Withdrawals = S + T + M

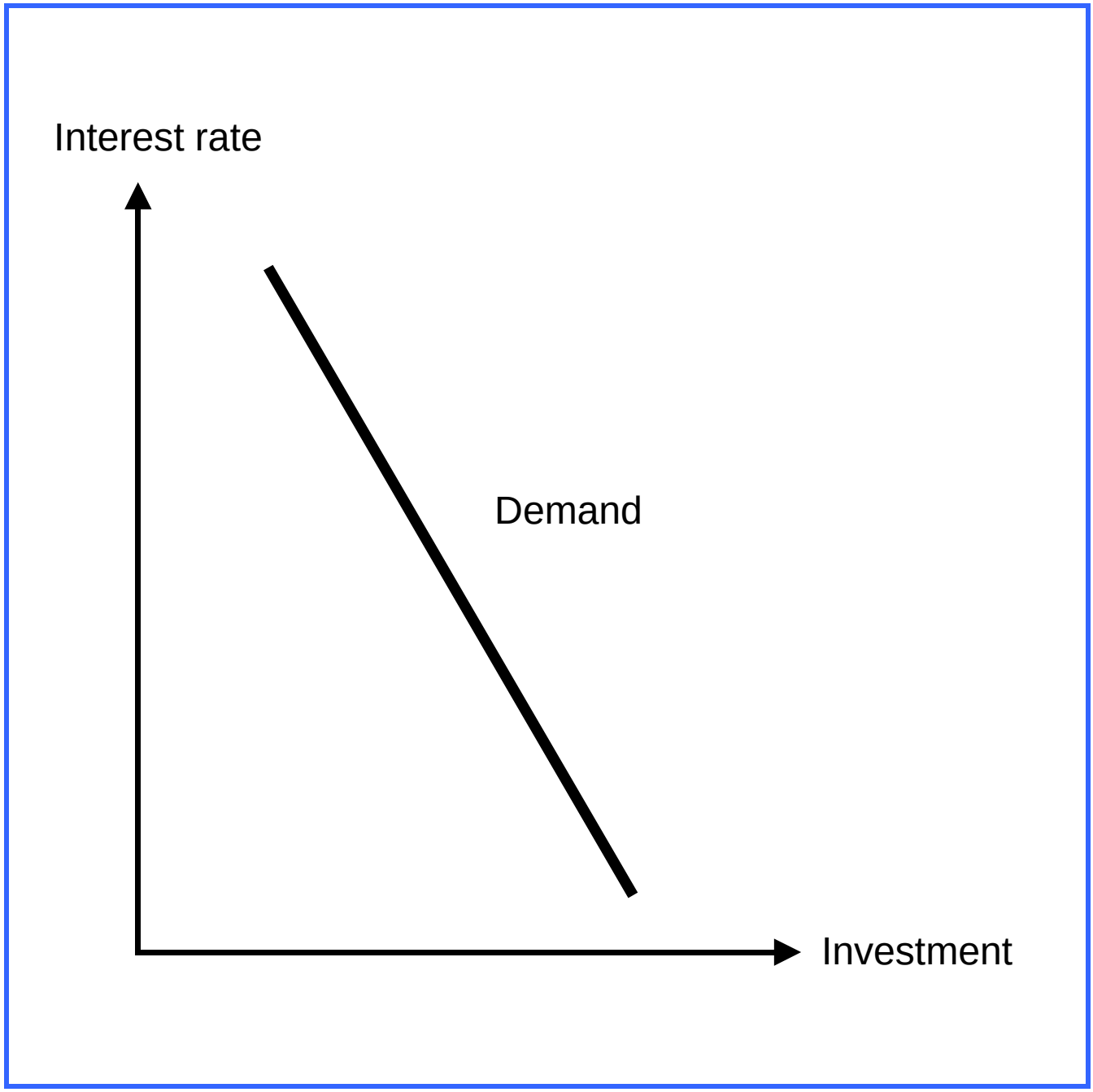
2 *Graphic*



3 *Abbreviations*

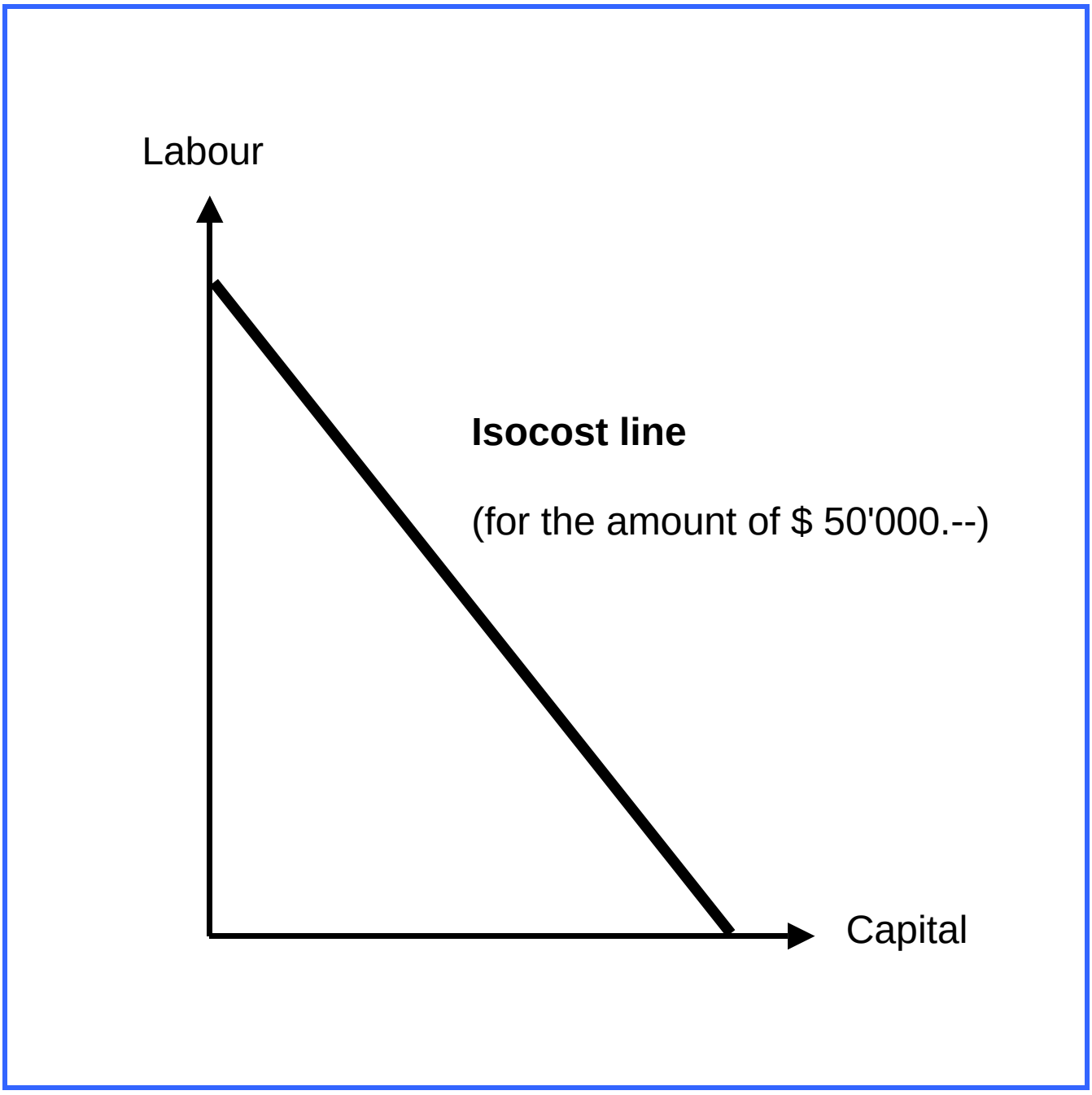
Injections	Withdrawals
I = Investment	S = Savings
G = Government spending	T = Taxes
X = Exports	M = Imports

Investment demand



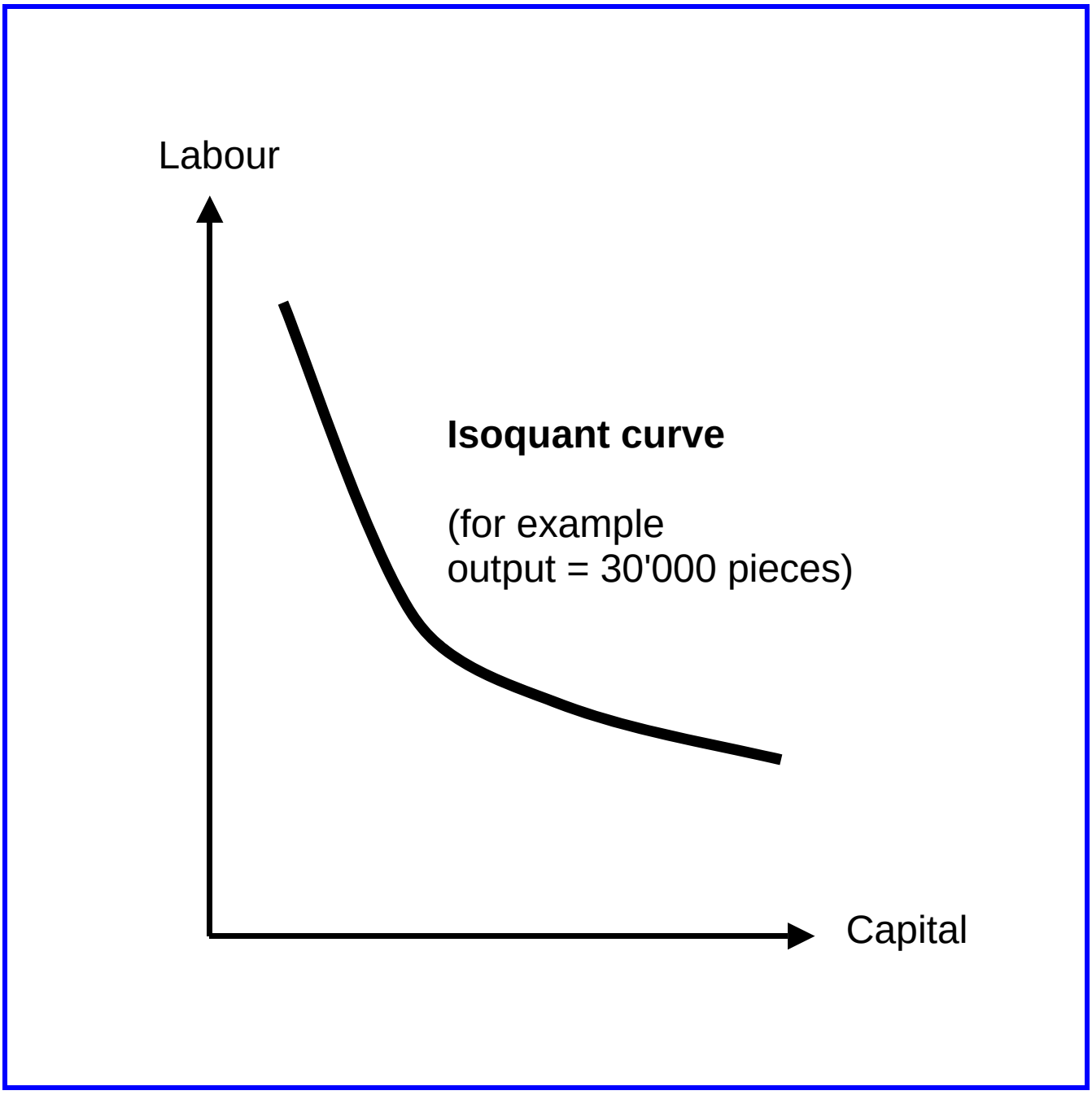
Isocost

An isocost line shows the combinations of divisible factors of production (labour, capital) that a firm can choose for a given amount of money.

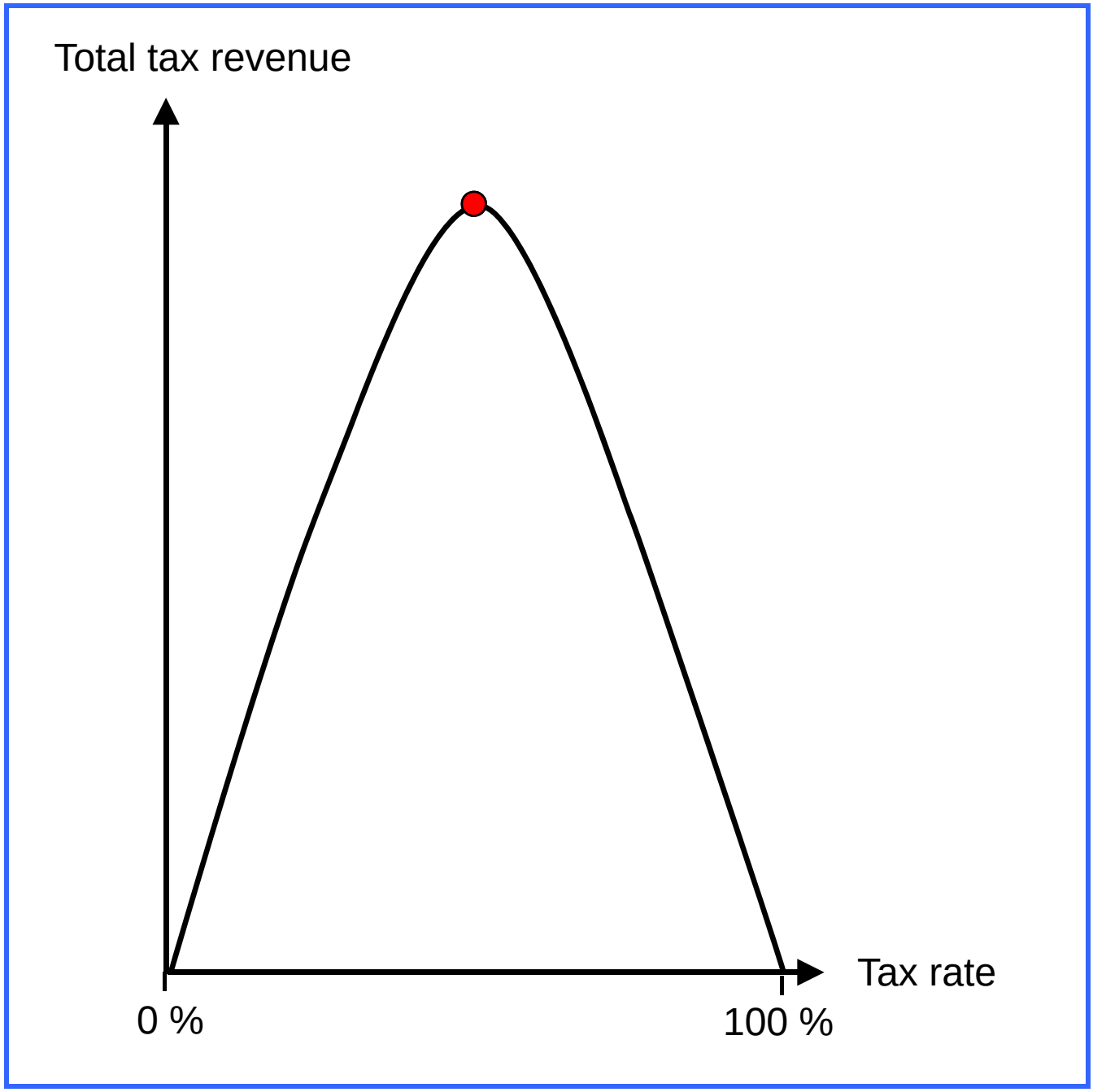


Isoquant

An isoquant curve shows the combinations of divisible factors of production (labour, capital) which are necessary for the production of a given output.



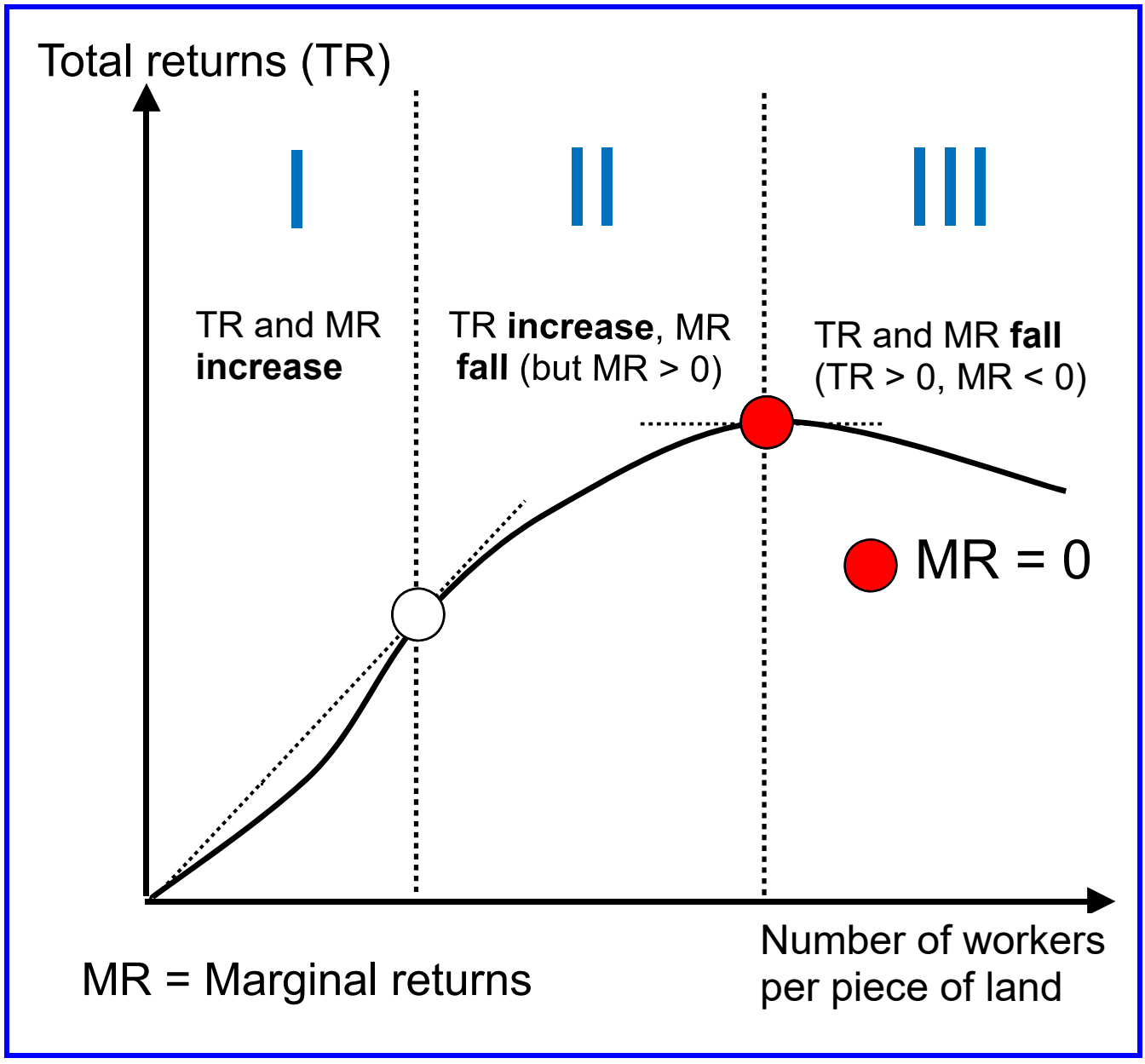
Laffer curve



Law of returns to a factor (classical)

Assumptions:

- The production factor 'labor' is variable;
- all other factors of production are constant (fixed).

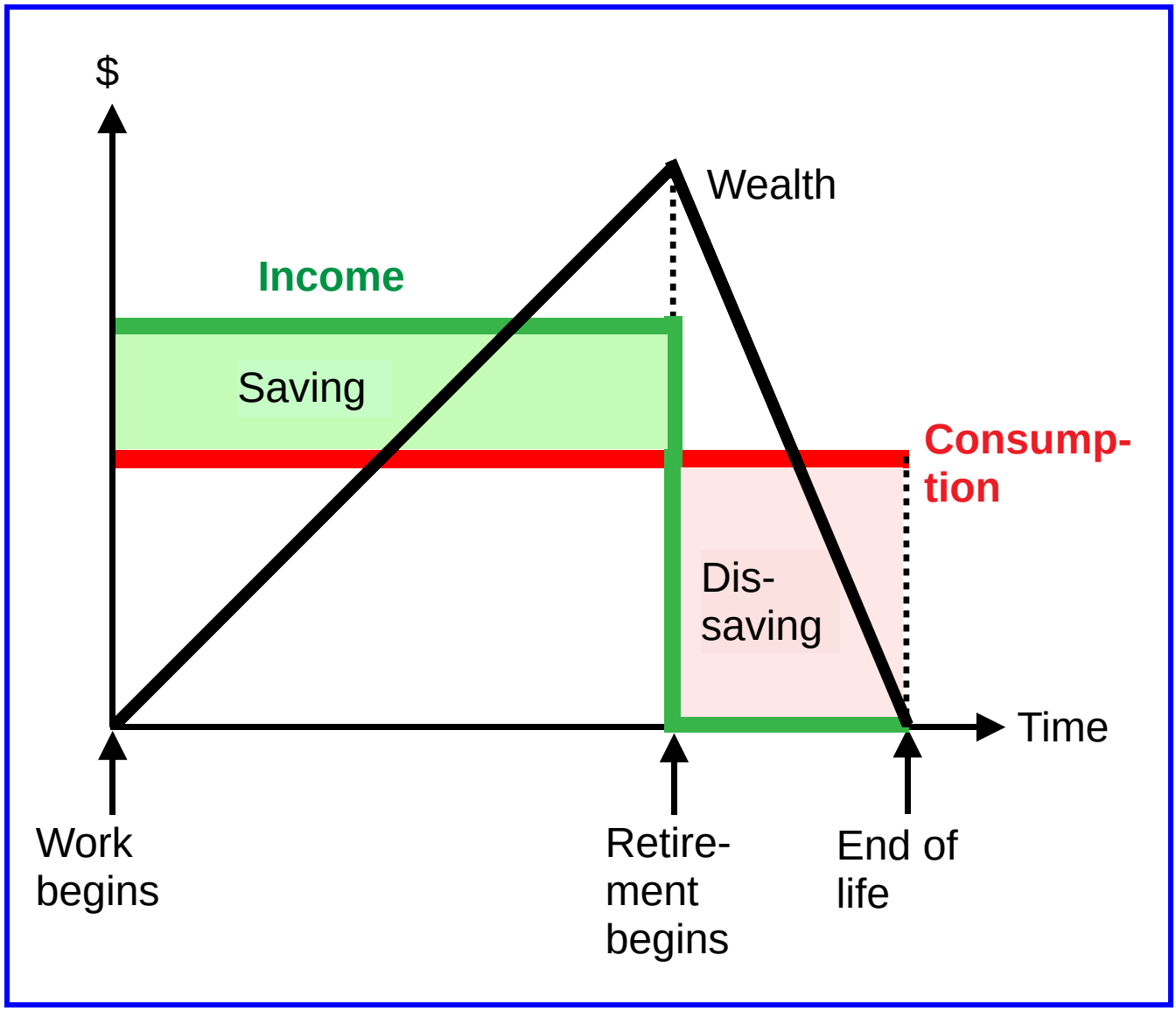


Note:

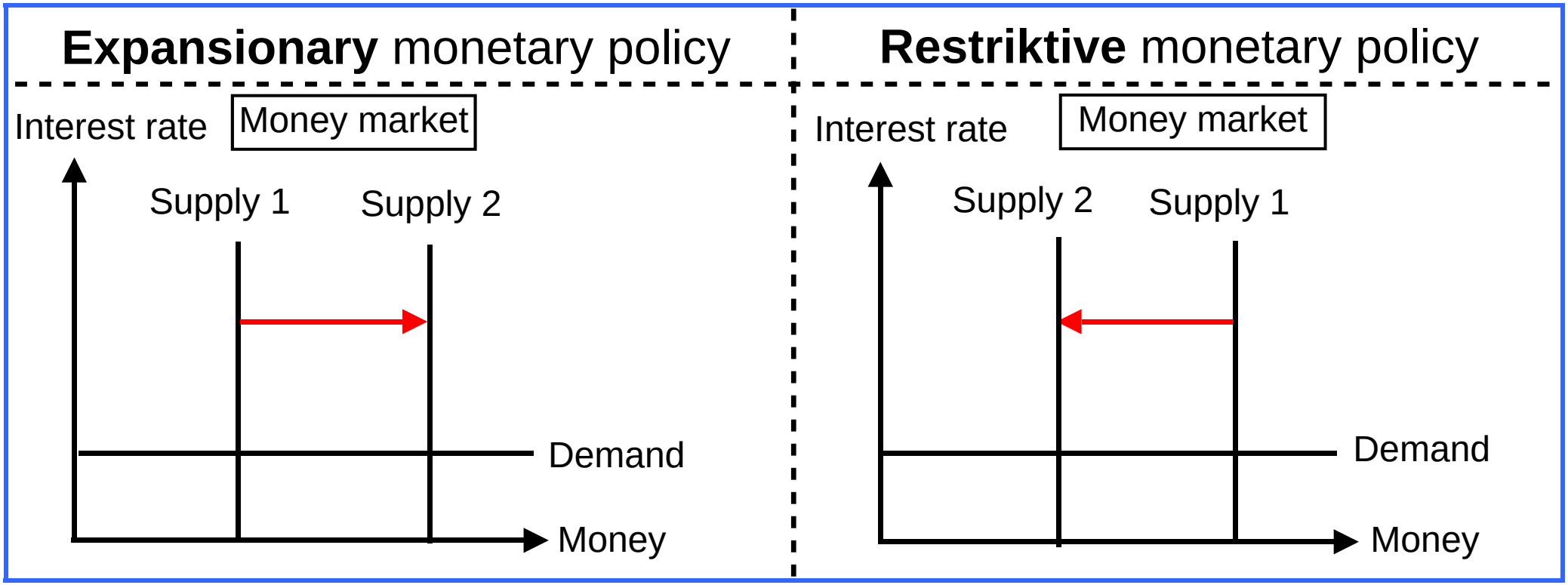
Neoclassical law of returns to a factor (special case of the classical law of returns to a factor) → Law of diminishing (marginal) returns to a factor (MR falls, but MR > 0) (graph looks like area II).

Life-cycle hypothesis

According to the life-cycle hypothesis, consumption does not depend on current income, but on **lifetime income**. Wealth is built up by saving out of income to enable consumption during retirement.

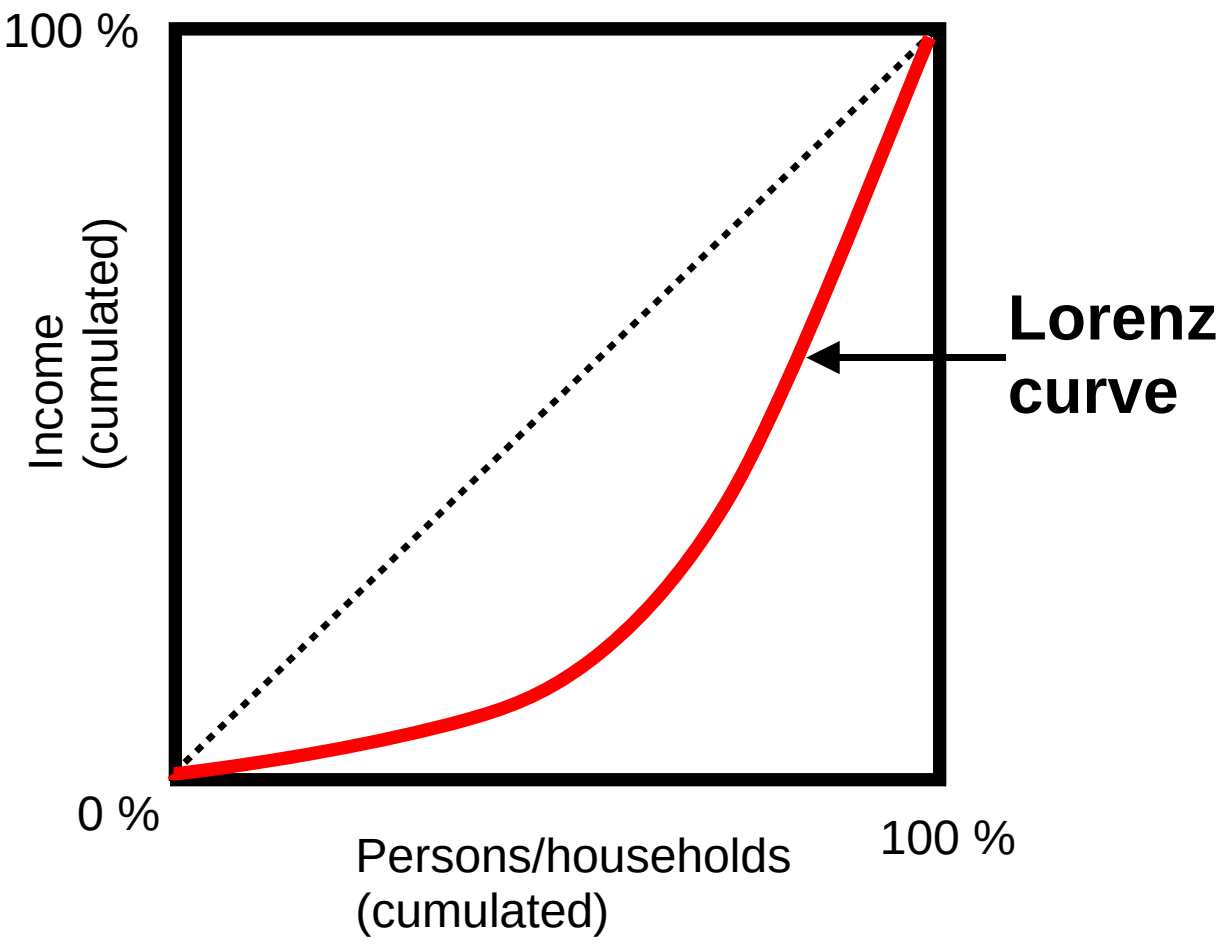


Liquidity trap



In both situations, neither the interest rates nor the corresponding investments will change.

Lorenz curve

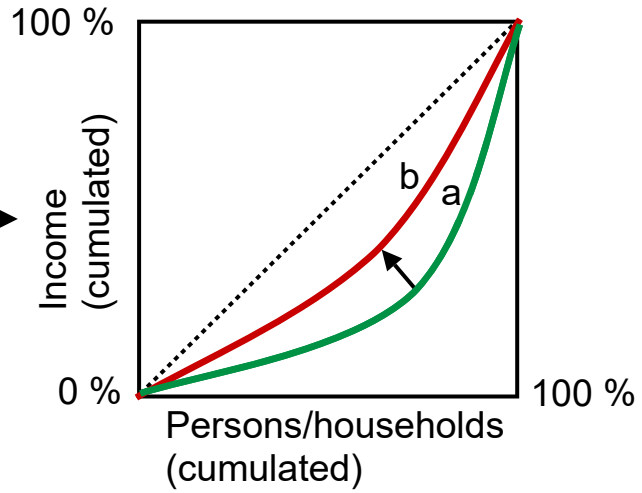


Lorenz curve and tax

① **Progressive** income tax

Lorenz curves a, b

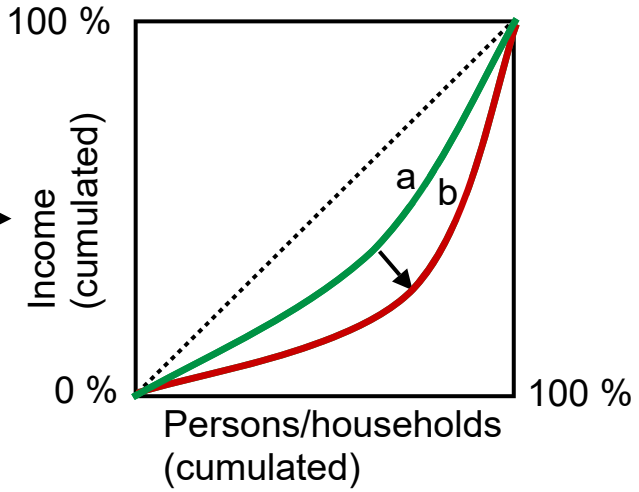
a **before** tax
b **after** tax



② **Regressive** income tax

Lorenz curves a, b

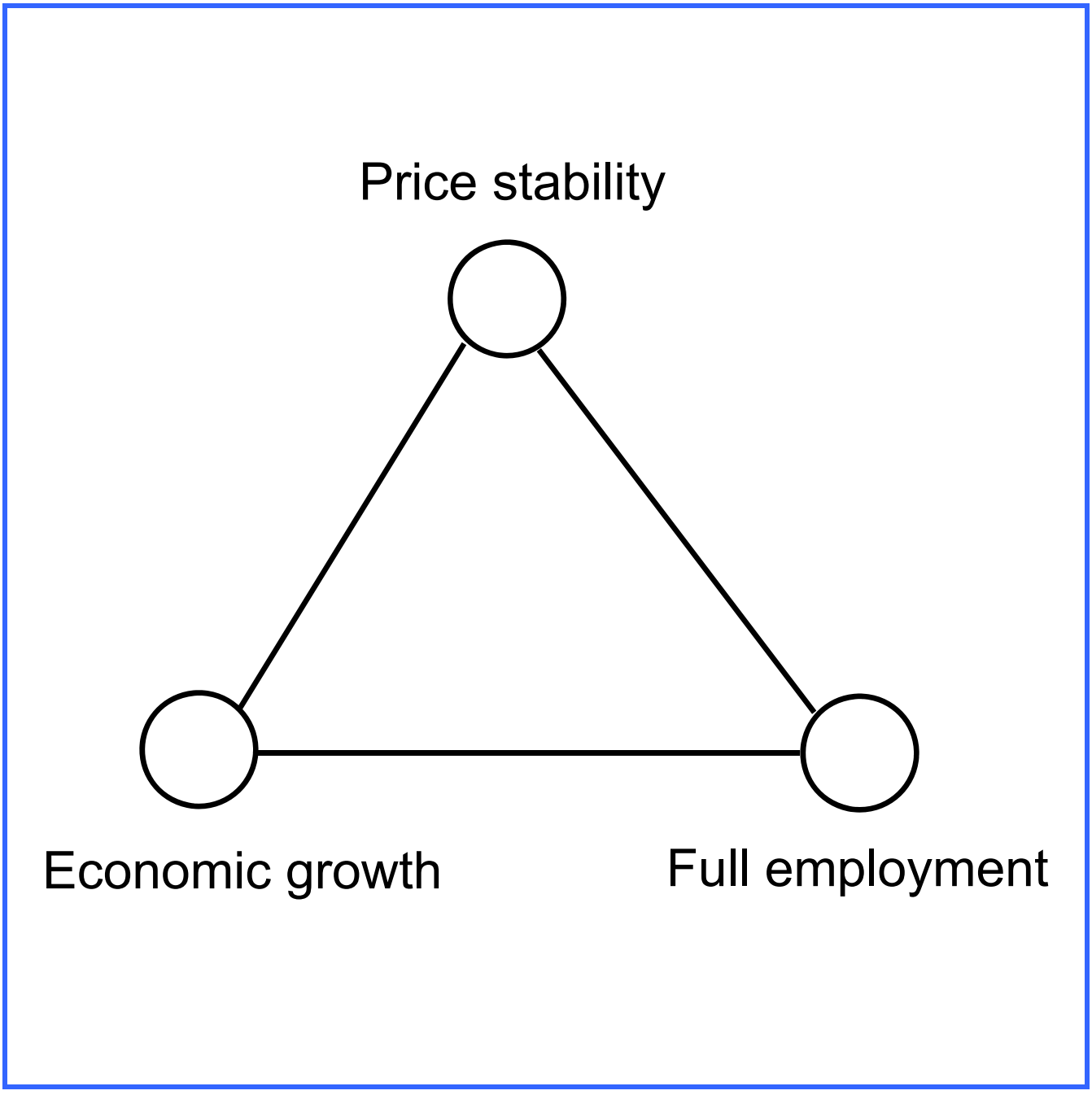
a **before** tax
b **after** tax



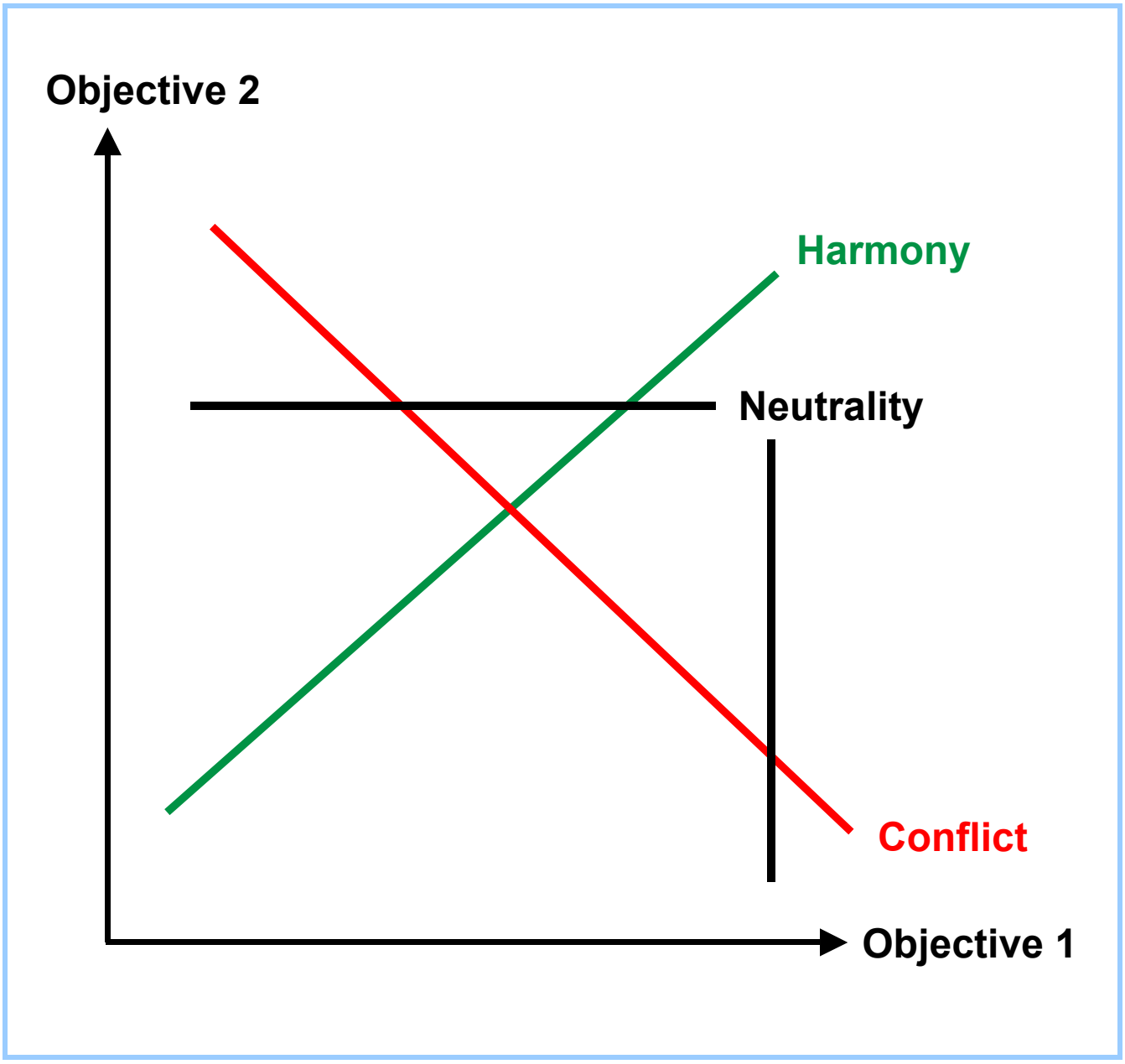
③ **Proportional** income tax

The position of the Lorenz curve **does not change** (a = b).

Macroeconomic objectives 1 - introduction

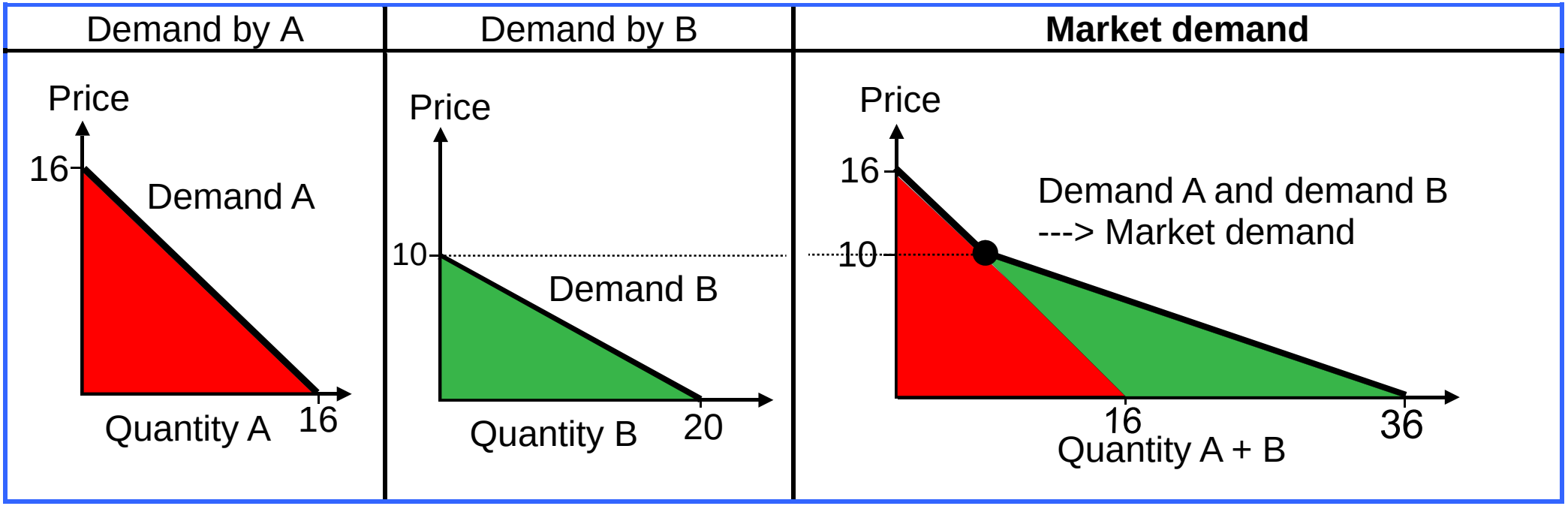


Macroeconomic objectives 2 - relations



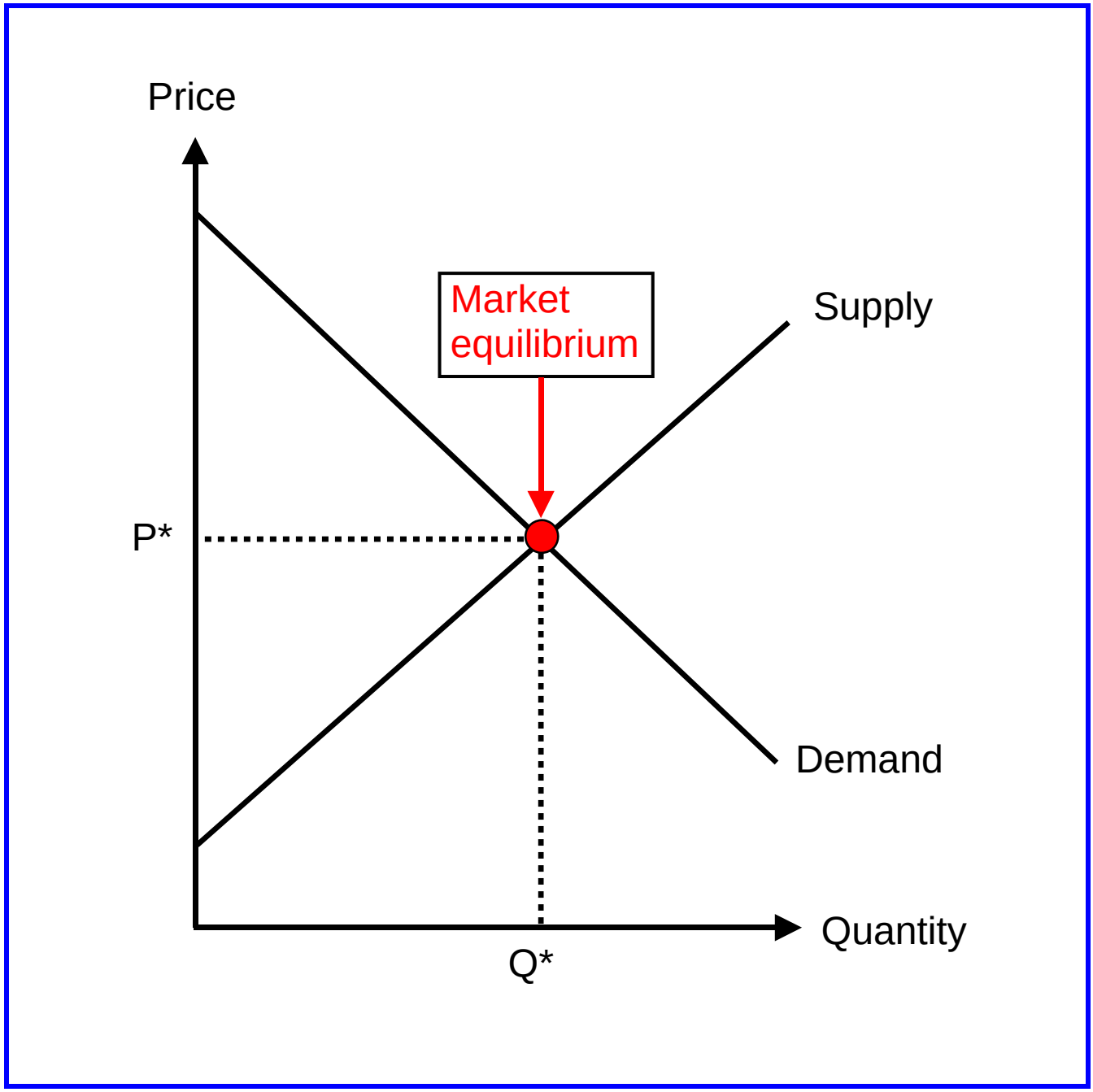
Market demand (derivation)

A market consists of 2 consumers, A and B. The market demand is derived from the individual demand curves by adding them horizontally.



Similarly, the market supply can be derived.

Market equilibrium

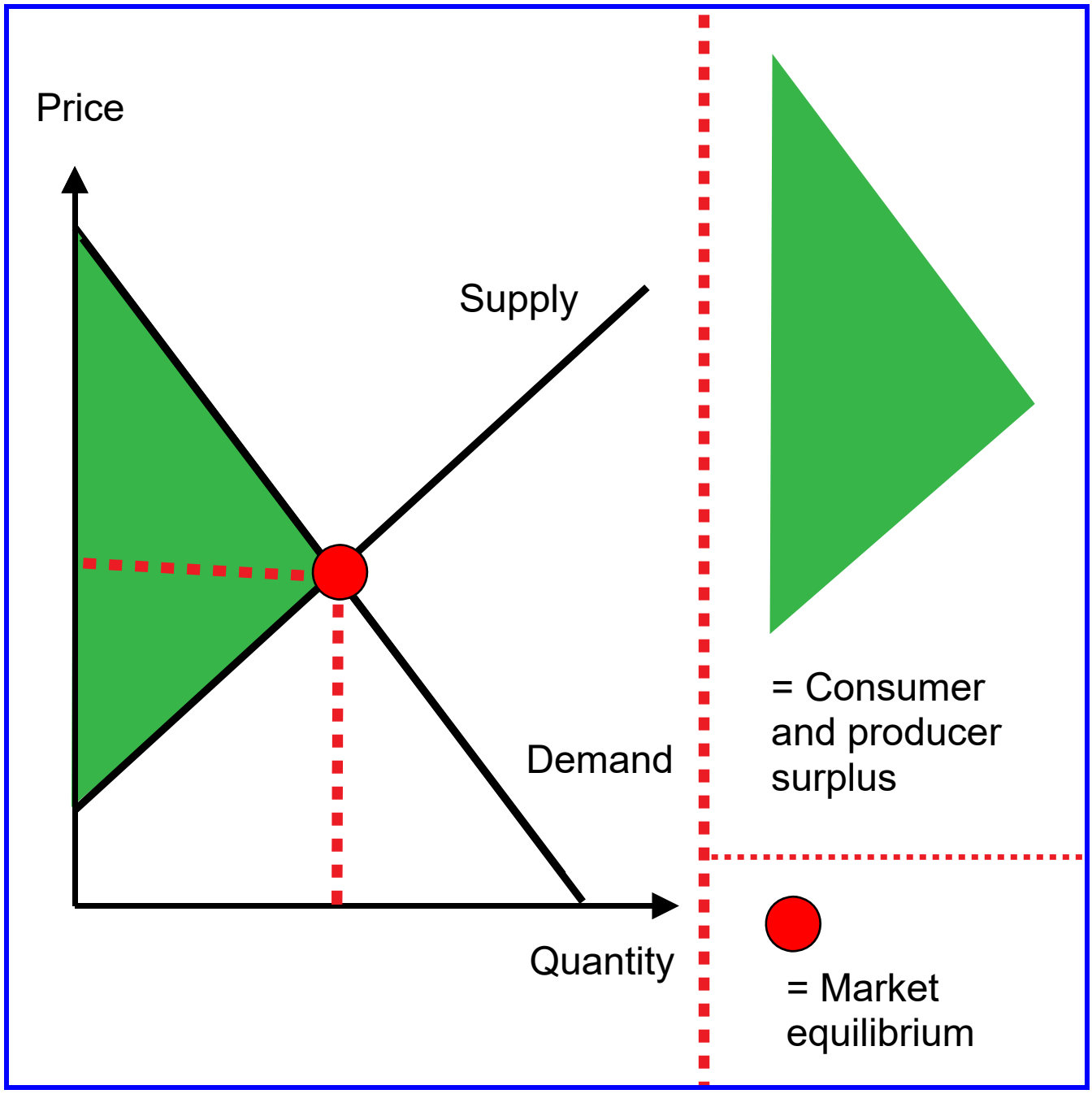


Q* = Equilibrium quantity
P* = Equilibrium price

Market equilibrium and efficiency

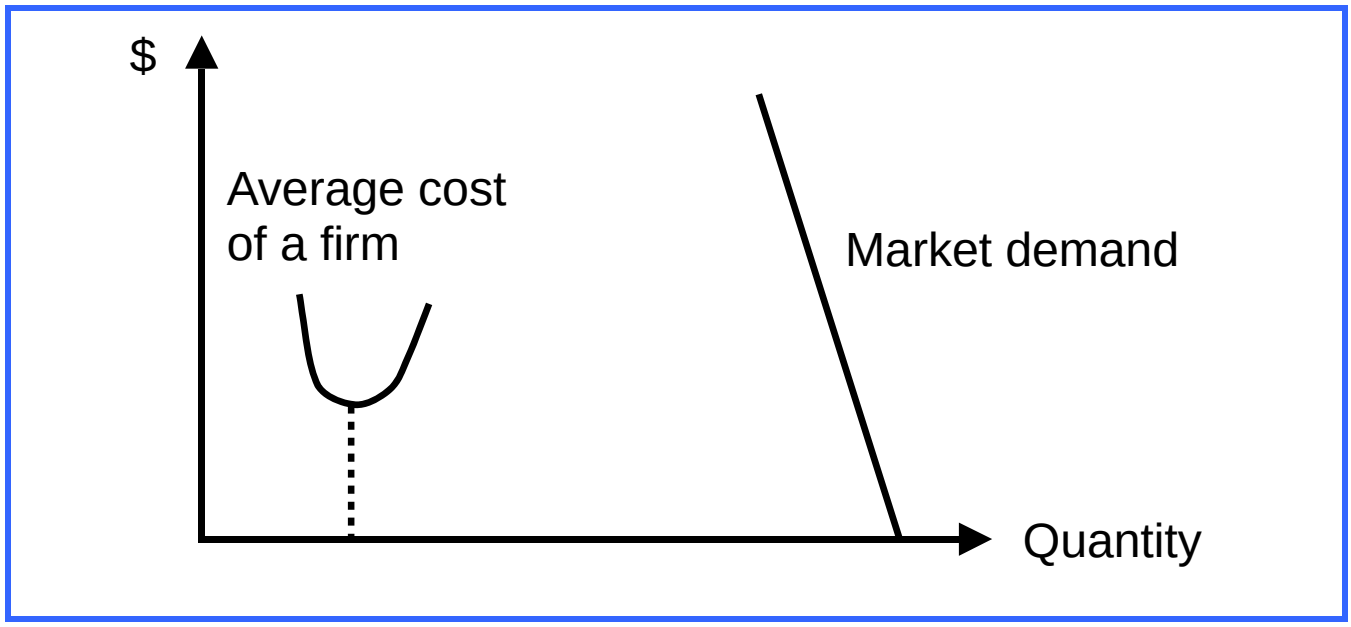
The market equilibrium is **efficient** for two reasons:

- At the intersection, marginal cost (supply) and marginal benefit (demand) are equal.
- The sum of the consumer and the producer surplus is the largest.

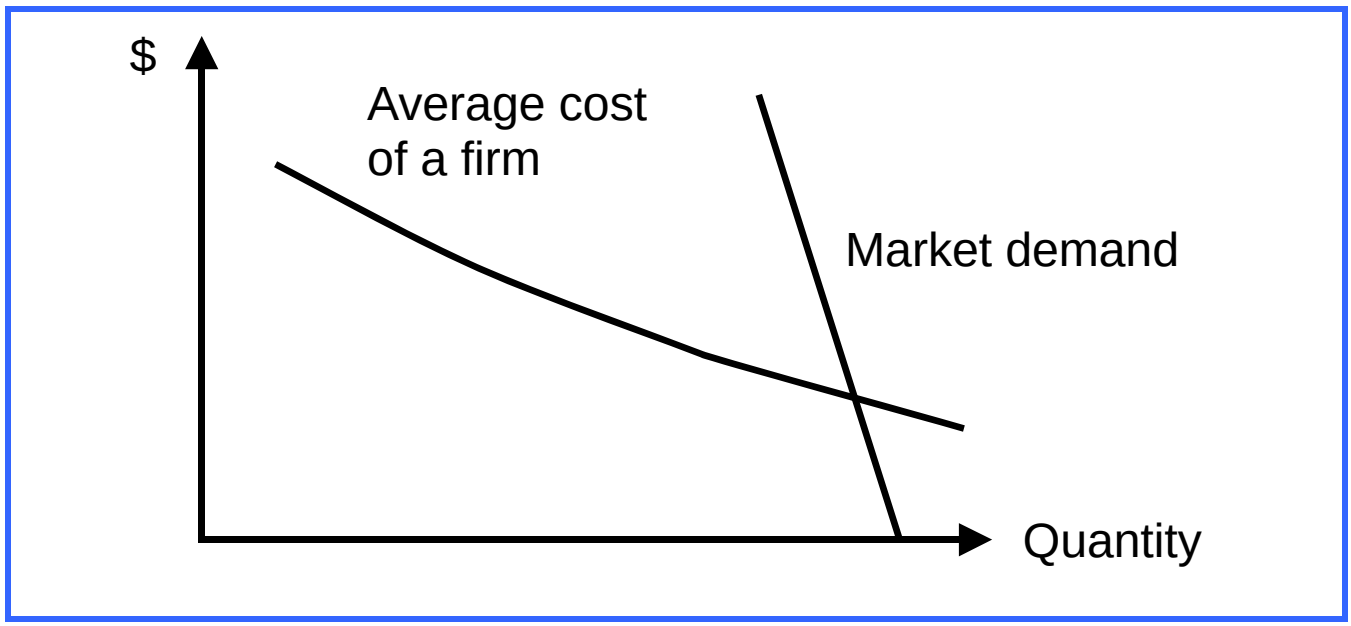


Market structure and cost

① **A few firms** offer the product.

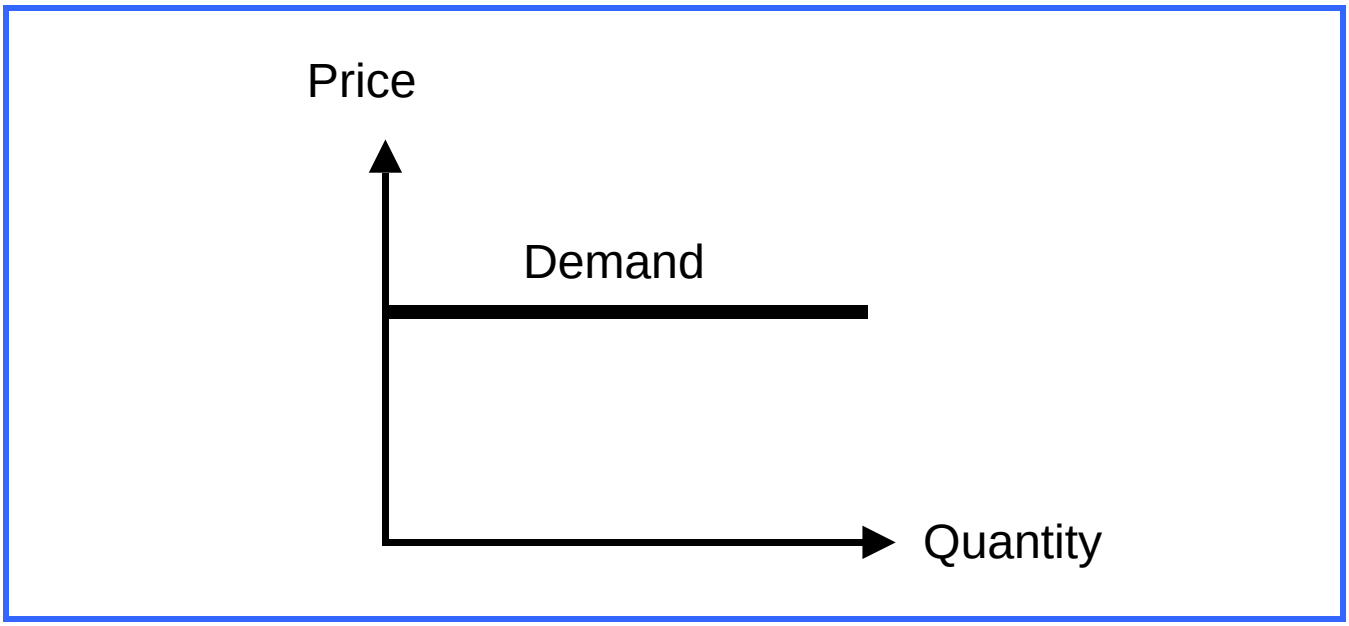


② **A monopoly** (as a natural monopoly) is probable.

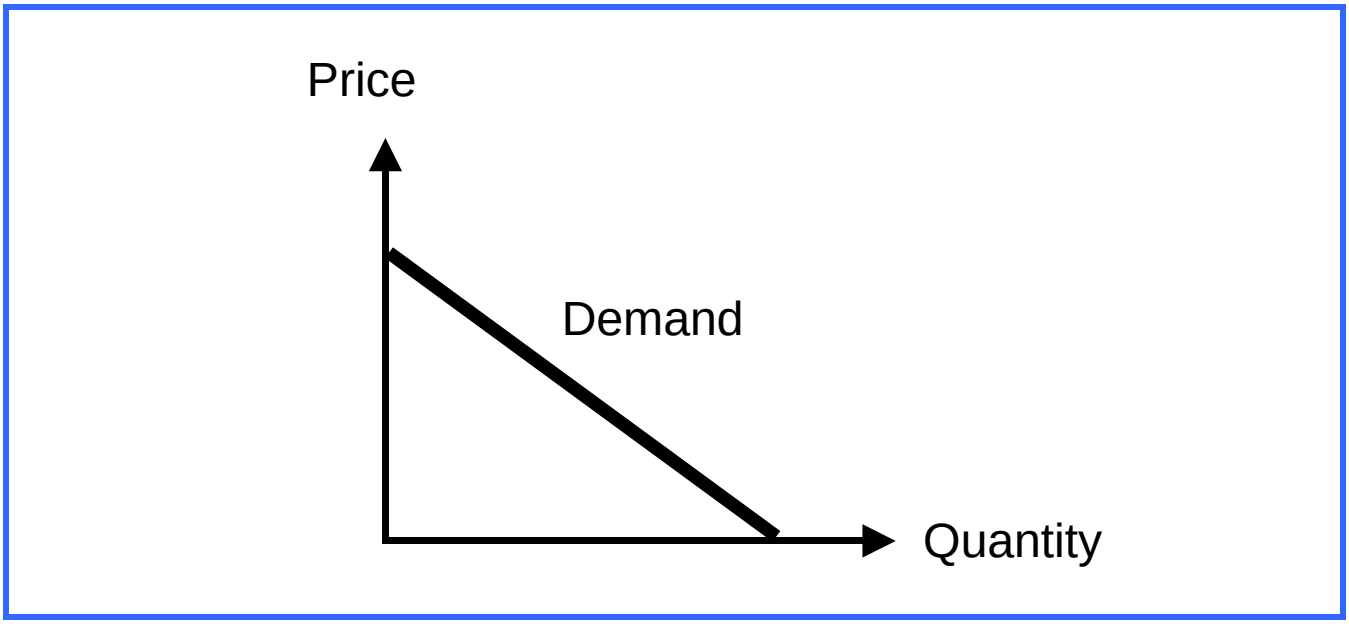


Market structure and demand

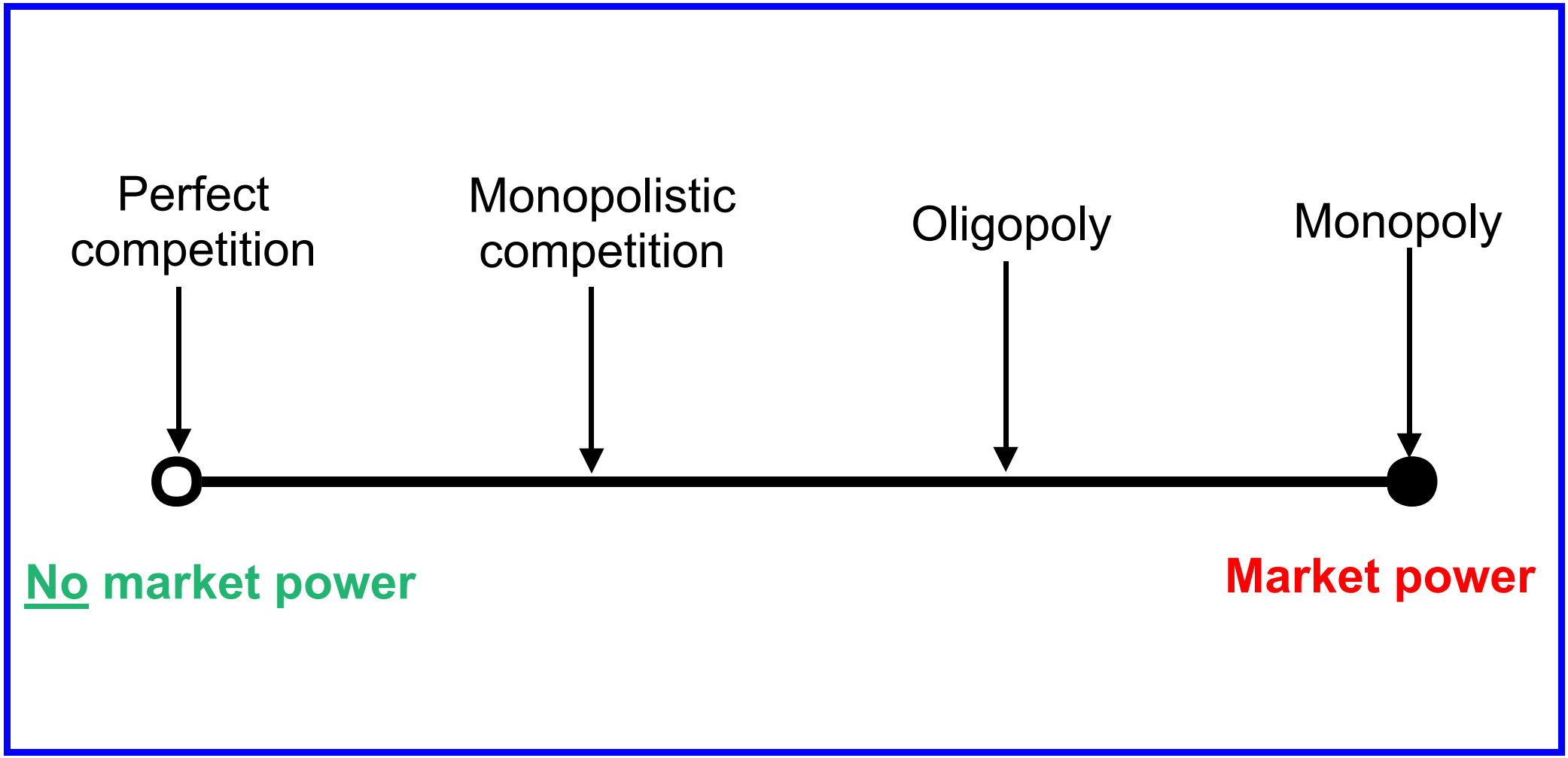
① Perfect competition



② Monopoly



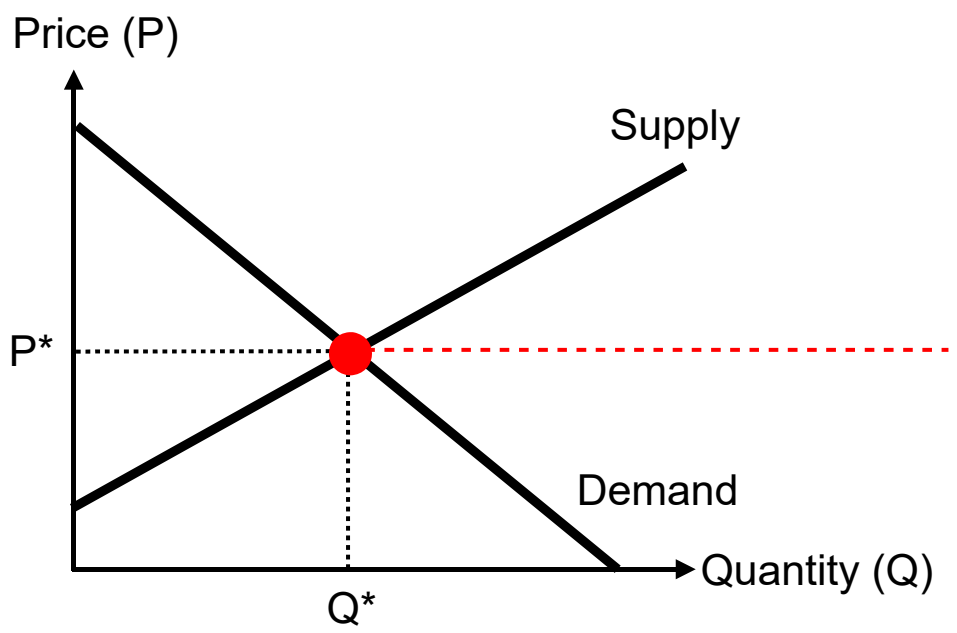
Market structure and market power



Market versus perfectly competitive firm

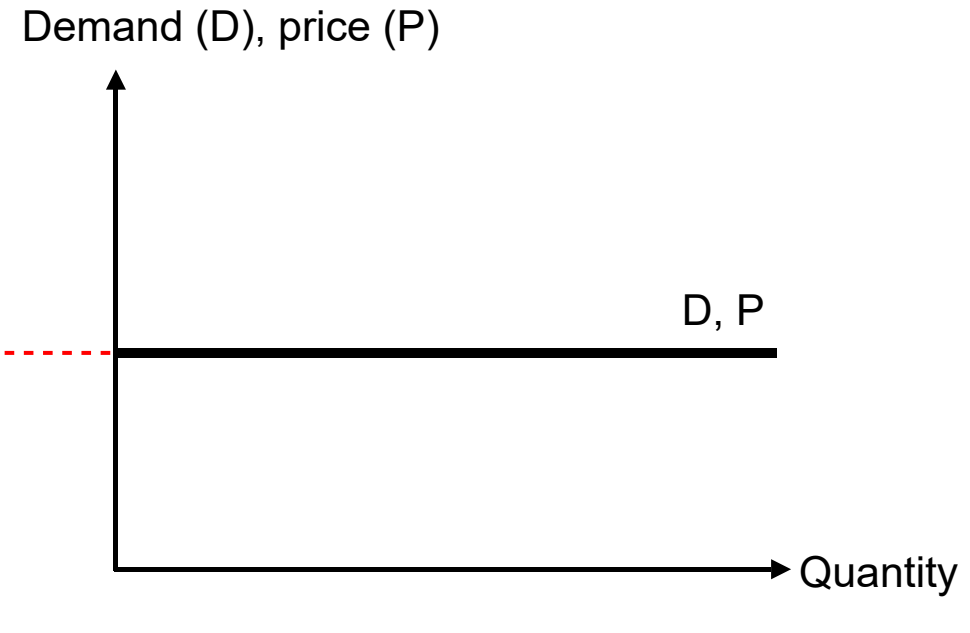
Market

(Supply, demand, equilibrium P*and Q*)



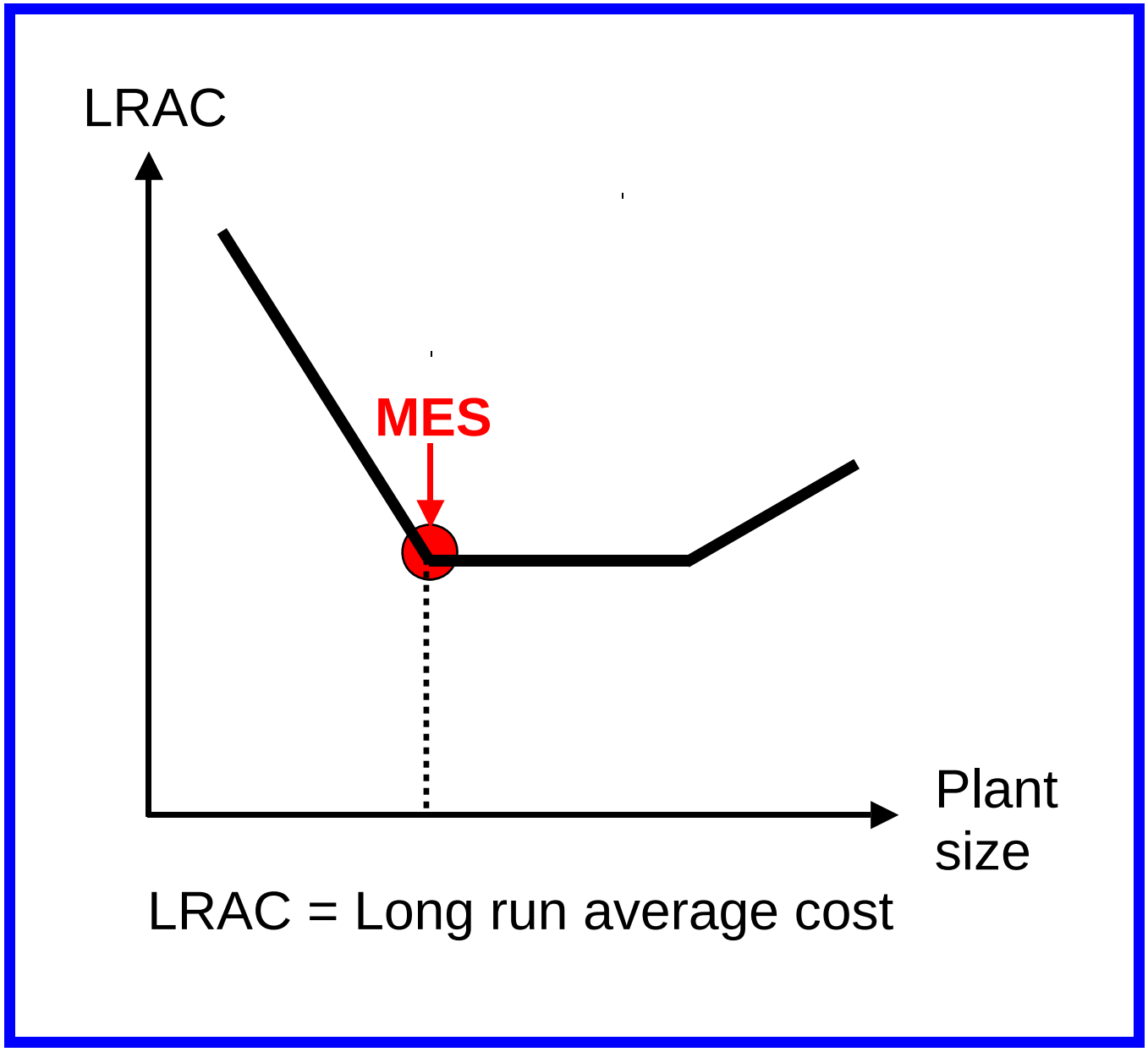
Individual firm

(Demand, price / perfect competition)



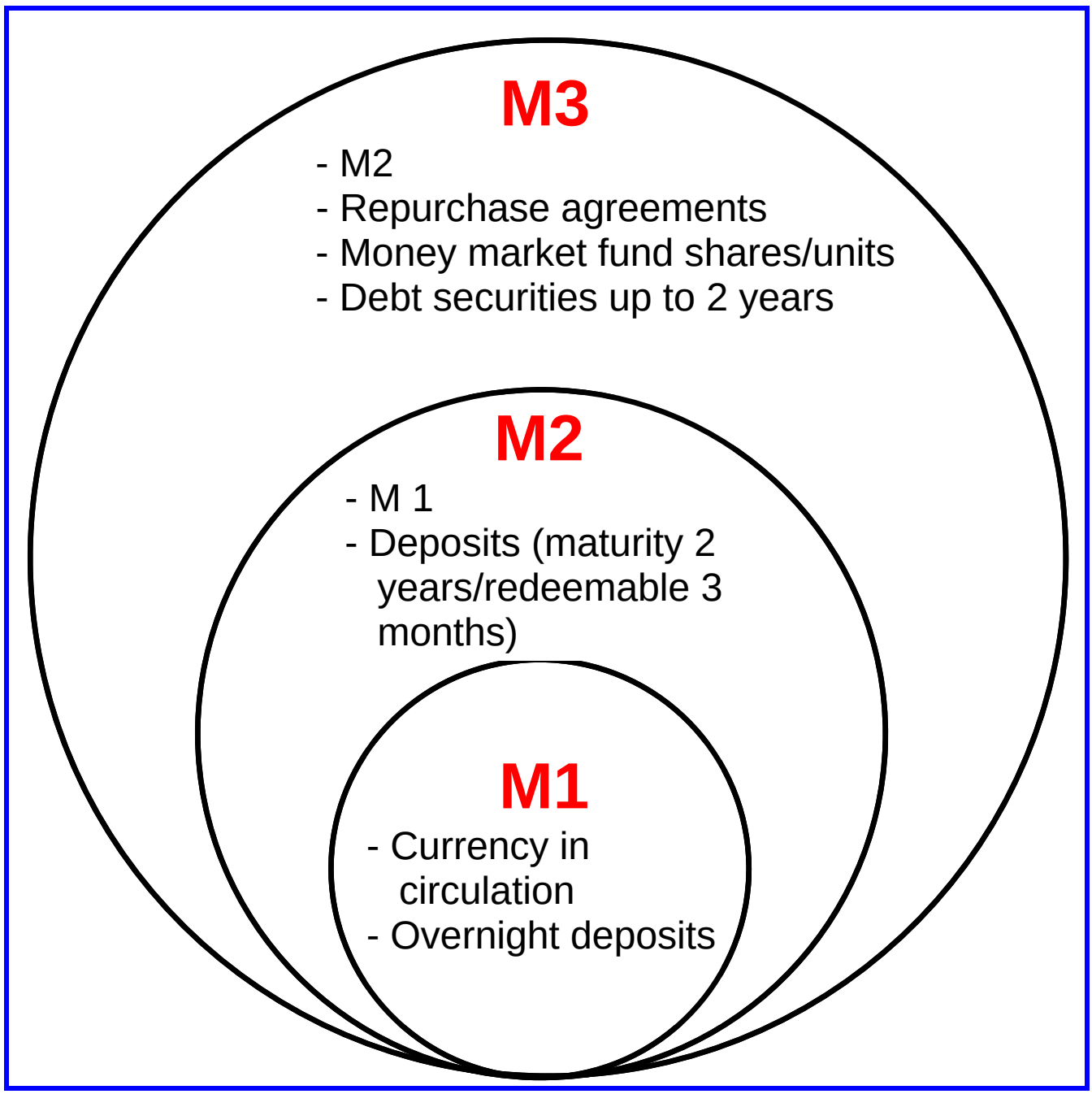
Supply according to individual situation

Minimum efficient scale (MES)



MES is the quantity of production whose further increases would not lead to lower long run average cost.

Monetary aggregates ECB

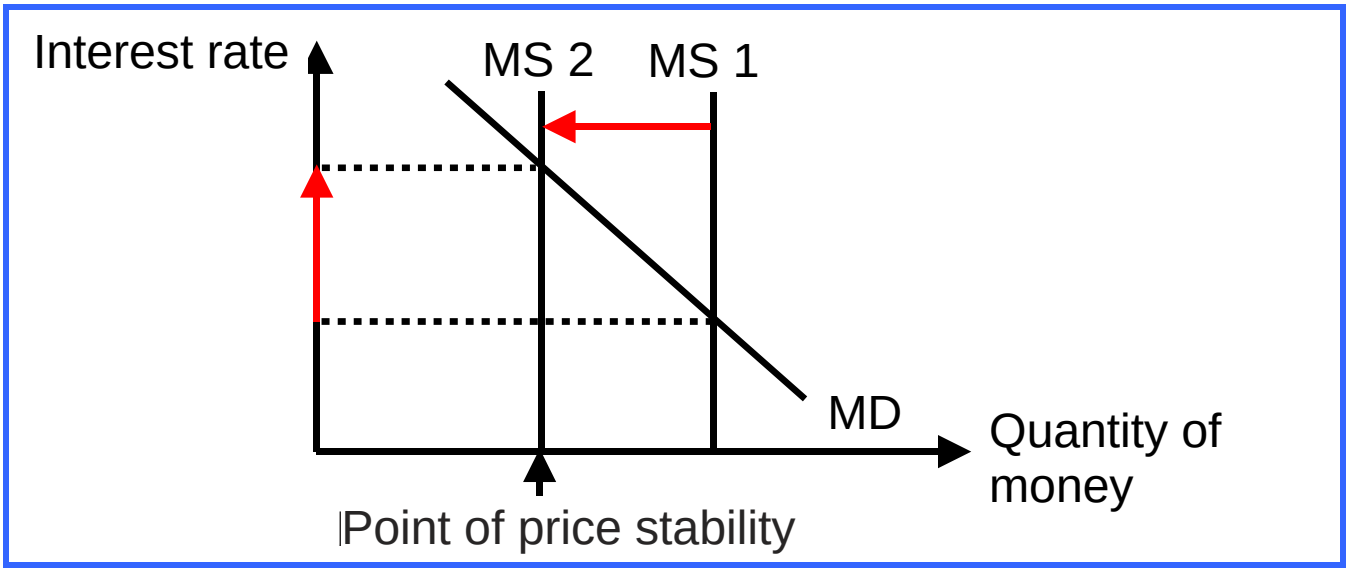


Source: www.ecb.europa.eu (21.1.18)

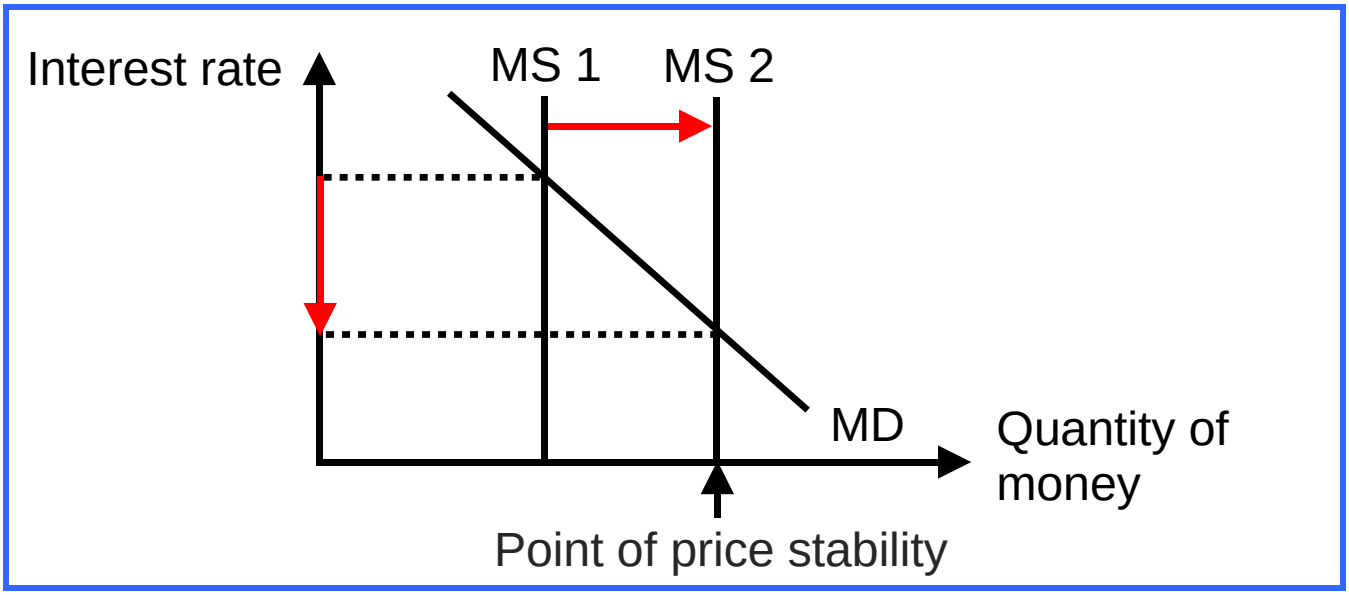
Monetary policy

We assume that the **price stability** is the primary goal of the monetary policy.

① Situation of **inflation**



② Situation of **deflation**

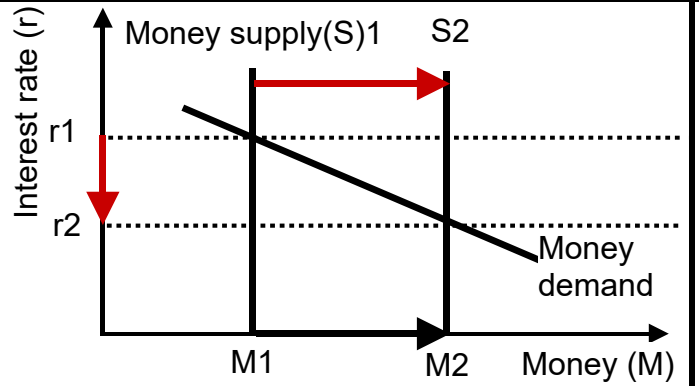


MS = Money supply
MD = Money demand

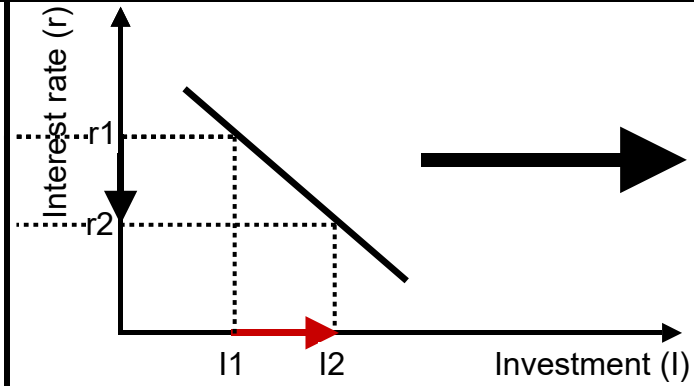
Monetary transmission mechanism

1 In the case of a **recession** (AD = Aggregate demand)

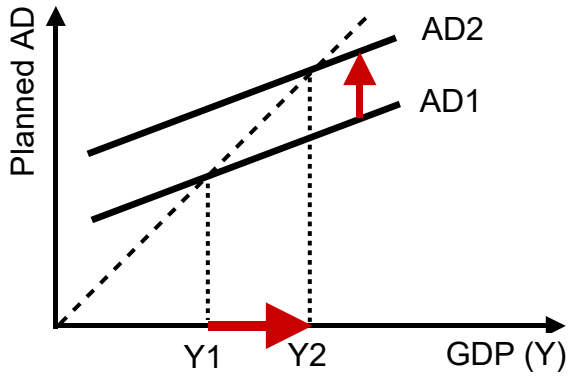
11 Money market



12 Investment

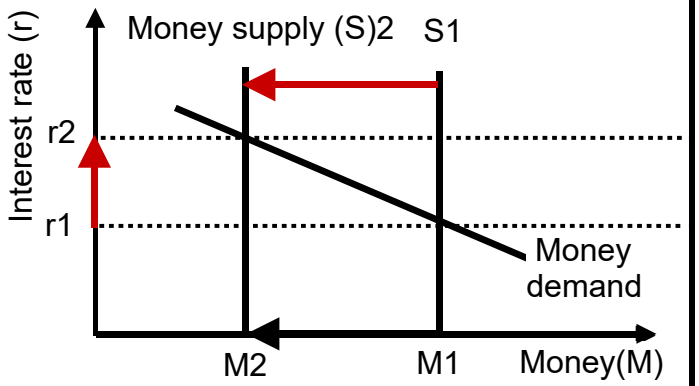


13 AD (= C+I+G+X-M)

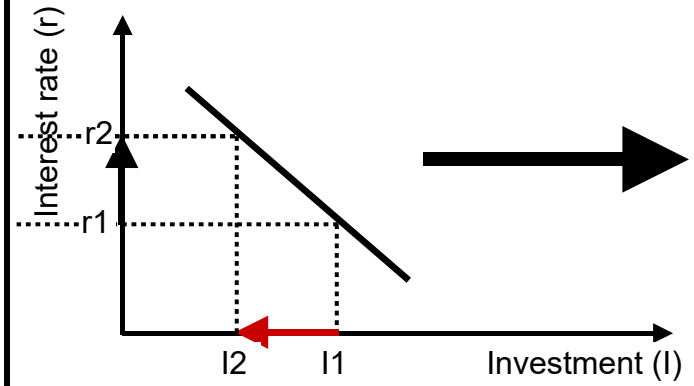


2 In the case of a **boom** (AD = Aggregate demand)

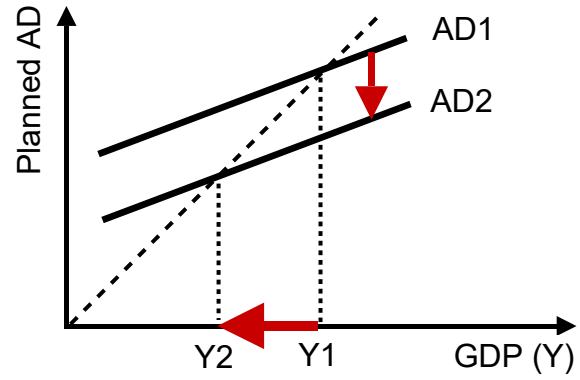
21 Money market



22 Investment

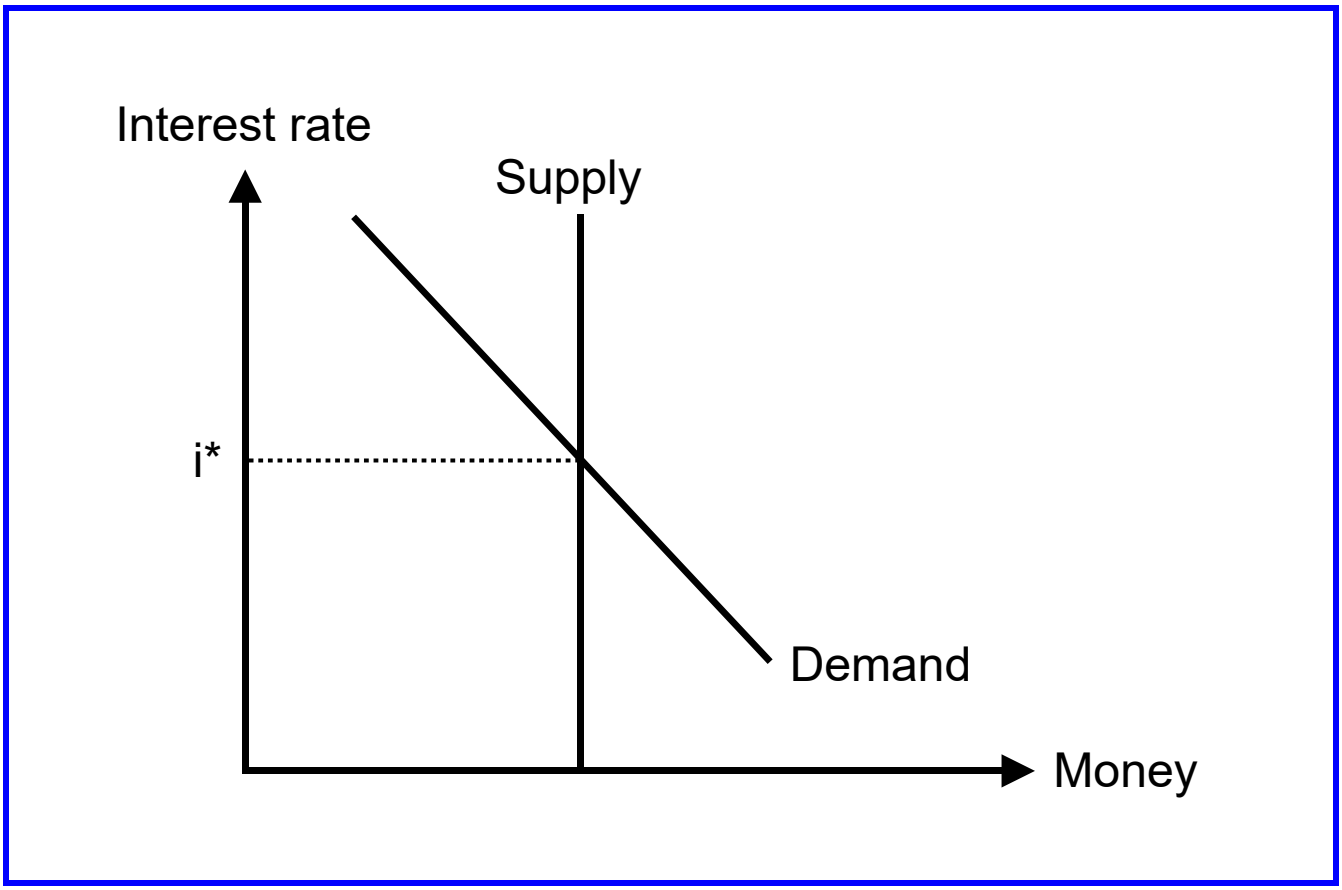


23 AD (= C+I+G+X-M)



C = Consumption / I = Investment / G = Government spending / X - M = Exports - imports (→ net exports) // GDP = Gross domestic product

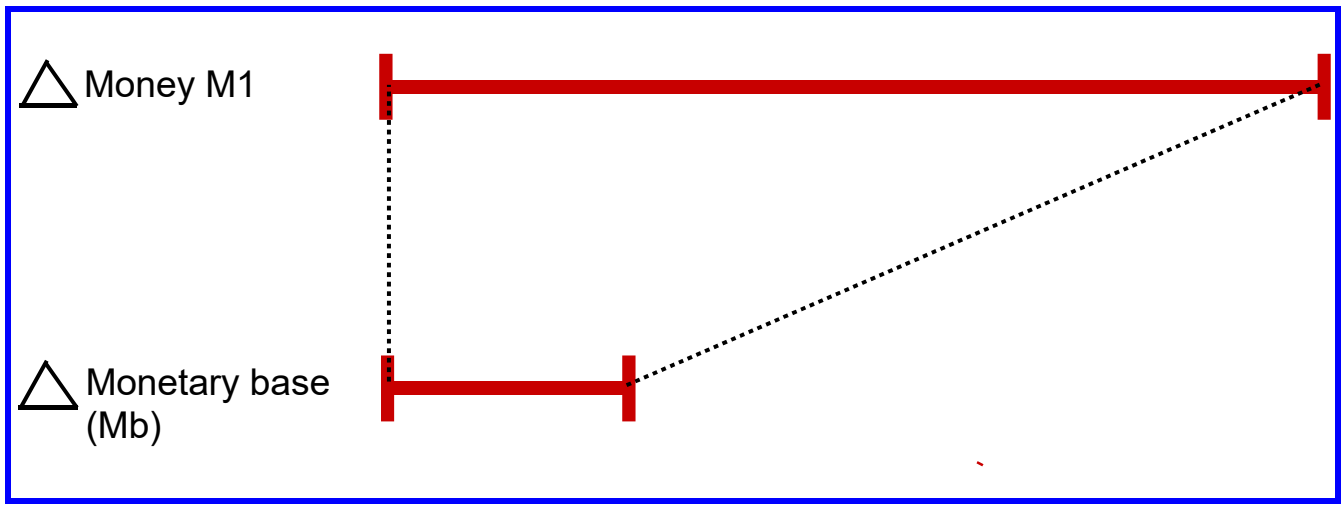
Money market



i* = interest rate at market equilibrium

Supply by the central bank
Demand by the public

Money multiplier



❶ Δ Mb and Δ Money M1 are known.

- Money multiplier = $\frac{\Delta \text{ Money M1}}{\Delta \text{ Mb}}$

❷ Δ Mb is known, **Δ Money M1 ?**
The public has no cash; r = reserve ratio of the banks.

- Money multiplier = $\frac{1}{r}$
- Δ Money M1 = Δ Mb * $\frac{1}{r}$ = $\frac{\Delta \text{ Mb}}{r}$

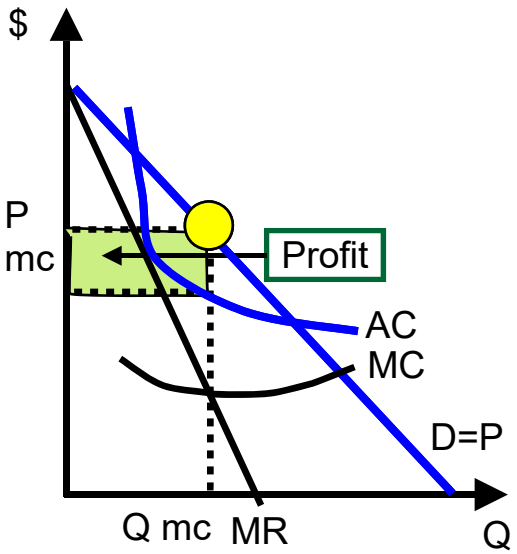
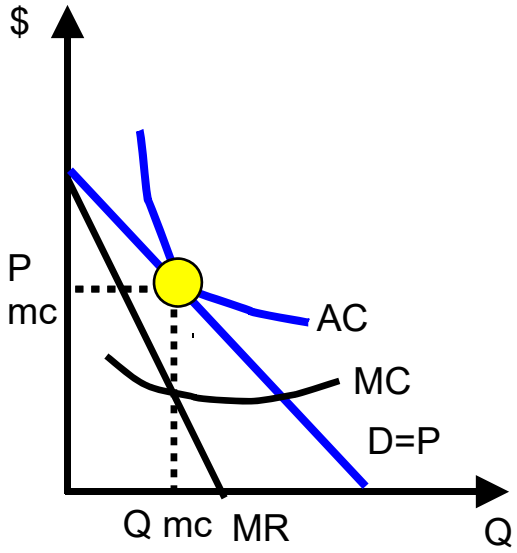
❸ Δ Mb is known, **Δ Money M1 ?**
c = cash-to-money ratio; r = reserve ratio of the banks.

- Money multiplier = $\frac{1}{1-(1-c)(1-r)}$
- Δ Money M1= Δ Mb * $\frac{1}{1-(1-c)(1-r)}$ = $\frac{\Delta \text{ Mb}}{1-(1-c)(1-r)}$

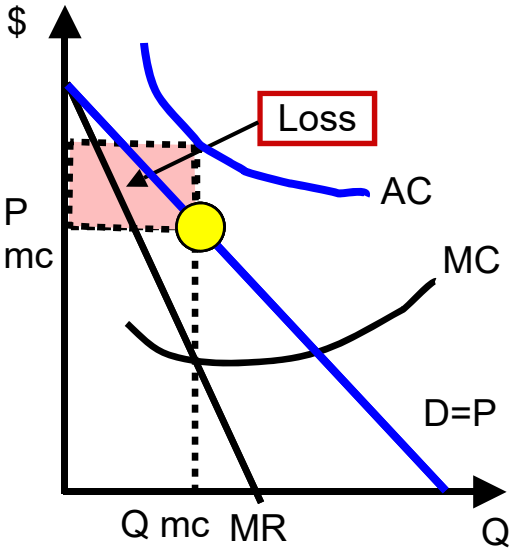
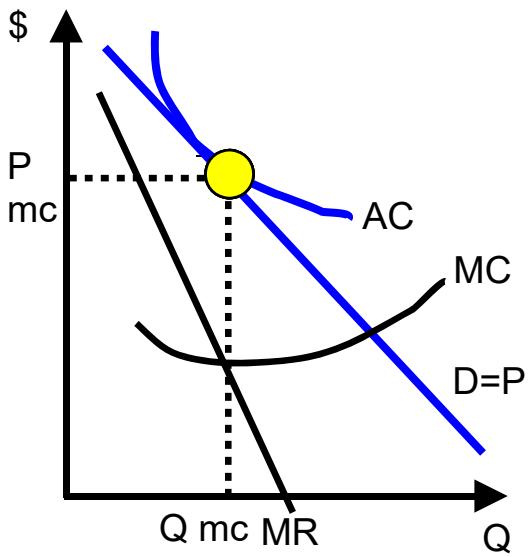
Monopolistic competition

Characteristics: As with monopoly, in monopolistic competition firms face a **negatively sloping demand curve**; in contrast, **entries and exits** are possible (example: consumer goods suppliers).

Case 1: Monopolistic competition with **profit** in the short run **and entries**.

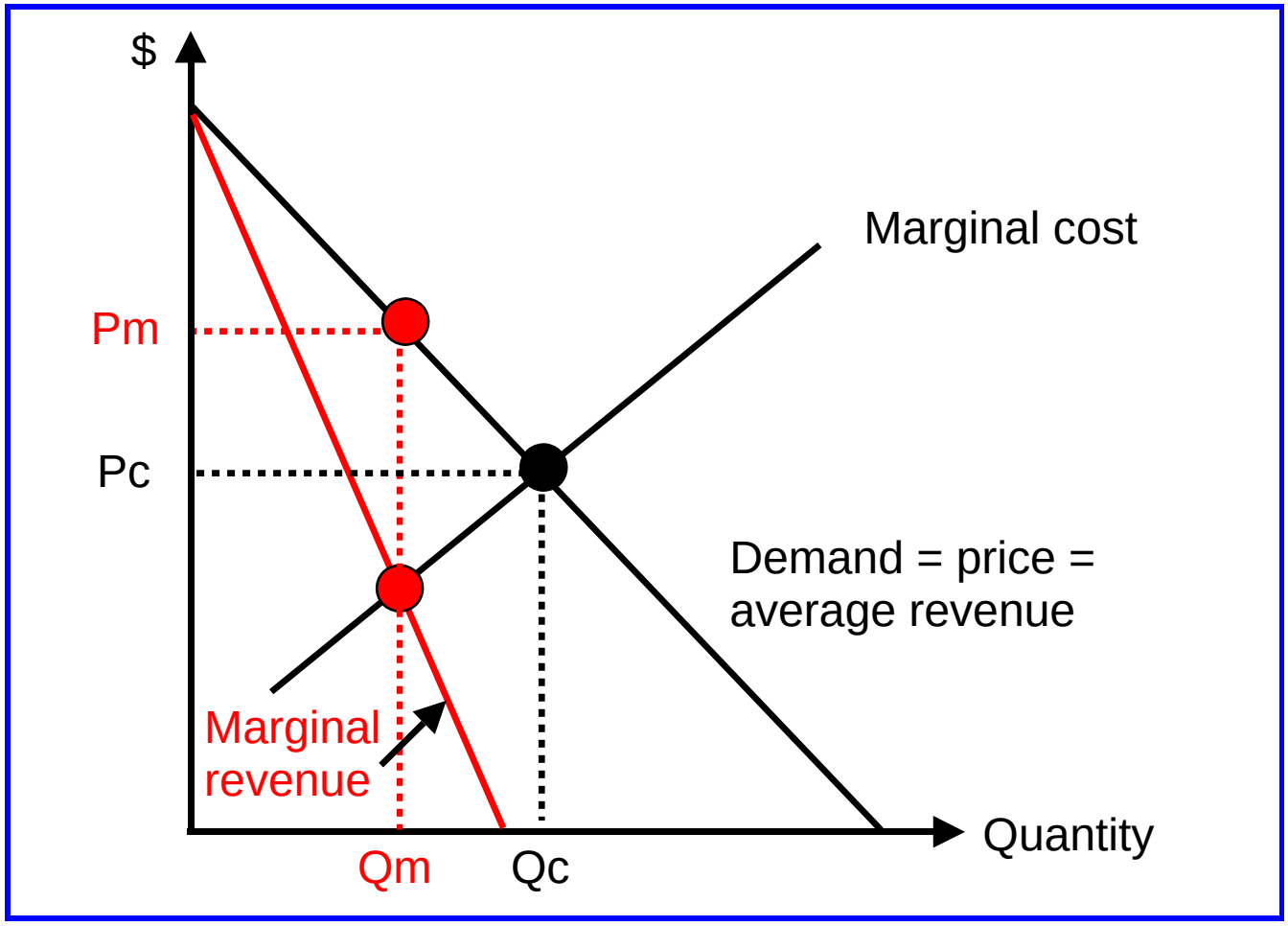
Short run situation	Entry/exit	**Long run** situation
	**Entries** of firms until the profit disappears.	

Case 2: Monopolistic competition with **loss** in the short run **and exits**.

Short run situation	Entry/exit	**Long run** situation
	**Exits** of firms until the loss disappears.	

AC = Average cost	MC = Marginal cost	MR = Marginal revenue
D = Demand	P = Price	Q = Quantity
mc = monopolistically competitive		

Monopoly and perfect competition - a comparison

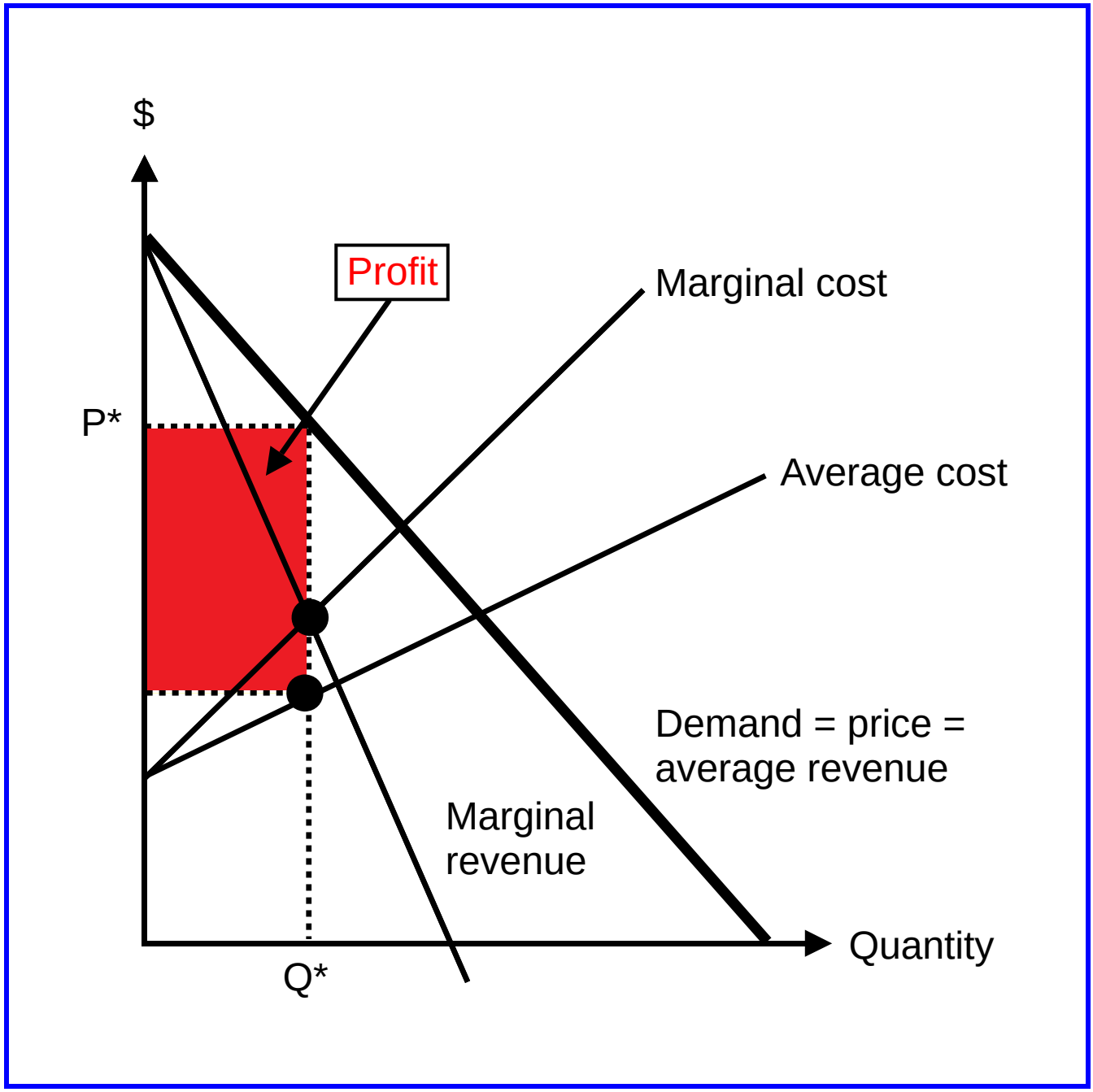


Pm / Pc = Price monopoly / Price perfect competition
Qm / Qc = Quantity monopoly / Quantity perfect competition

- The monopoly is choosing the following point:
  MR = MC; but price > MC
- The firm in the competitive market is choosing the following point:
  Price* = MC (* equally MR = MC, since price = MR)
- Result: The monopoly is choosing a higher price and a smaller quantity than the firm in the competitive market.

MC = Marginal cost MR = Marginal revenue

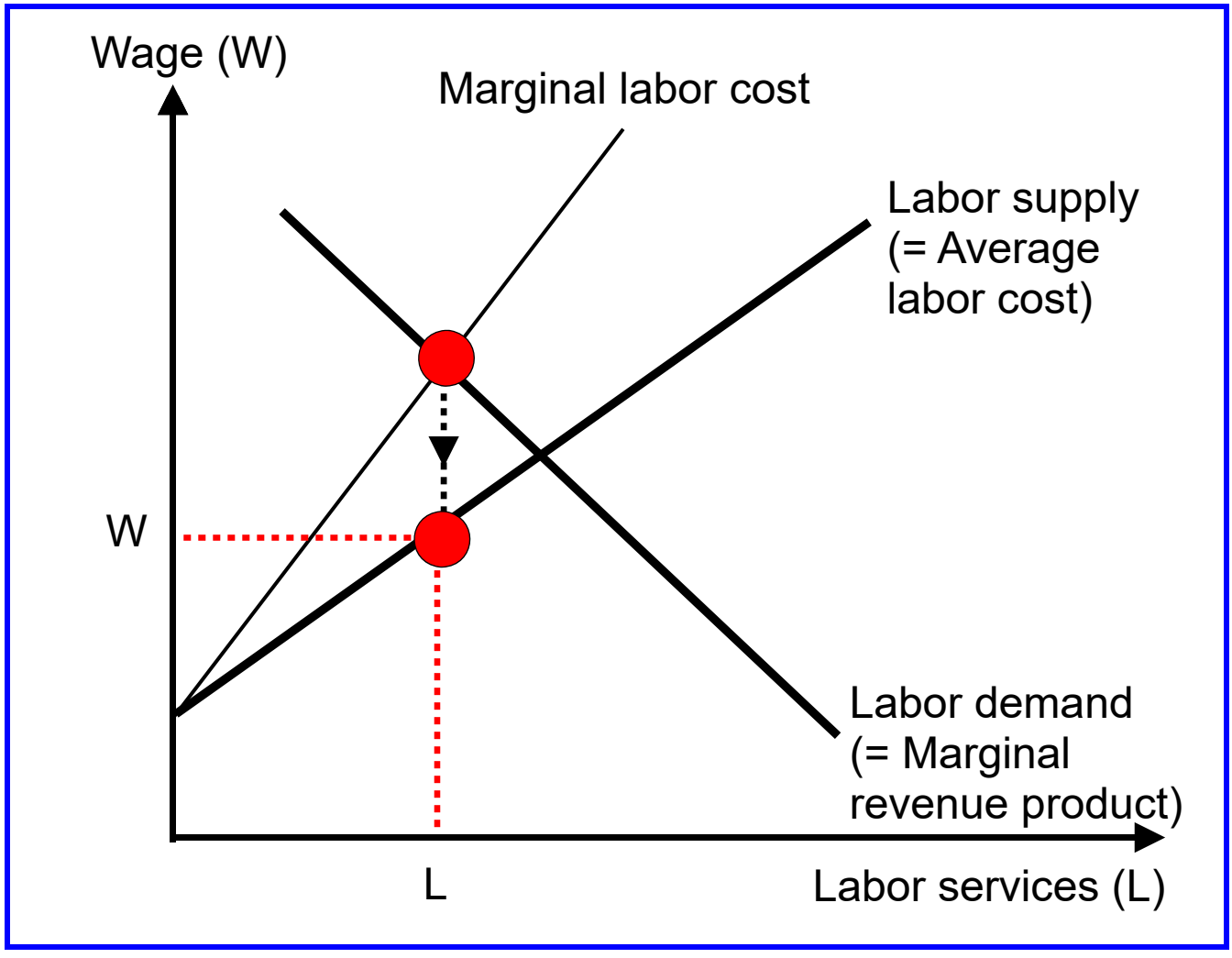
Monopoly



Q* = Quantity, supplied by the monopoly
P* = Price, charged by the monopoly

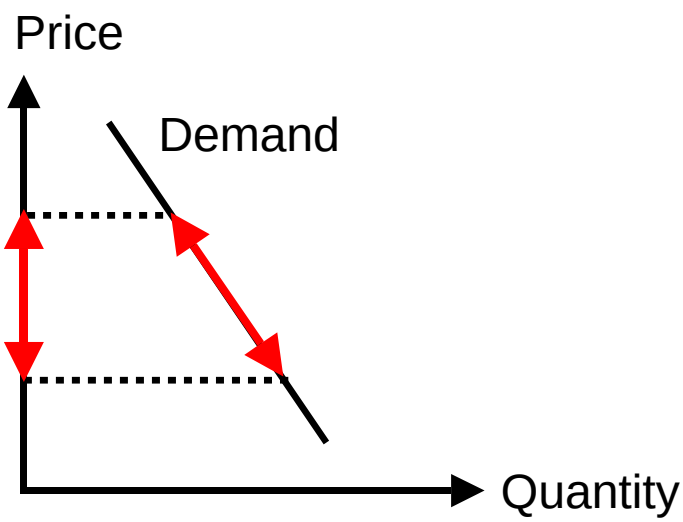
Monopsony

- A monopsonist is the **only buyer** in a market with many suppliers, in this case the only employer compared to many employees.
- The **labor supply** also corresponds to the average labor cost for the monopsonist. With rising average labor cost, the **marginal** labor cost runs **above** the **average** labor cost.
- At the intersection 'Marginal labor cost = Labor demand', the marginal labor cost corresponds to the marginal revenue product. However, the quantity of labor (L) can be contracted out at a **lower wage** (W).



Movements and shifts - demand

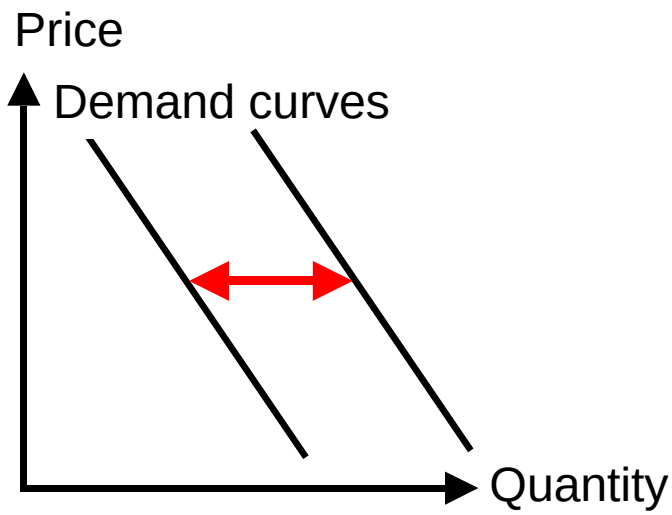
① **Movements** along the demand curve



Influences that cause **movements**:

Changes in the price of the good in question

② **Shifts** of the demand curve

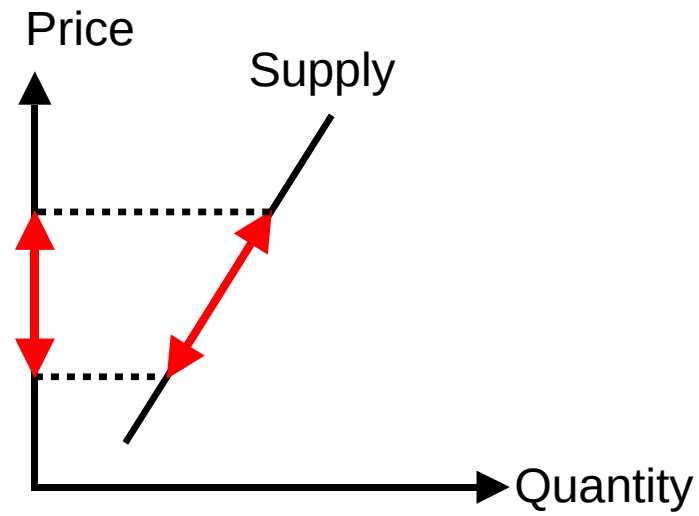


Influences that cause **shifts** ↔ ↓

Changes in the following items:
- Price of other goods
- Income
- Preference
- Number of buyers

Movements and shifts - supply

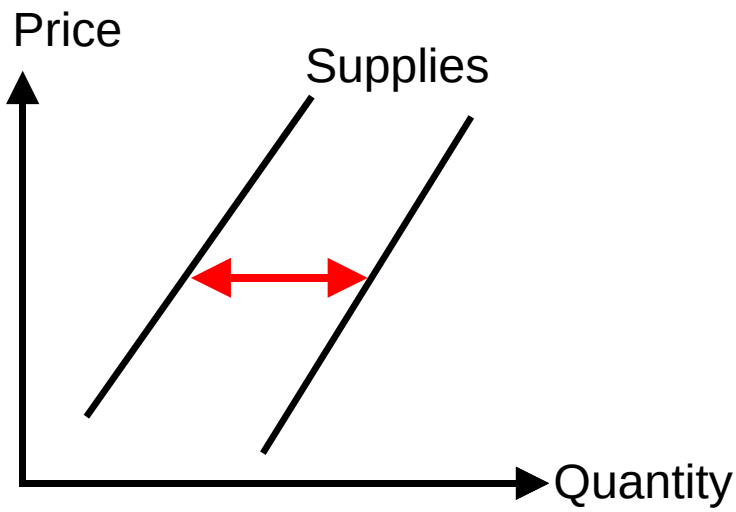
① **Movements** along the supply curve



Influences that cause **movements**:

Changes in the price of the good in question

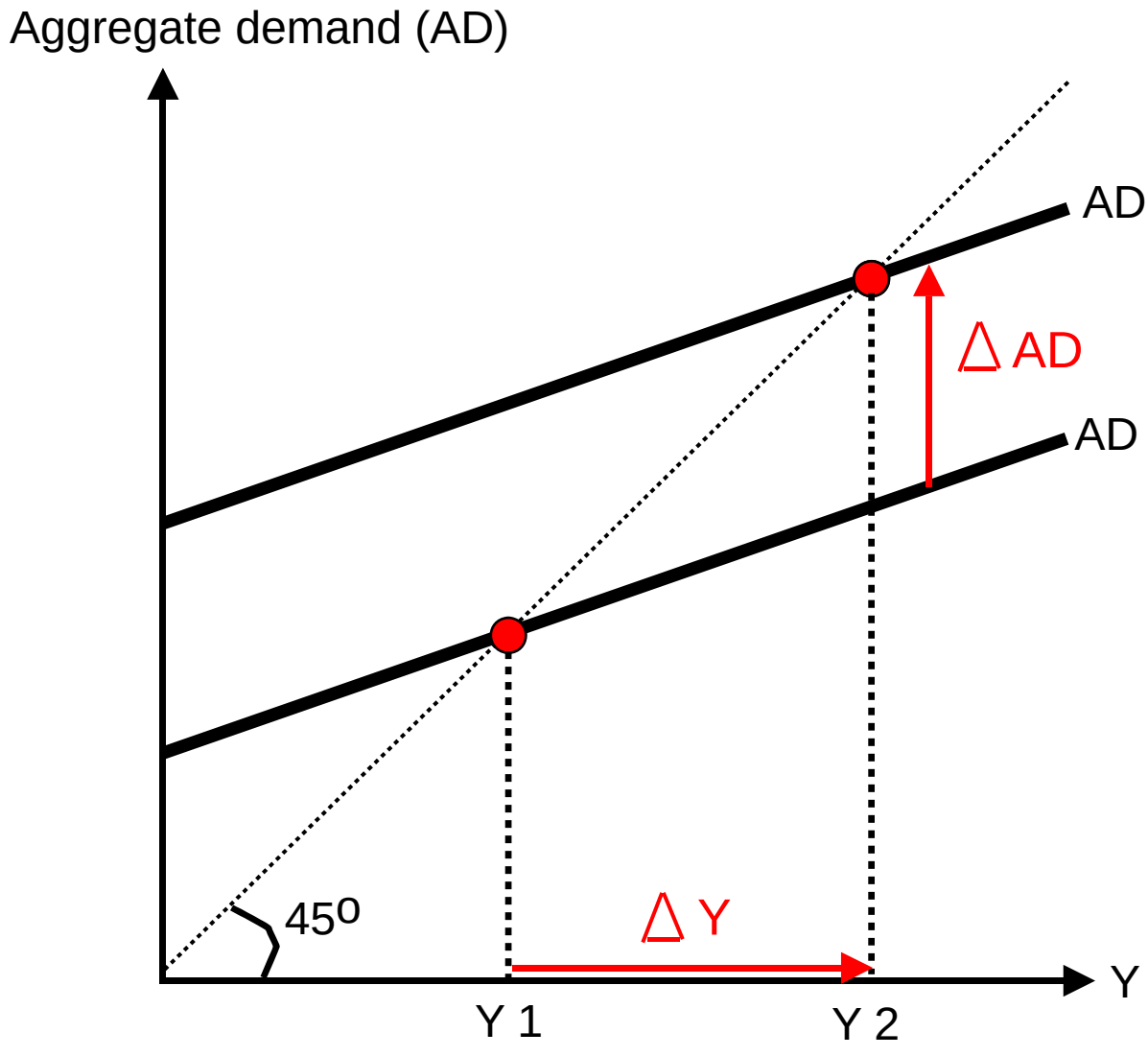
② **Shifts** of the supply curve



Influences that cause **shifts**

Changes in the following items:
- Cost
- Productivity
- Taxes and subsidies
- Number of sellers

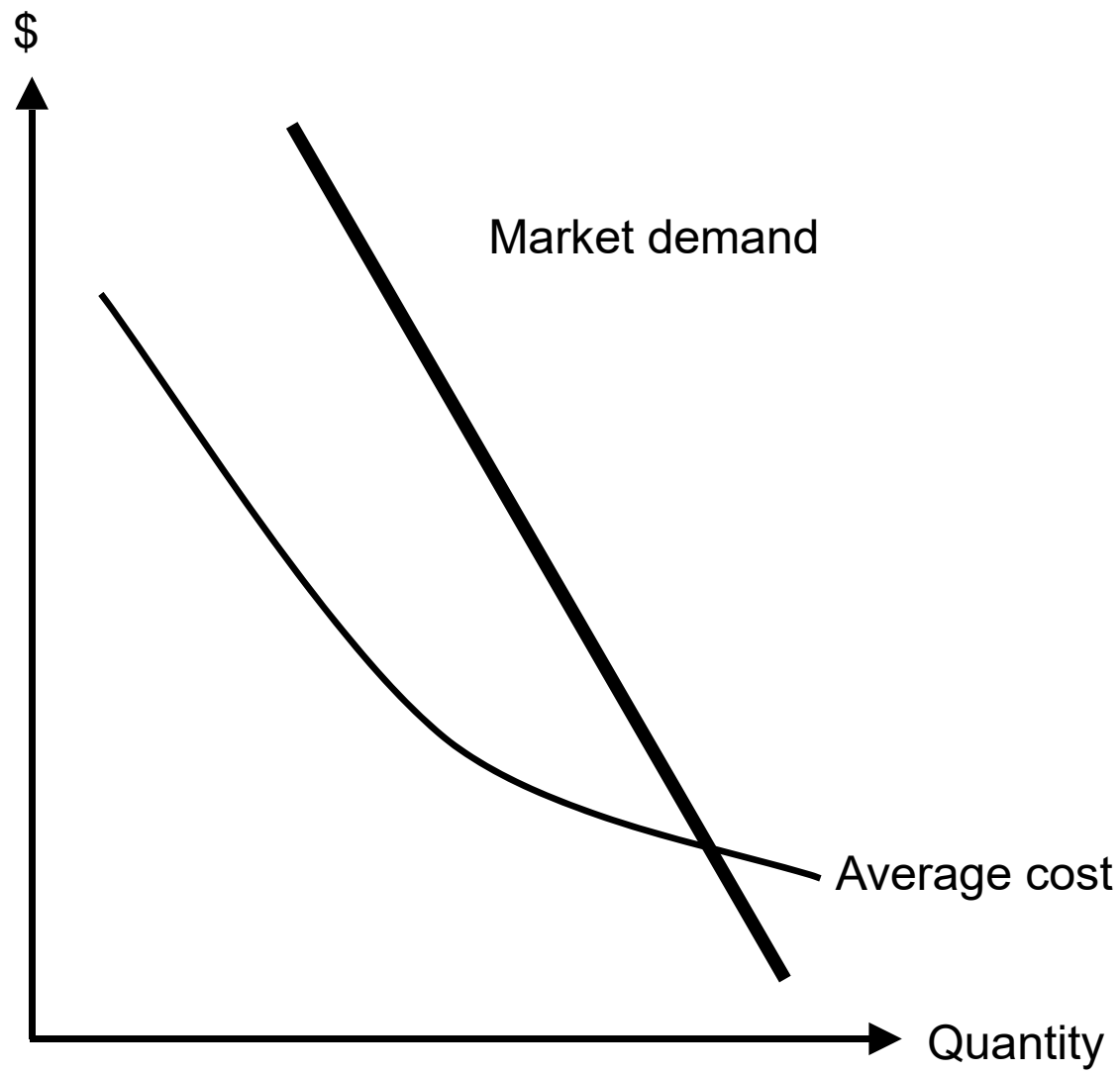
Multiplier



$$\textbf{Multiplier} = \frac{\Delta Y}{\Delta AD}$$

Y = Output, income

Natural monopoly

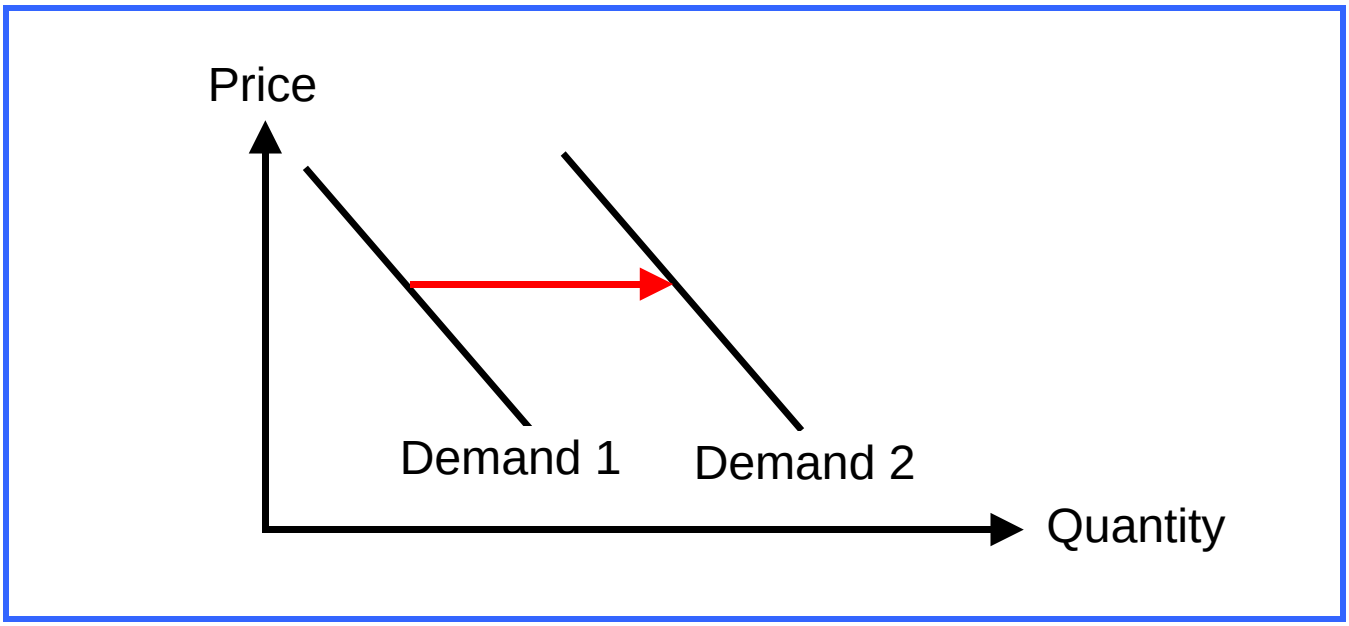


A natural monopoly may arise when there are high fixed costs and, therefore, falling average costs.

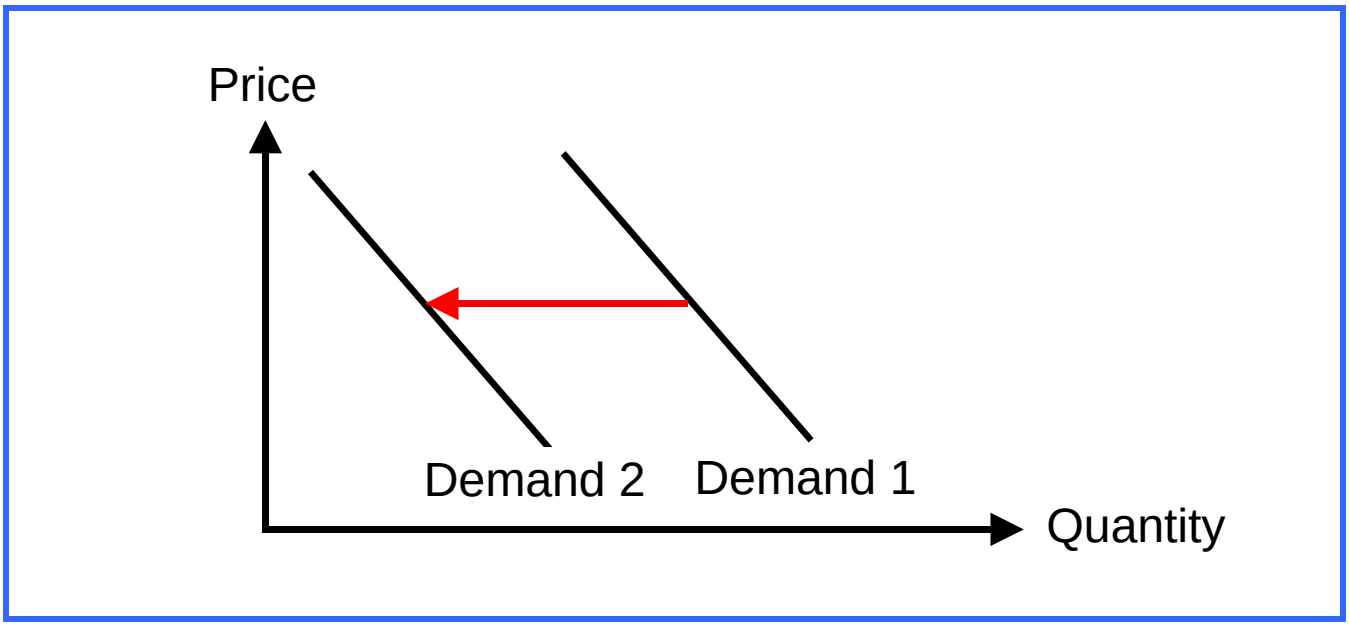
Normal good

What happens to a normal good if ...

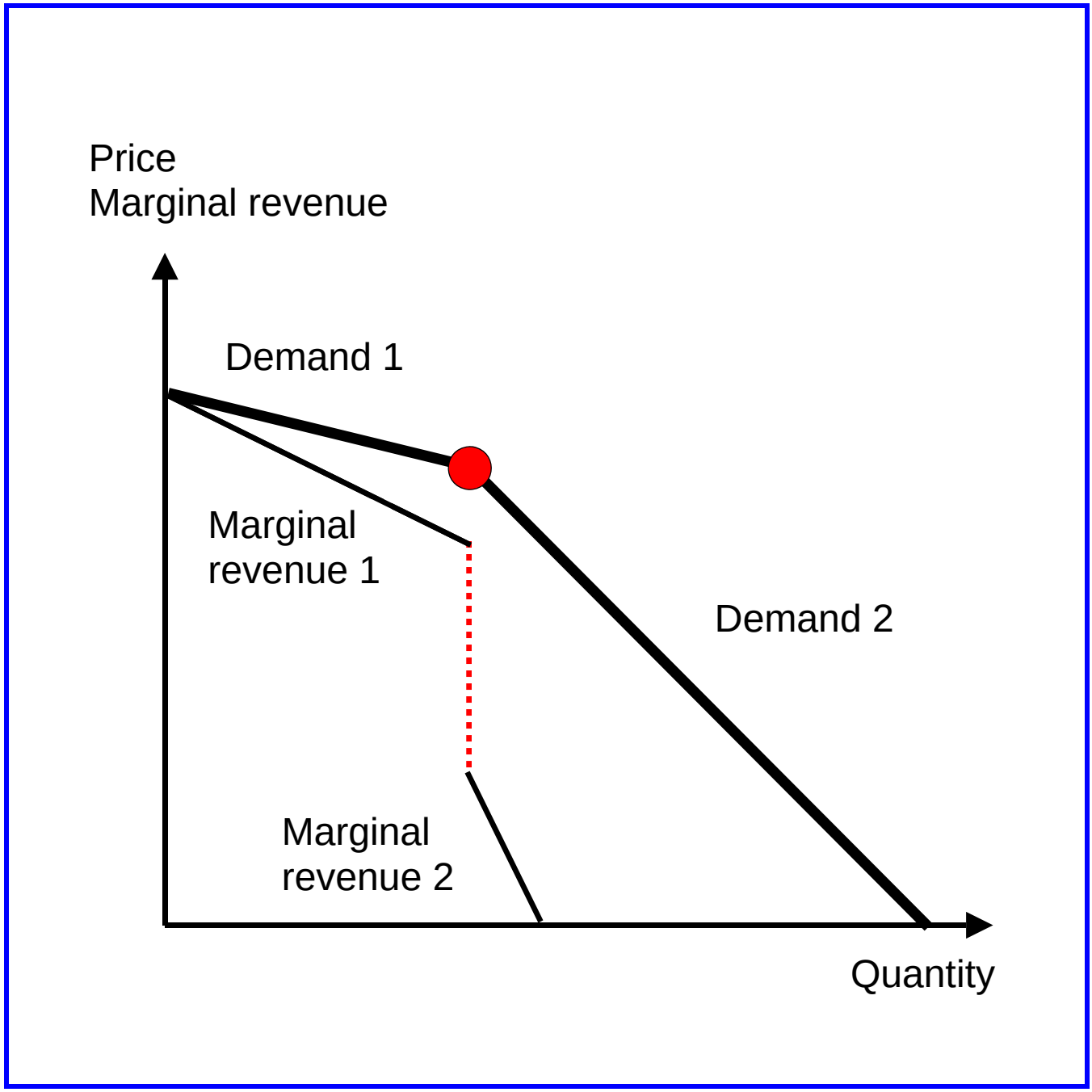
① **income rises;**



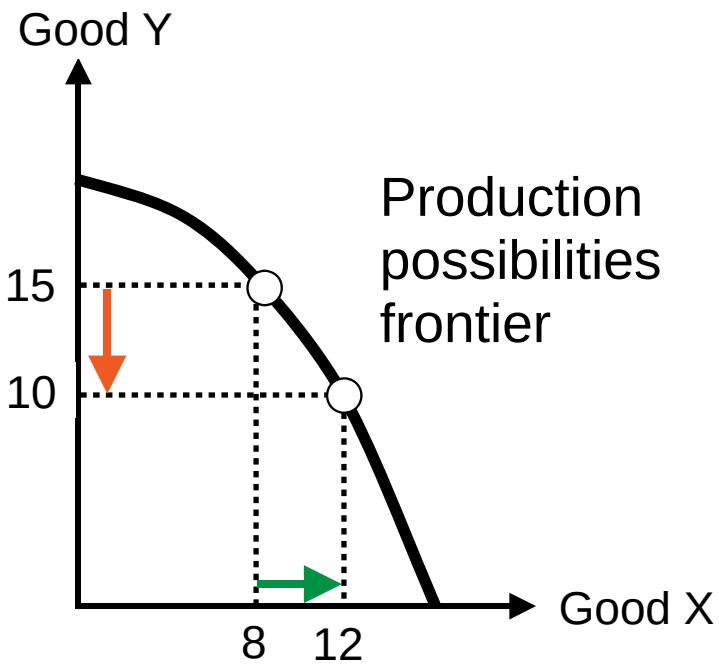
② **income falls?**



Oligopoly - kinked demand curve

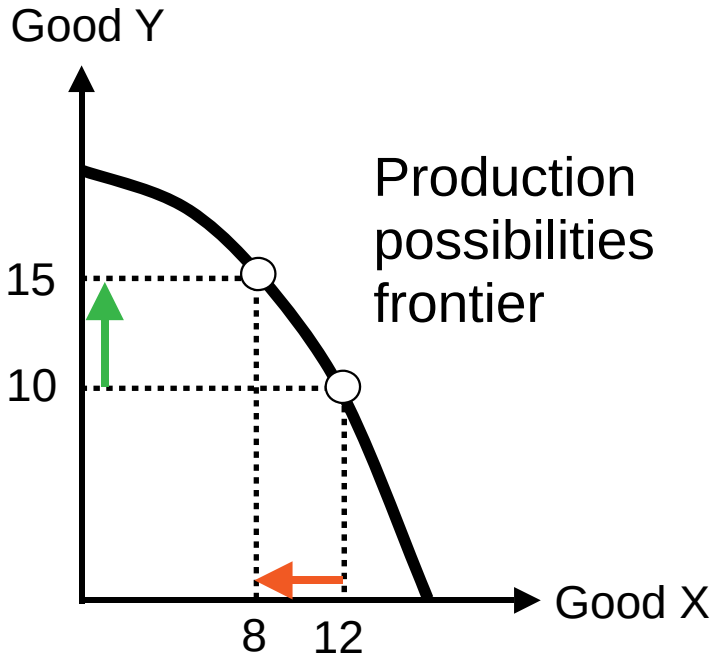


Opportunity cost (in the case of 2 goods)



$$OCx = \frac{\text{Loss of } \mathbf{Y}}{\text{Gain of } \mathbf{X}} = \frac{5}{4} = 1.25$$

OC_x = Opportunity cost of the production X

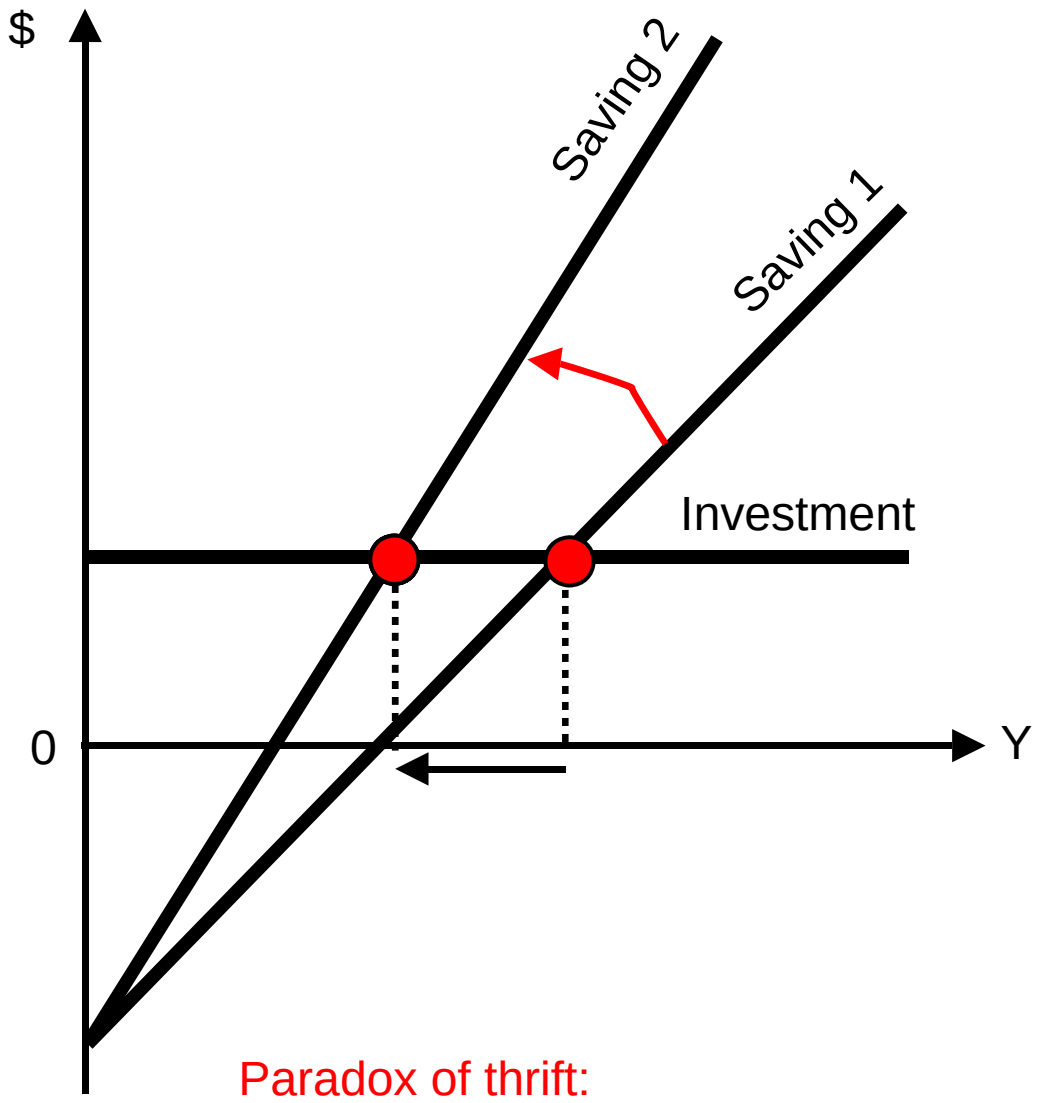


$$OCy = \frac{\text{Loss of } \mathbf{X}}{\text{Gain of } \mathbf{Y}} = \frac{4}{5} = 0.8$$

($OC_y = 1/OC_x = 1/1.25 = 0.8$)

OC_y = Opportunity cost of the production Y

Paradox of thrift



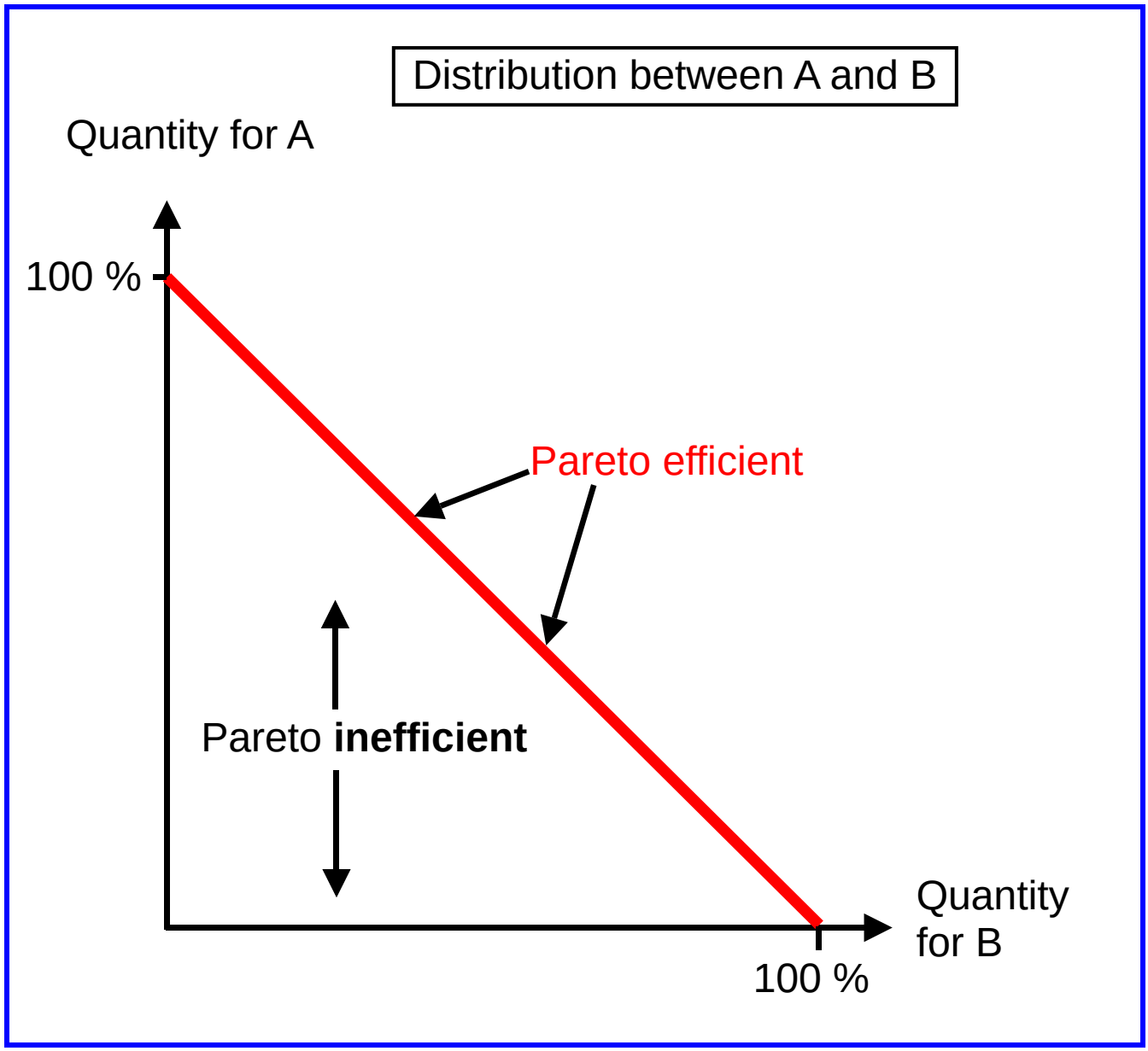
Paradox of thrift:
- Marginal propensity to save rises.
- Saving in $ stays the same (Y falls).

Y = Output, income

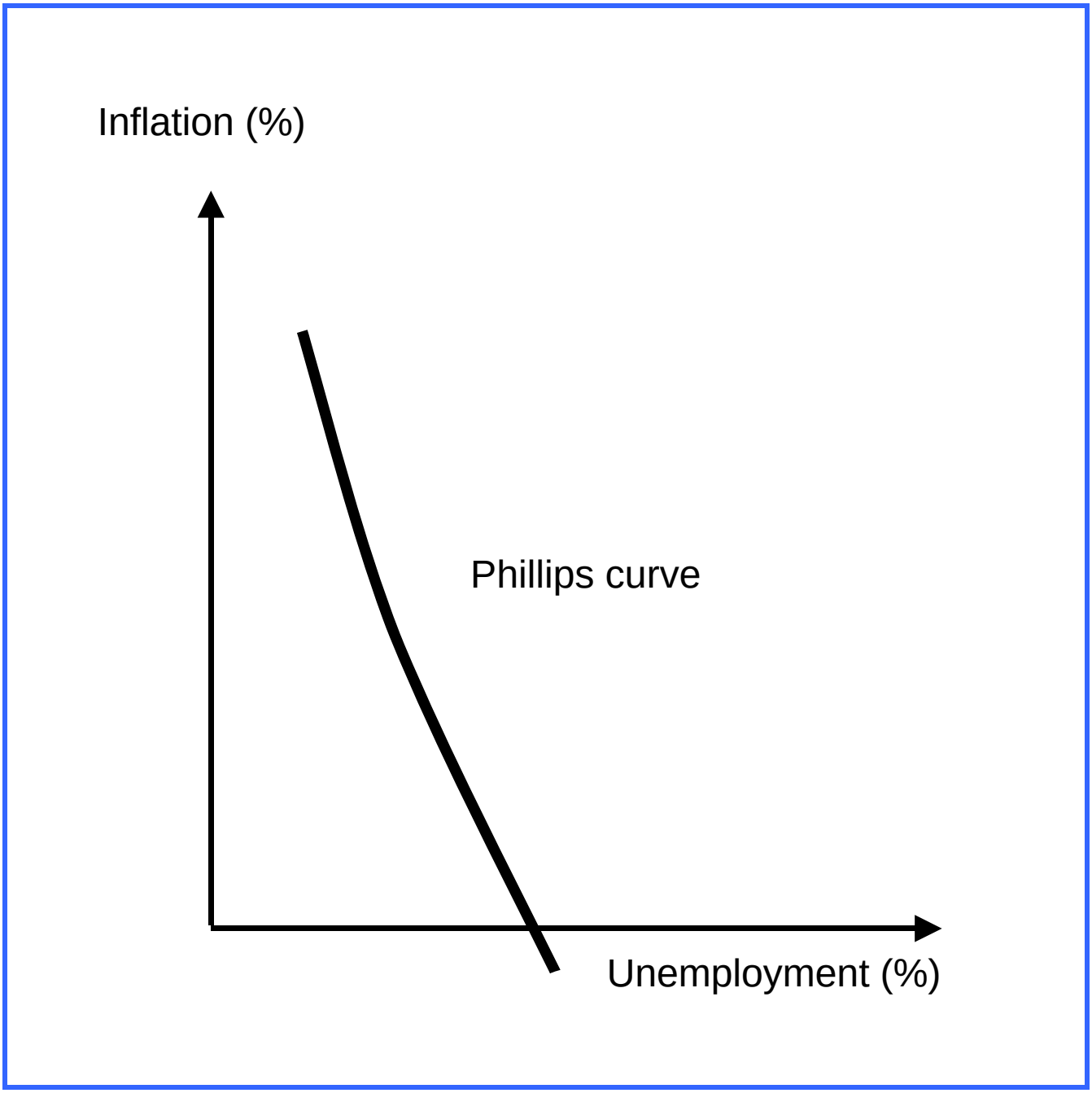
Pareto efficiency

Introduction:

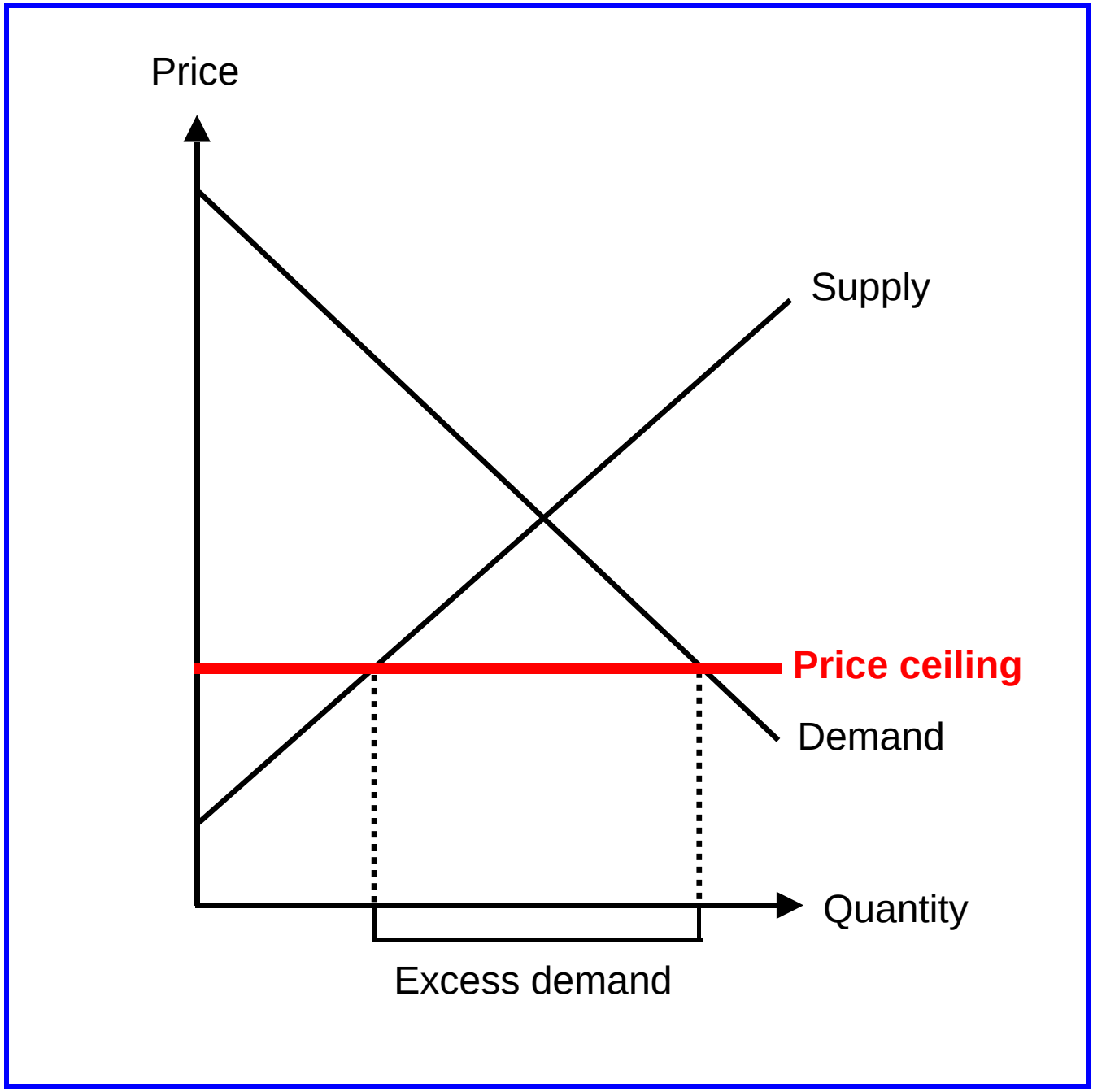
- 2 persons (A and B), distribution of 1 divisible good
- Which possibilities of distribution between A and B are feasible, irrespective of utility and income? What can be said about Pareto efficiency?



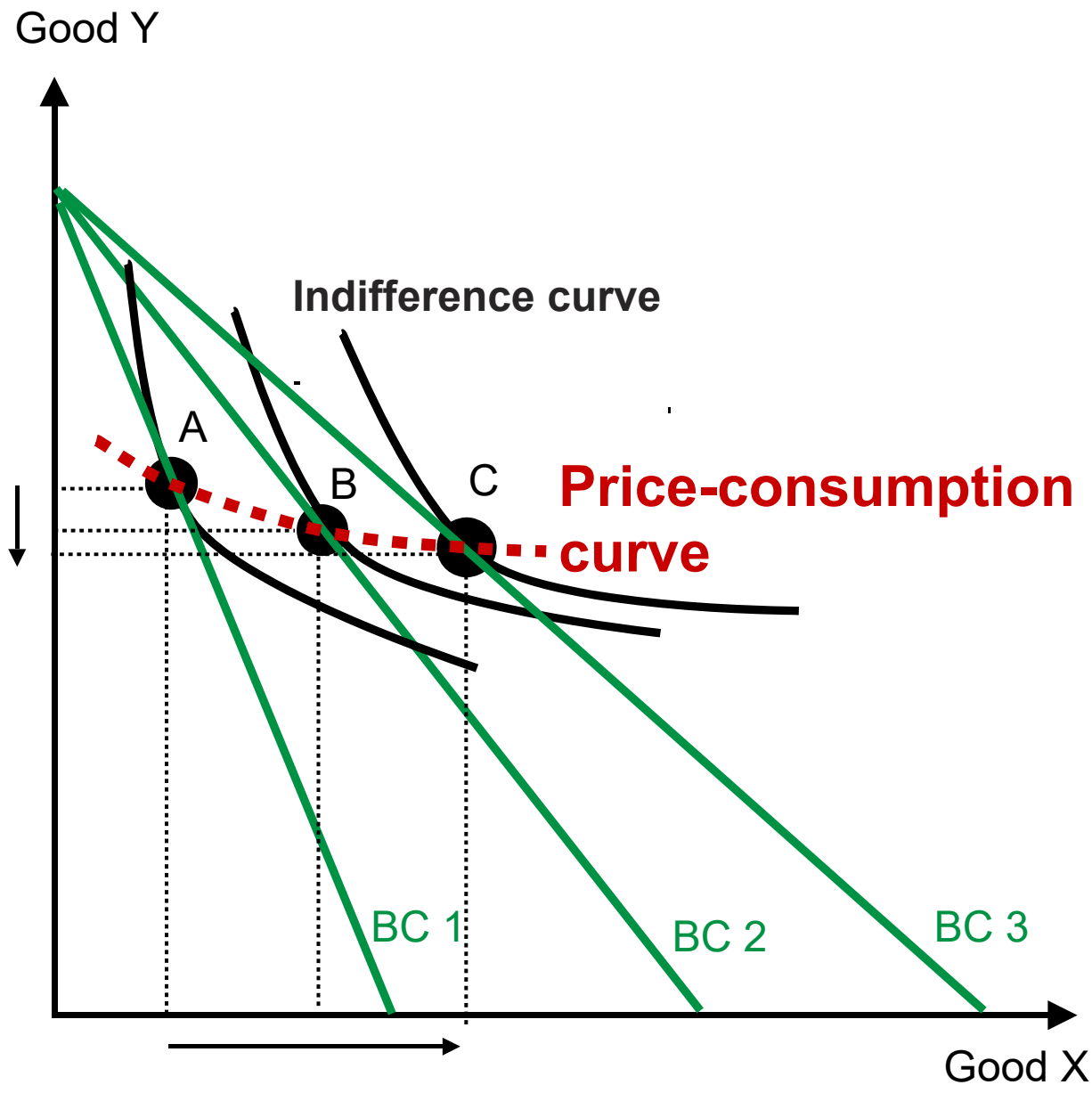
Phillips curve



Price ceiling (maximum price)



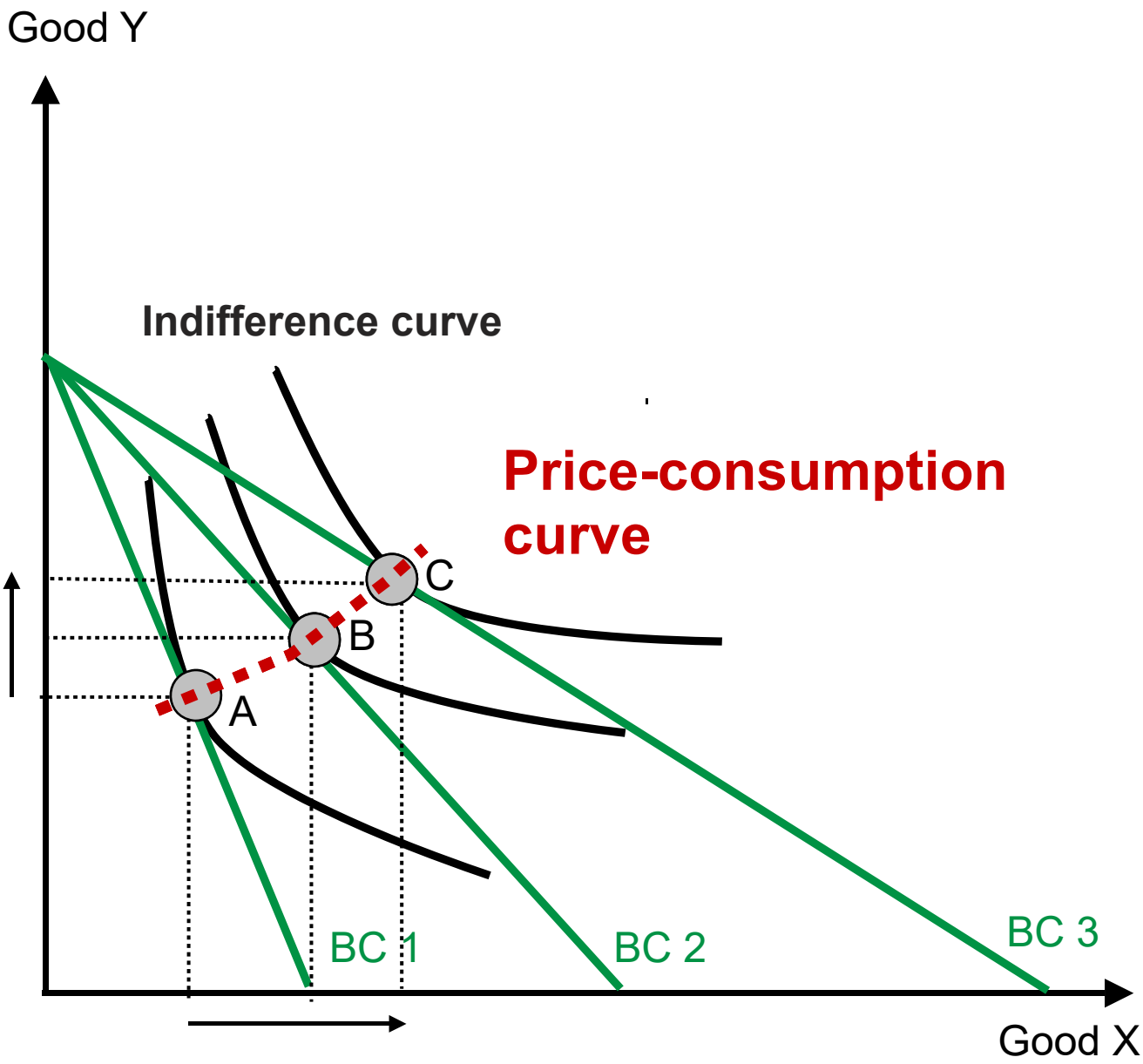
Price-consumption curve 1 - substitutes



BC = Budget constraint

If the price of good X decreases (from BC 1 to BC 2 and then to BC 3), the quantity of good X increases as expected. In contrast, the quantity of good Y decreases at the same time. The two goods are therefore **substitutes** (cross-price elasticity of demand **>** 0).

Price-consumption curve 2 - complements



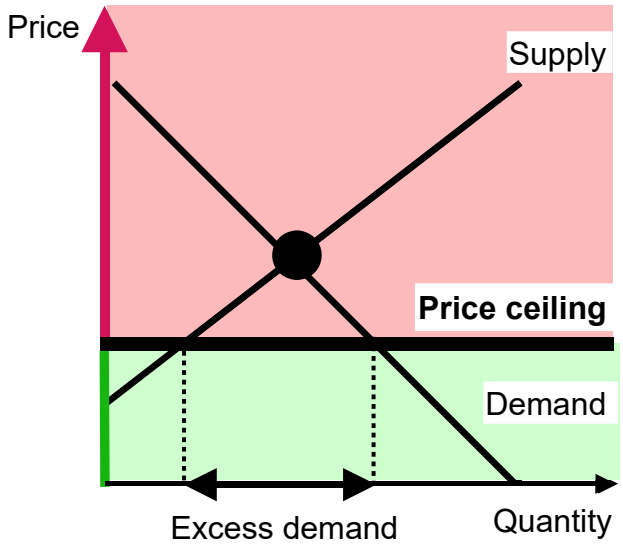
BC = Budget constraint

If the price of good X decreases (from BC 1 to BC 2 and then to BC 3), the quantities of good X and Y are increasing. The two goods are therefore **complements** (cross-price elasticity of demand **<** 0).

Price controls

Price controls are introduced by the **government**.

① Price ceiling
(maximum price)

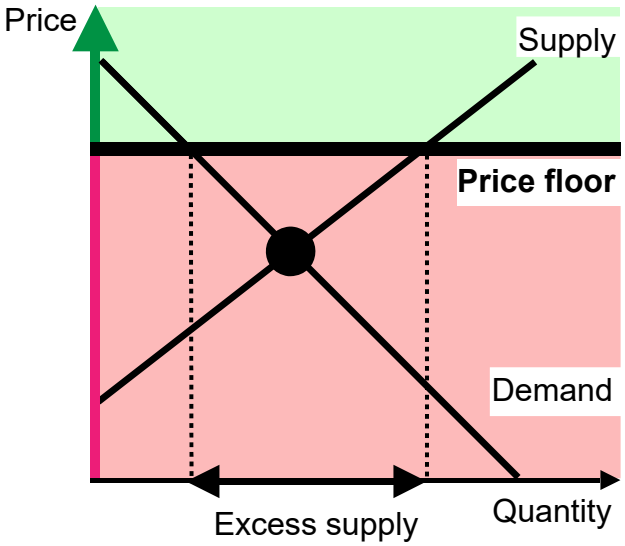


Qantity demanded **>** quantity supplied

Example: Price ceiling for bread

Result: Shortage of bread

② Price floor
(minimum price)

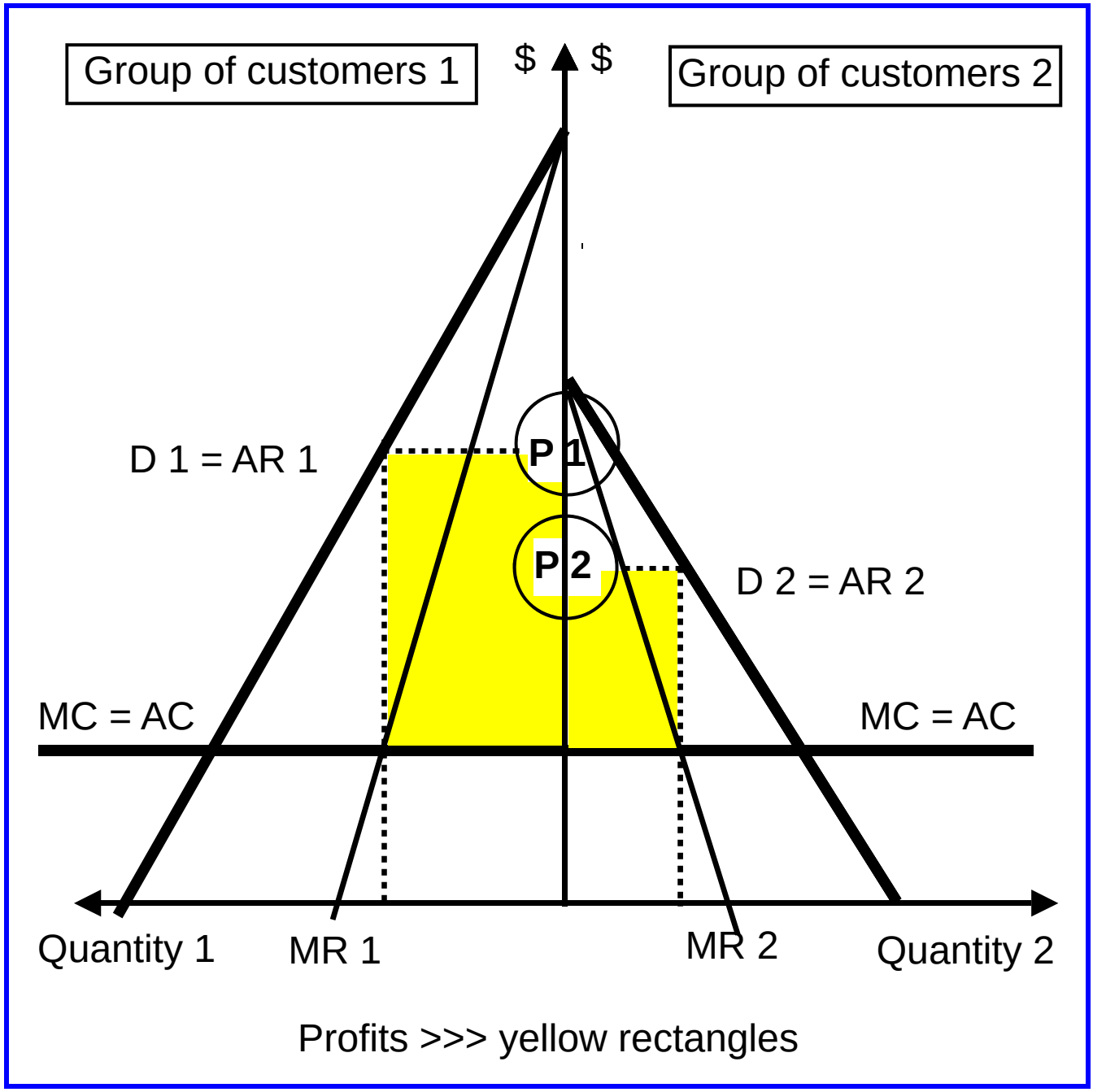


Quantity supplied **>** quantity demanded

Example: Minimum wage

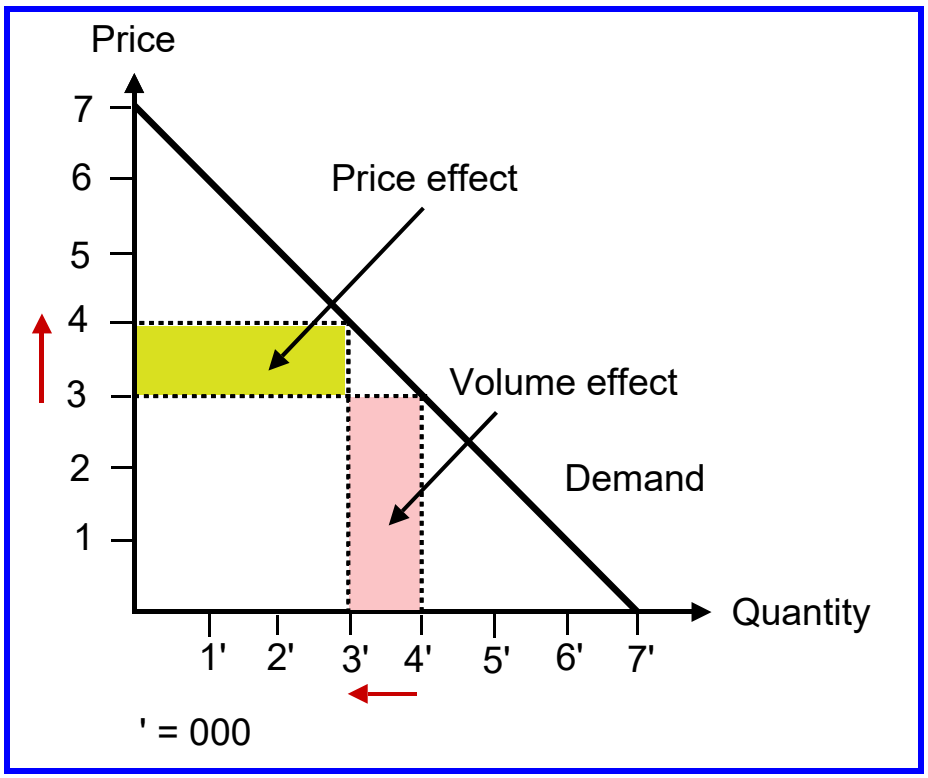
Result: Unemployment

Price discrimination



D = Demand	AC = Average cost
P = Price	MR = Marginal revenue
AR = Average revenue	MC = Marginal cost

Price effect and volume effect



Price effect and volume effect in the event of a price increase from 3 to 4:

Total revenue at the price of 3:	3 * 4000	= 12000
Total revenue at the price of 4:	4 * 3000	= 12000
Variation of total revenue		= 0

Breakdown of the result:

Price effect	= 1 * 3000	= + 3000
Volume effect	= 3 * (- 1000)	= - 3000
Variation of total revenue		= 0

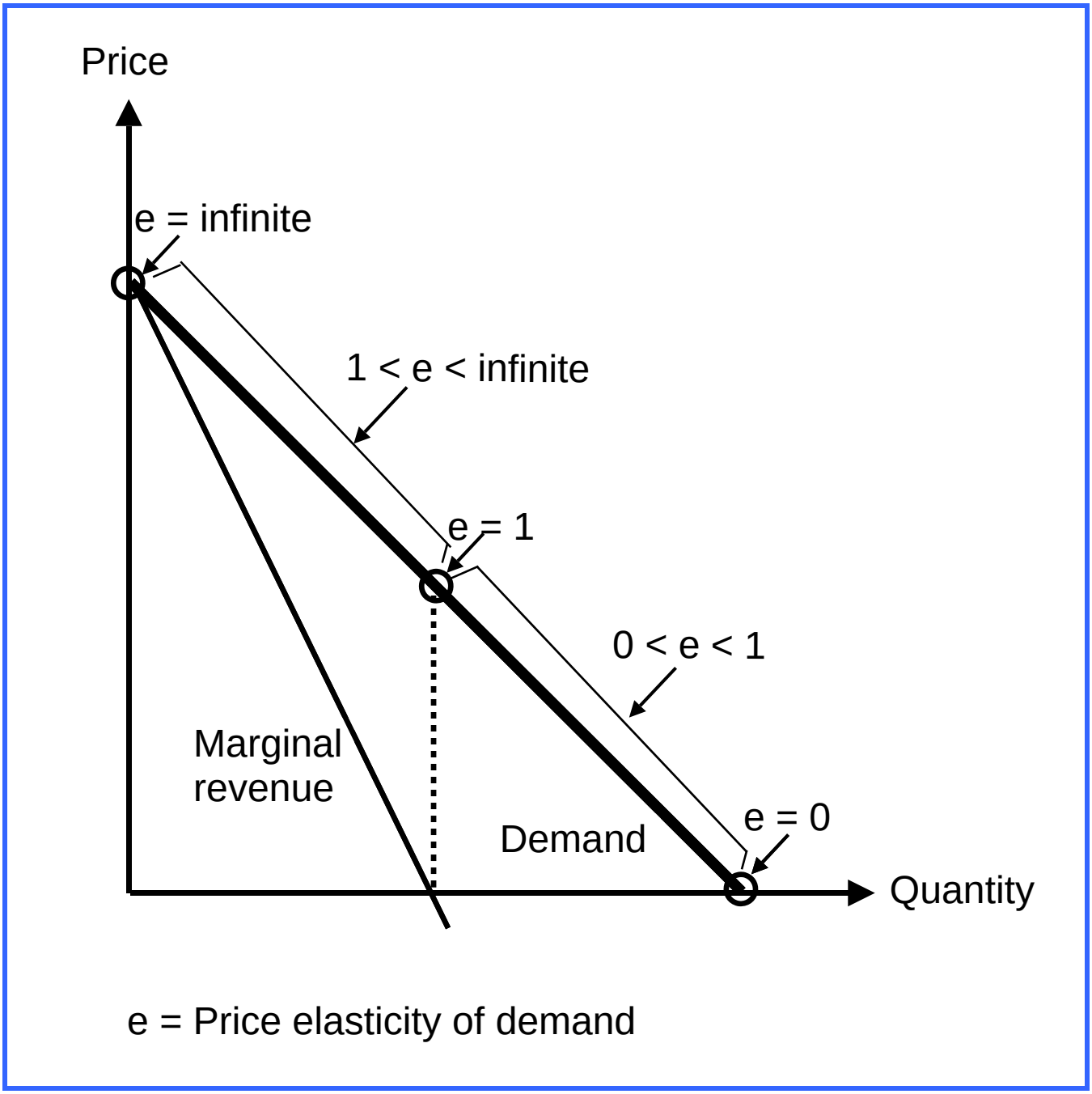
(= Price effect and volume effect)

In general:

Price effect	= (P2 - P1) * Q2	→ (4 - 3) * 3000	= + 3000
Volume effect	= (Q2 - Q1) * P1	→ (3000 - 4000) * 3	= - 3000

P1	old price	Q1	old quantity
P2	new price	Q2	new quantity

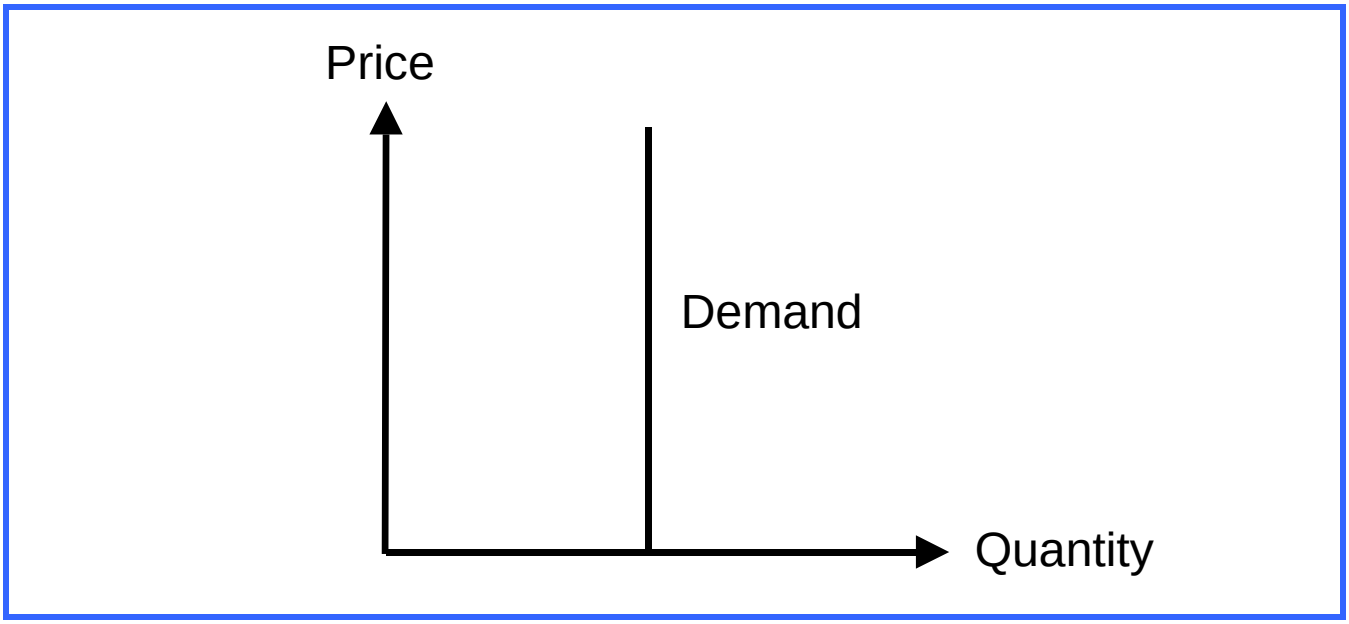
Price elasticity of demand 1 - linear demand



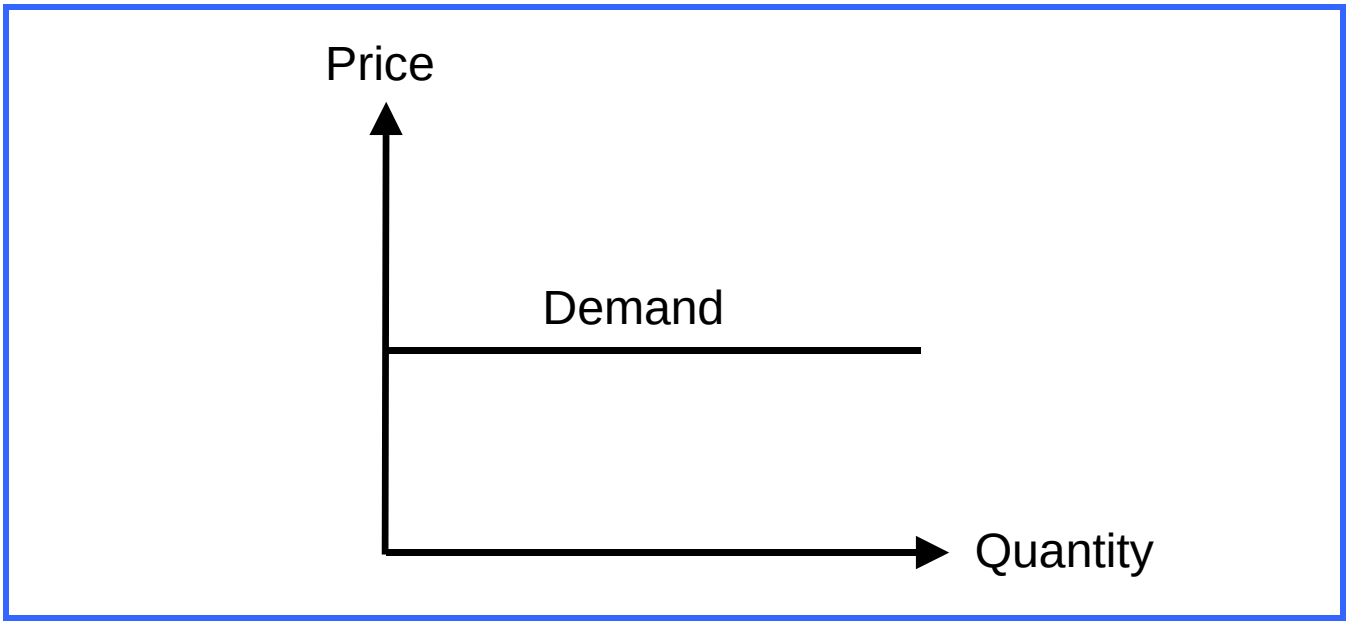
e = Price elasticity of demand

Price elasticity of demand 2 - extreme cases

① Price elasticity of demand = 0

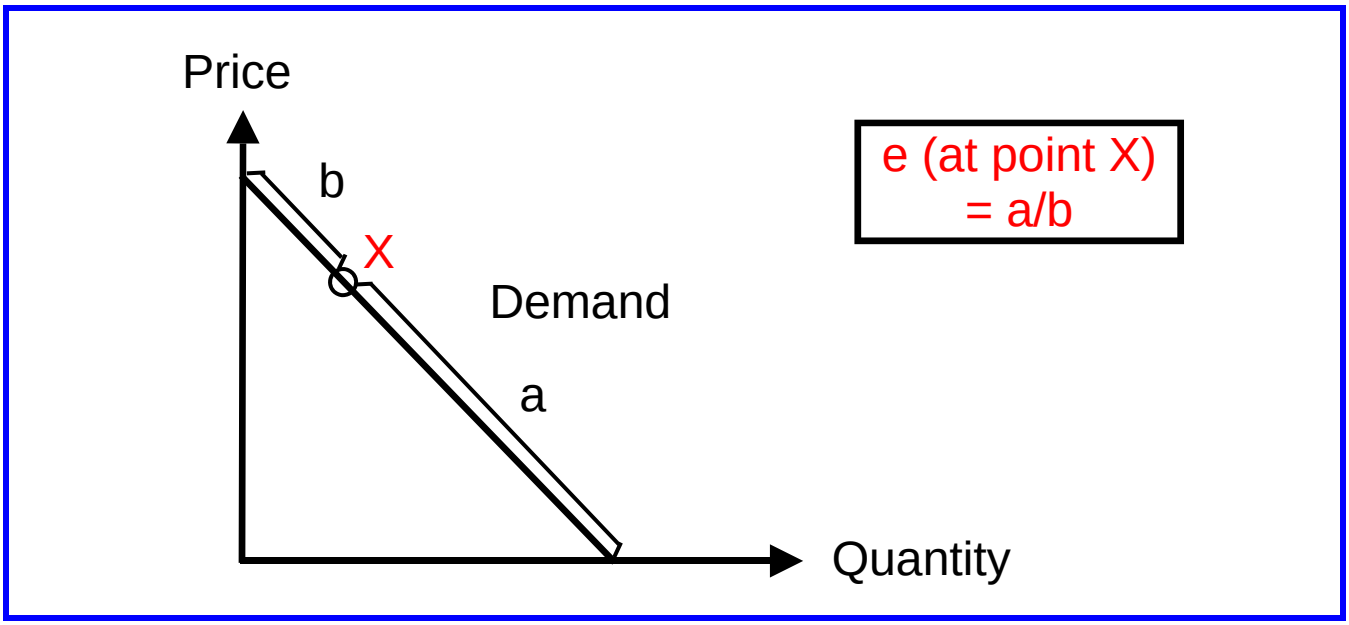


② Price elasticity of demand = infinite

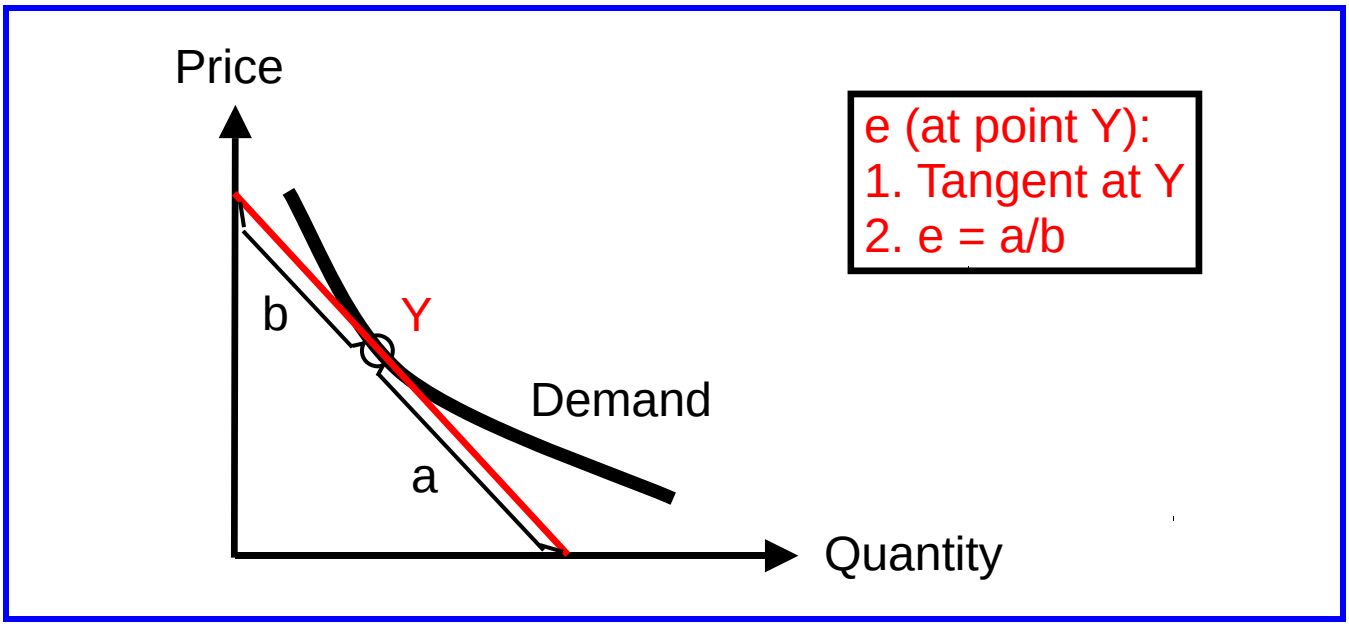


Price elasticity of demand 3 - given point

① Linear demand

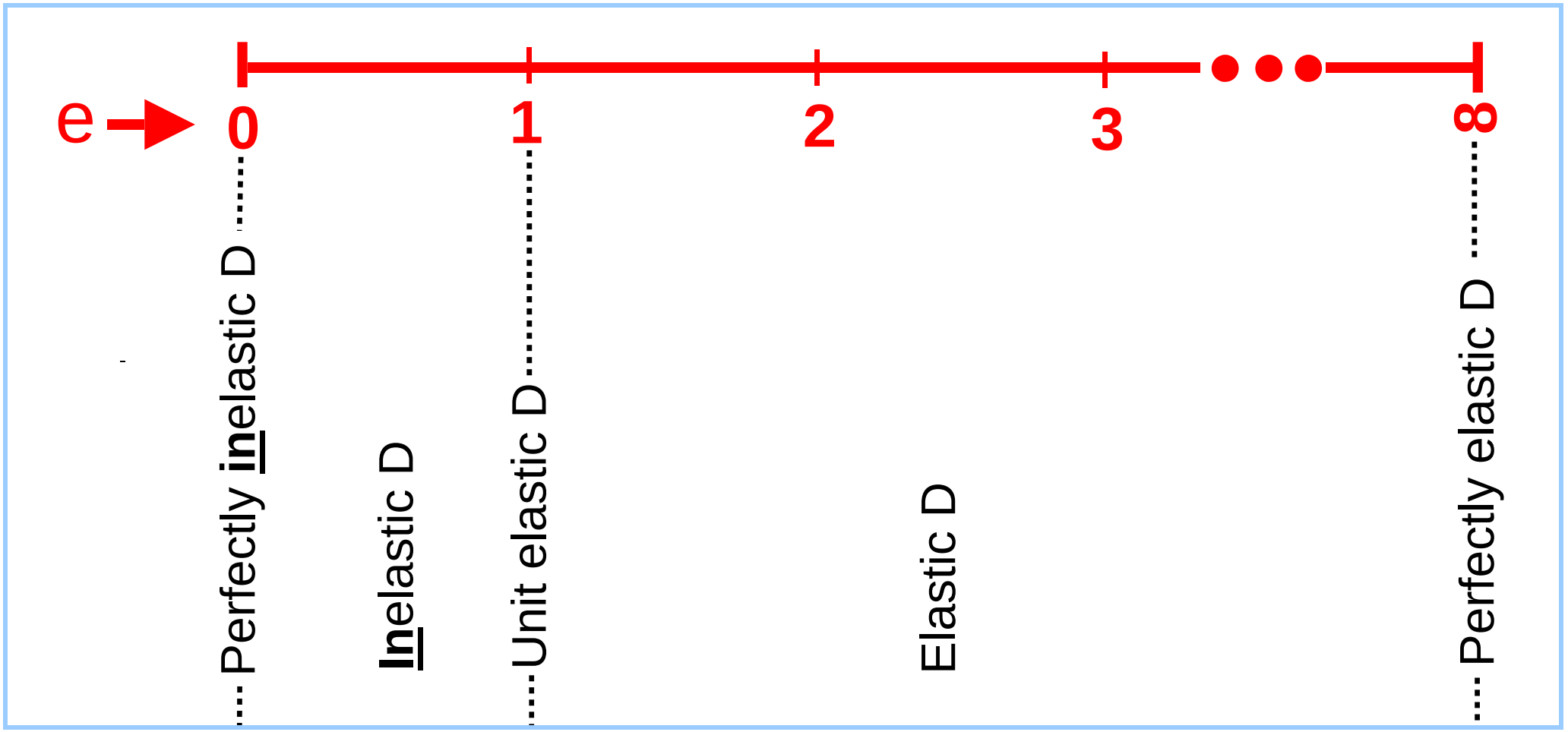


② Demand curve



e = Price elasticity of demand

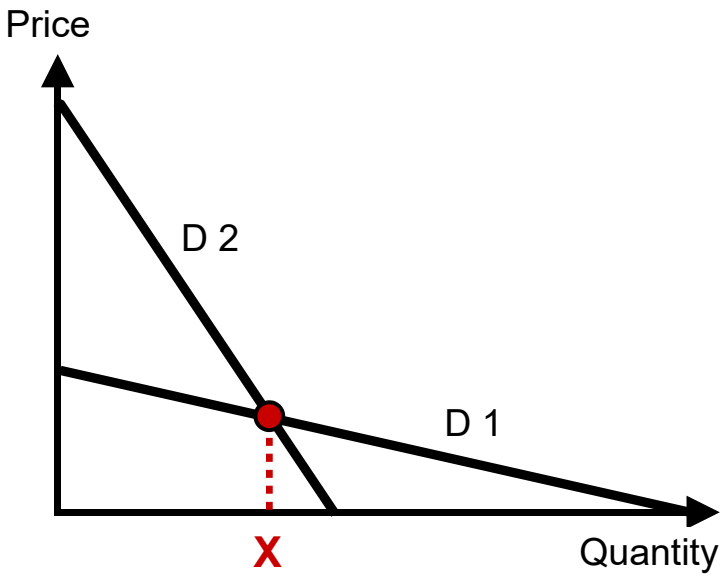
Price elasticity of demand 4 - Elasticity (e) and demand (D)



Price elasticity of demand 5 - elasticity and demand

① Price elasticity of demand (e) **at point X**

(D = Demand)



Demand at point X:

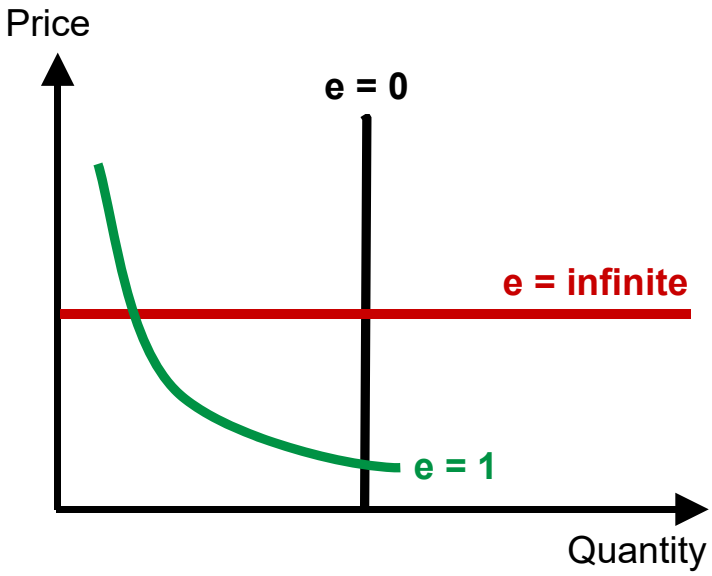
D 1: elastic D (e > 1)

D 2: ***in***elastic D (e < 1)

It should be noted that both demands (D 1 and D 2) run through all values between 0 and infinity. The statement that D 1 is more elastic than D 2 should be avoided. At point X it is exceptionally the case.

② **Constant** price elasticity of demand

(e = Price elasticity of demand)



Characterization of demand:

e = 0
perfectly ***in***elastic demand

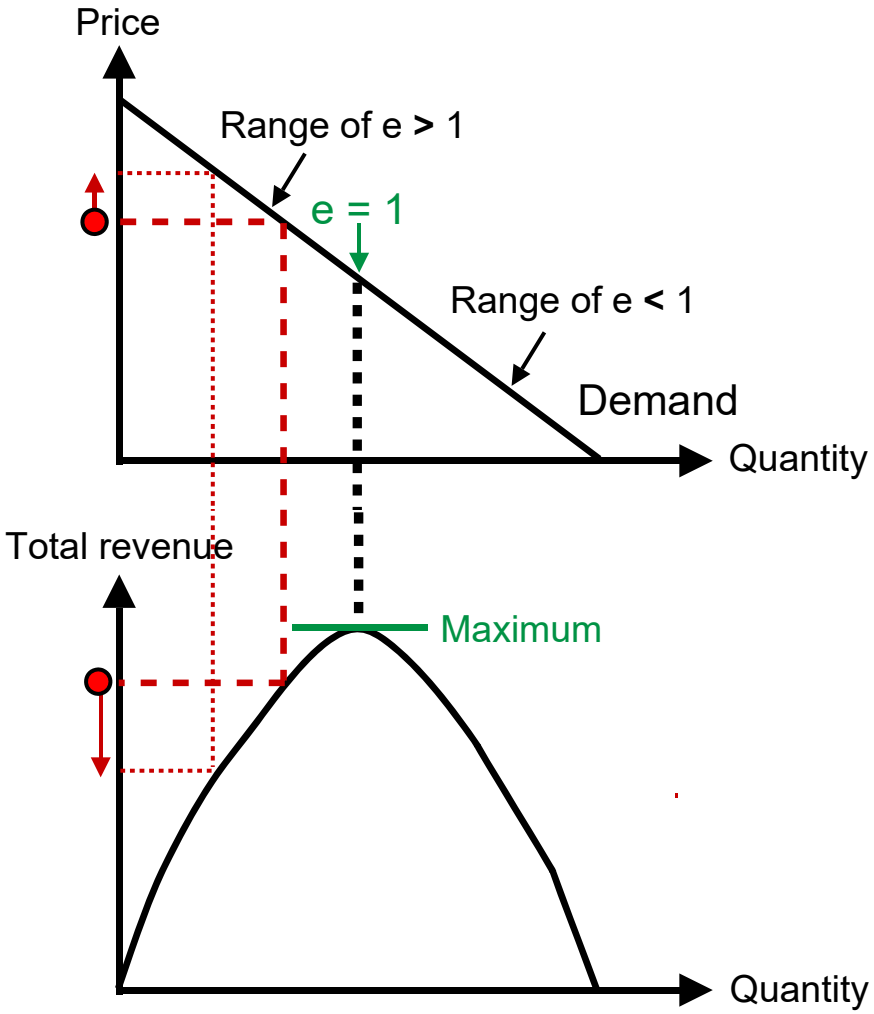
e = infinite
perfectly elastic demand

e = 1
unit elastic demand

*If e = 1, **total revenue** (quantity*price) remains **constant** despite price changes.*

Price elasticity of demand 6 - elasticity and total revenue

e = Price elasticity of demand



Rules:

① in the range of e **>** 1:

P+ → total revenue - → shown in red in the graph above

P- → total revenue +

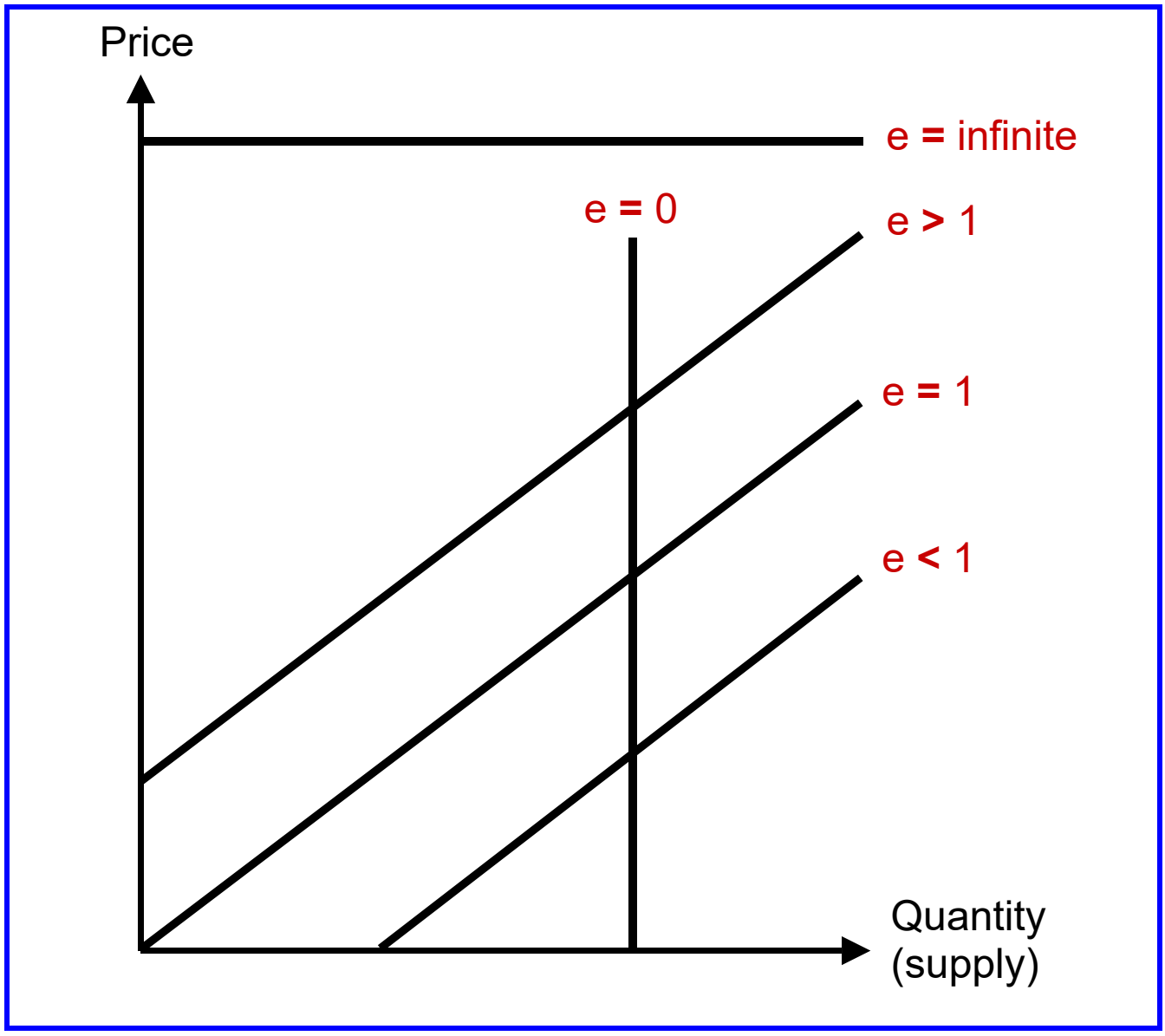
② in the range of e **<** 1

P+ → total revenue +

P- → total revenue -

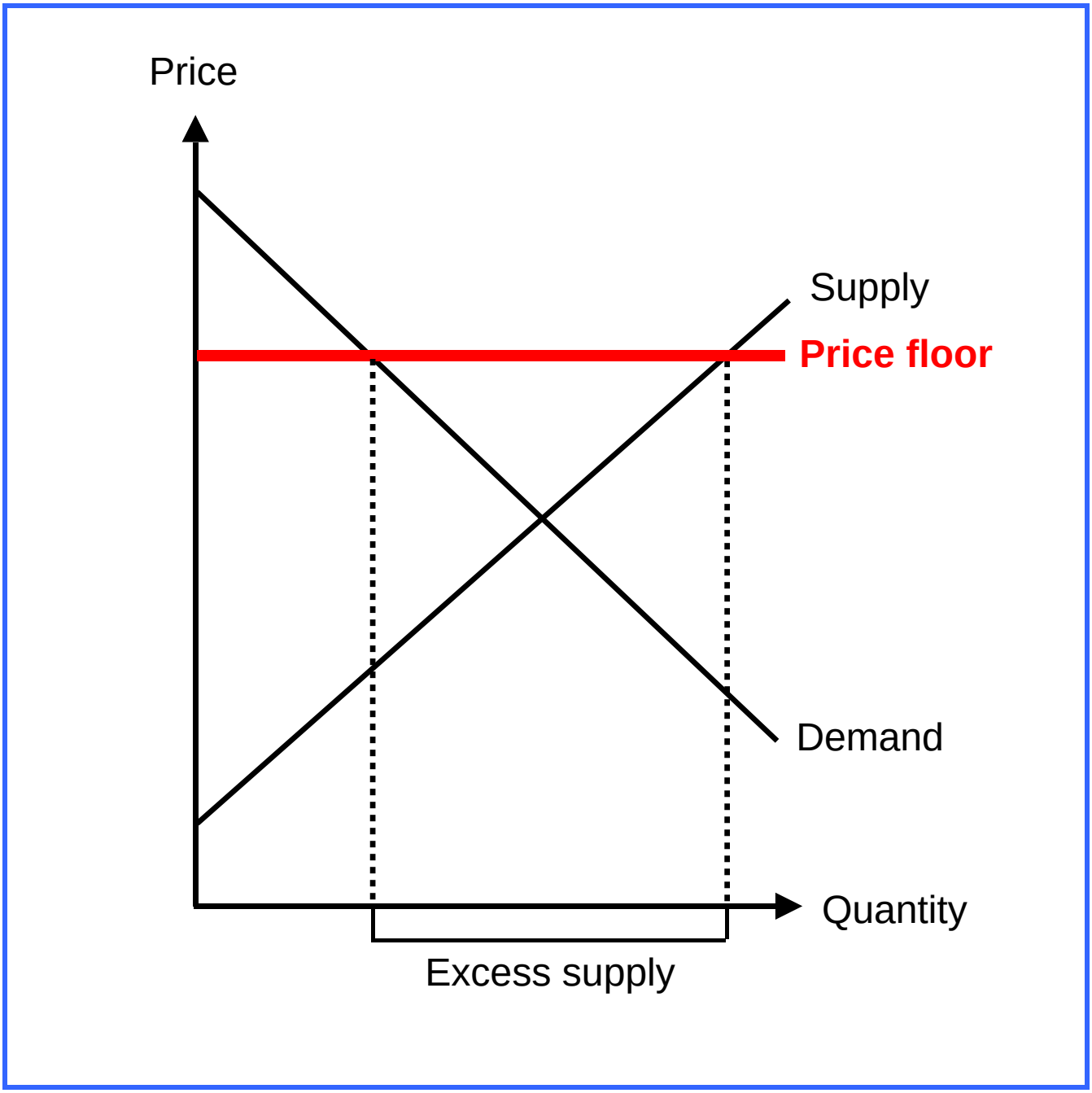
Price elasticity of supply

$$\text{Price elasticity of supply} = \frac{\%\text{ change in quantity supplied}}{\%\text{ change in price}}$$

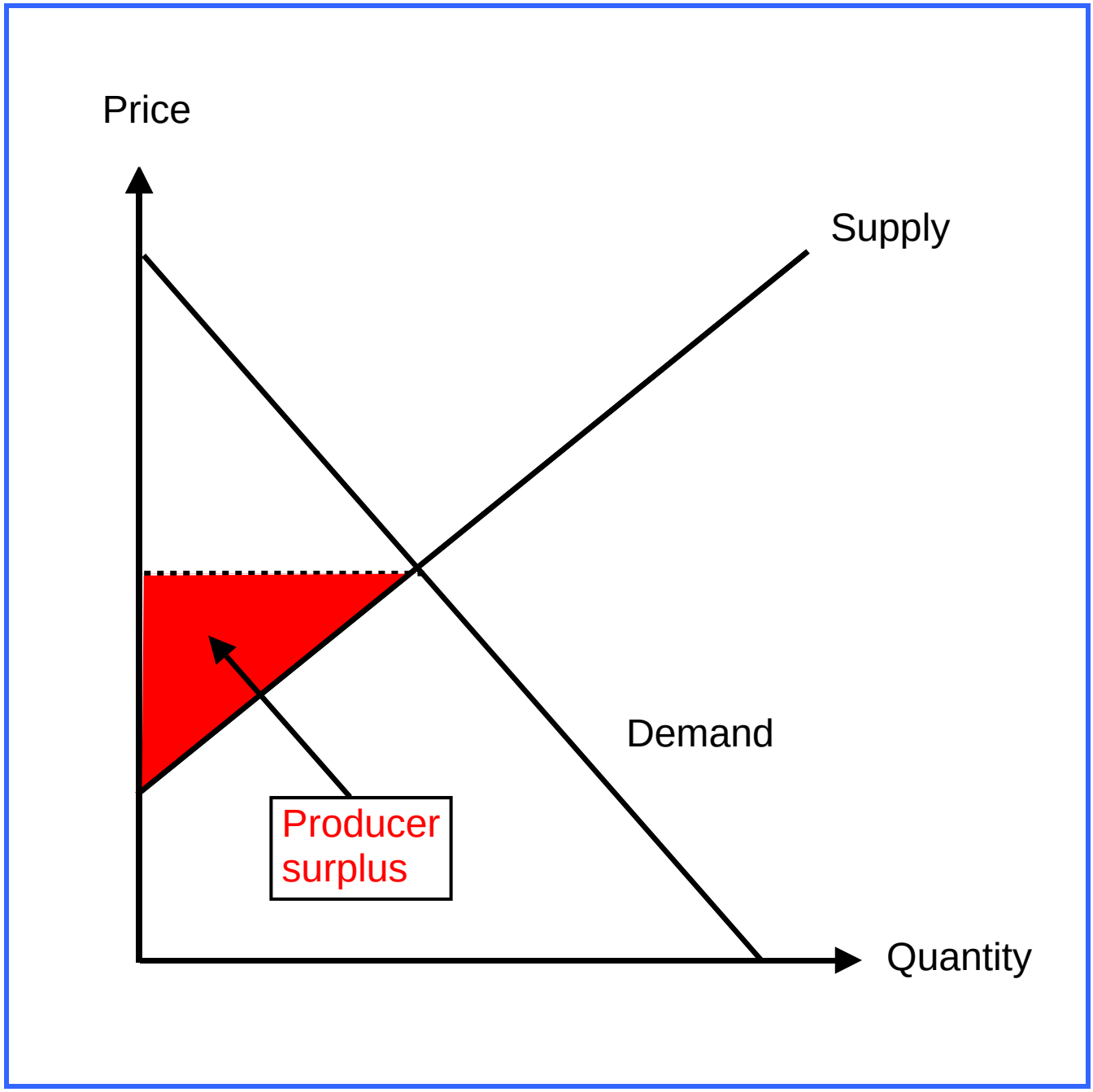


e = Price elasticity of supply

Price floor (minimum price)



Producer surplus

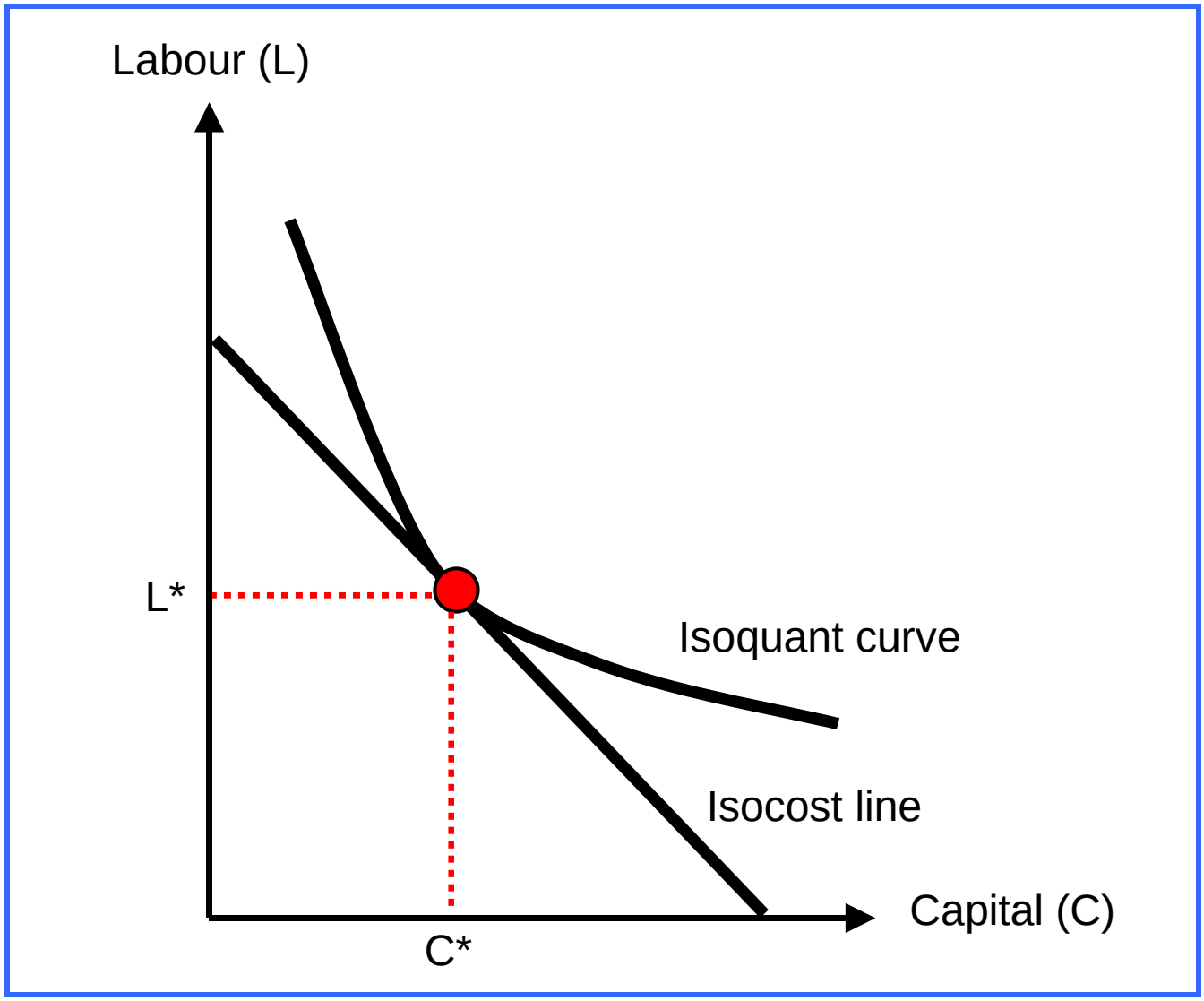


Production - minimum cost

The minimum cost of production is at the point where the isocost line and the isoquant curve have the same slope, that is, where the isocost line touches the isoquant curve.

Information about

- the isoquant. Click here!
- the isocost. Click here!

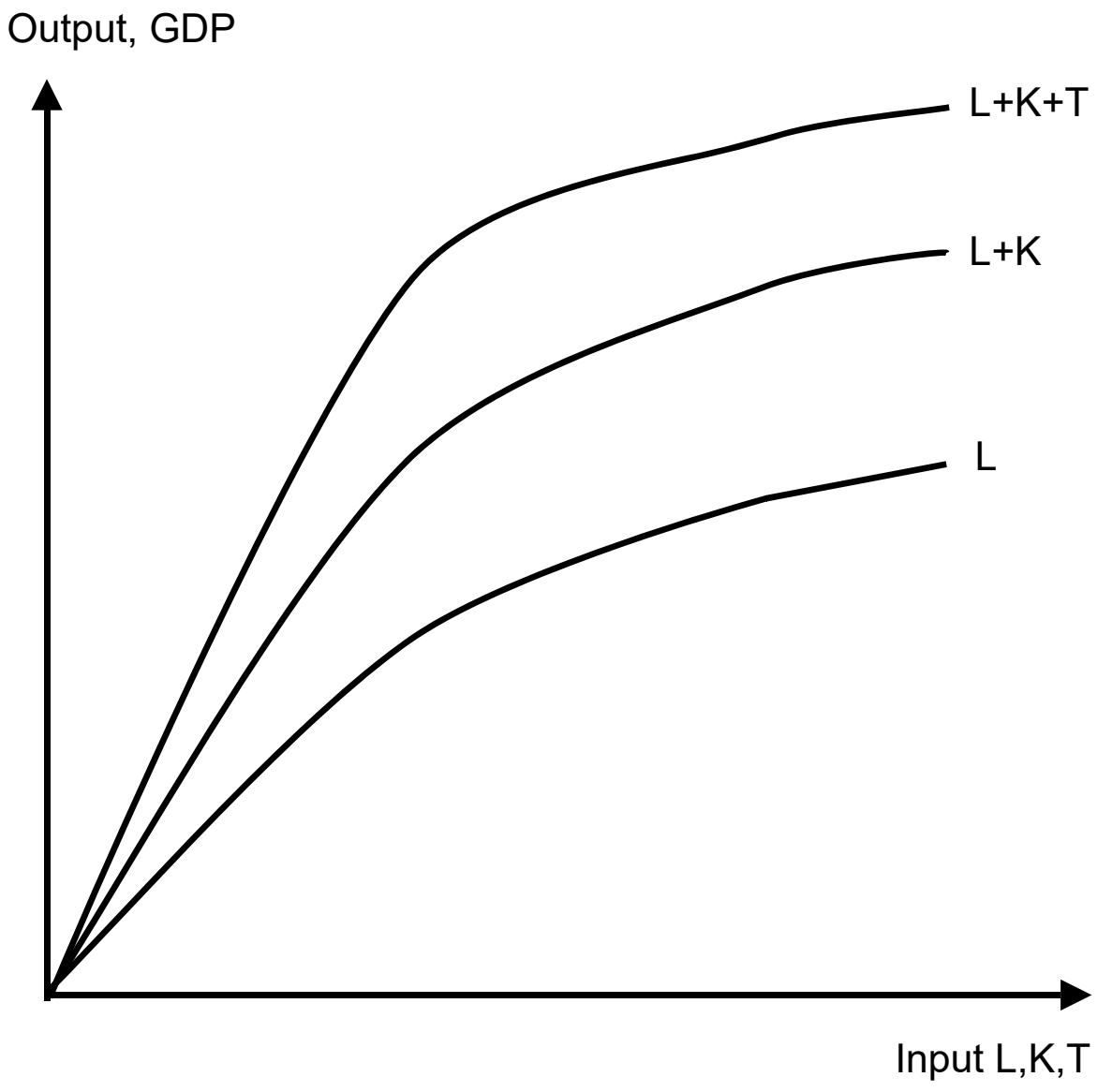


Production function

$Y = f(L,K,T)$

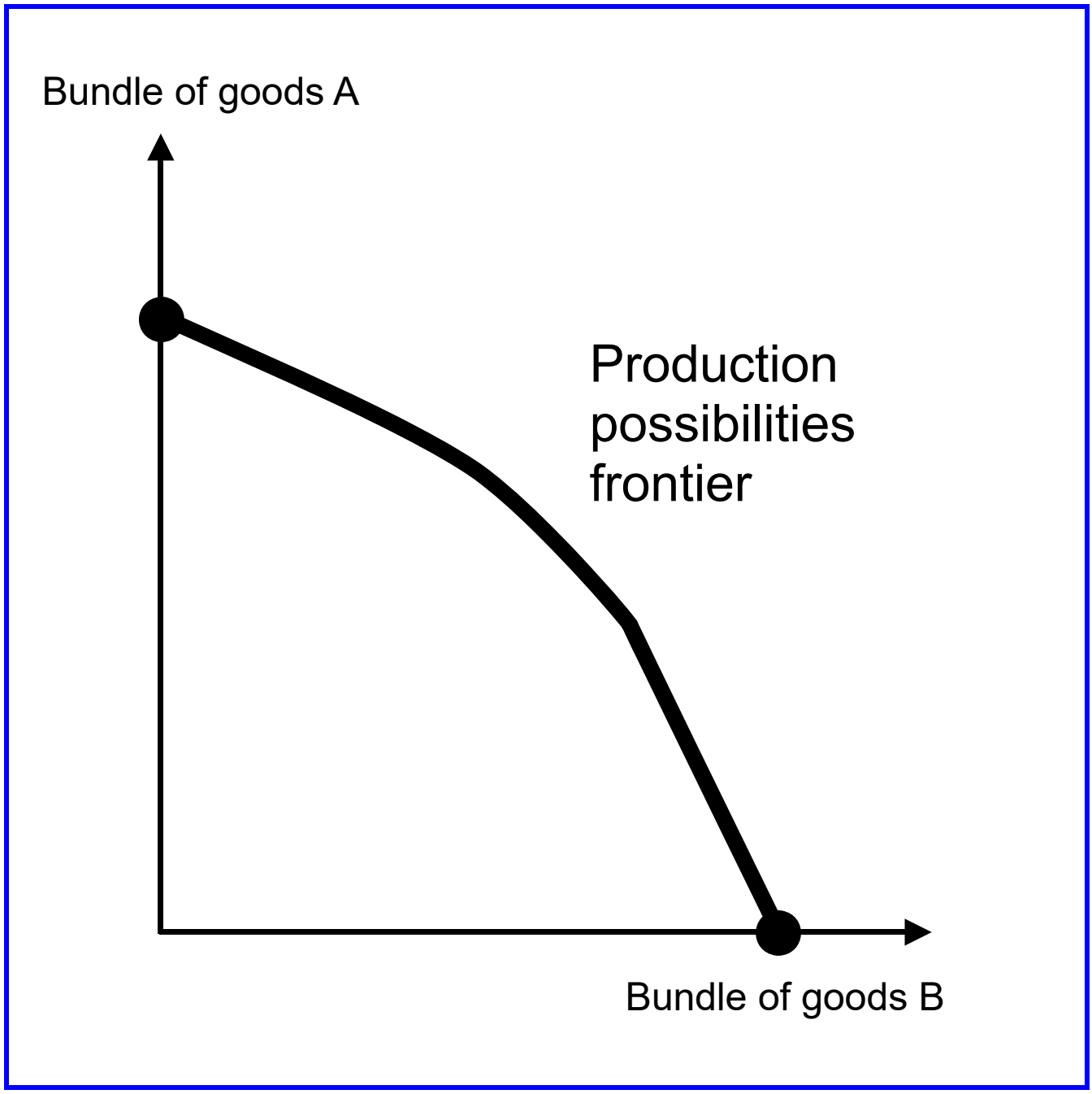
Y = Output or GDP (Gross domestic product)
f(...) = function of ...

L = Labor
K = Capital
T = Technology

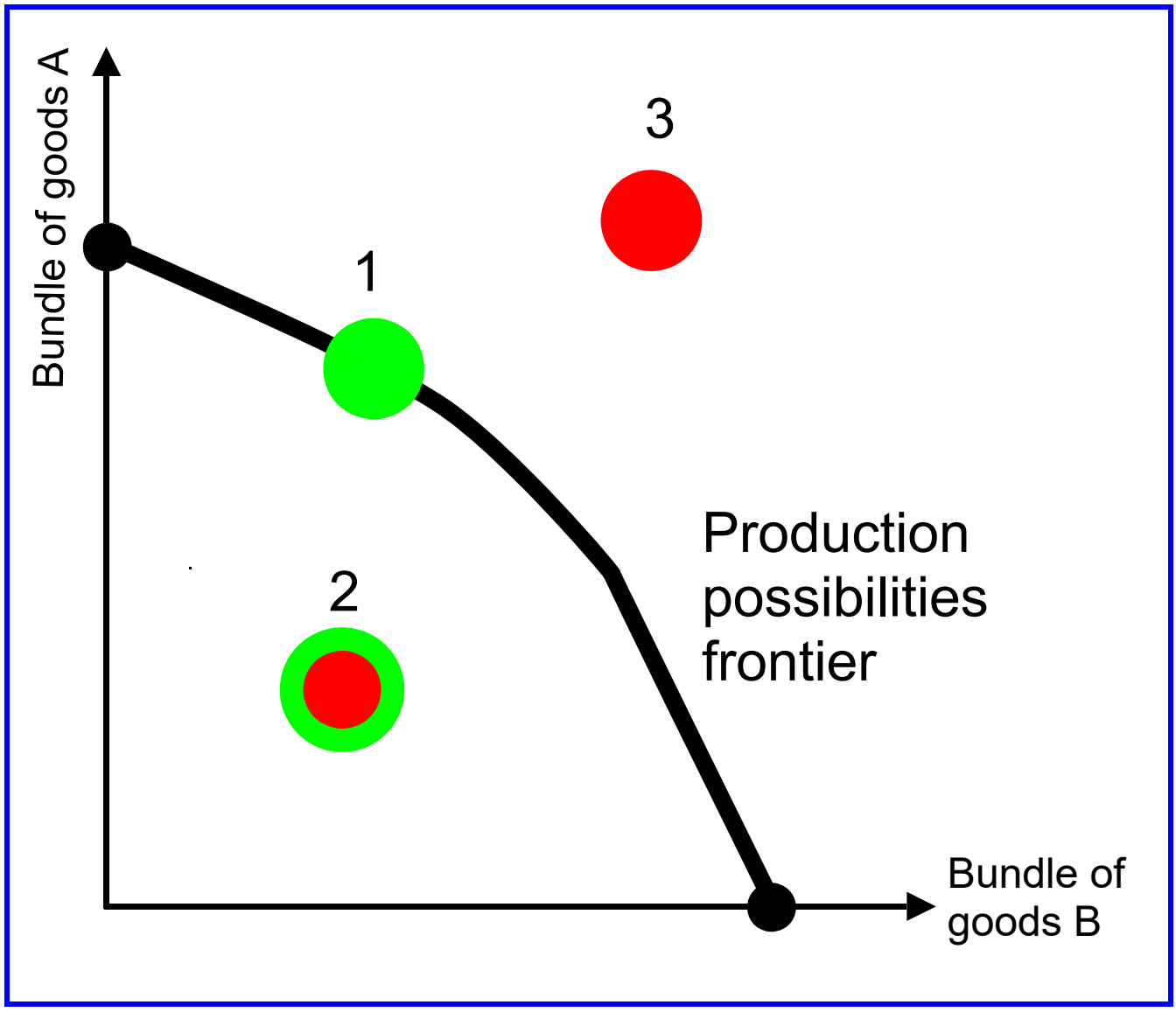


This graph shows diminishing marginal products of factors of input.

Production possibilities frontier 1



Production possibilities frontier 2



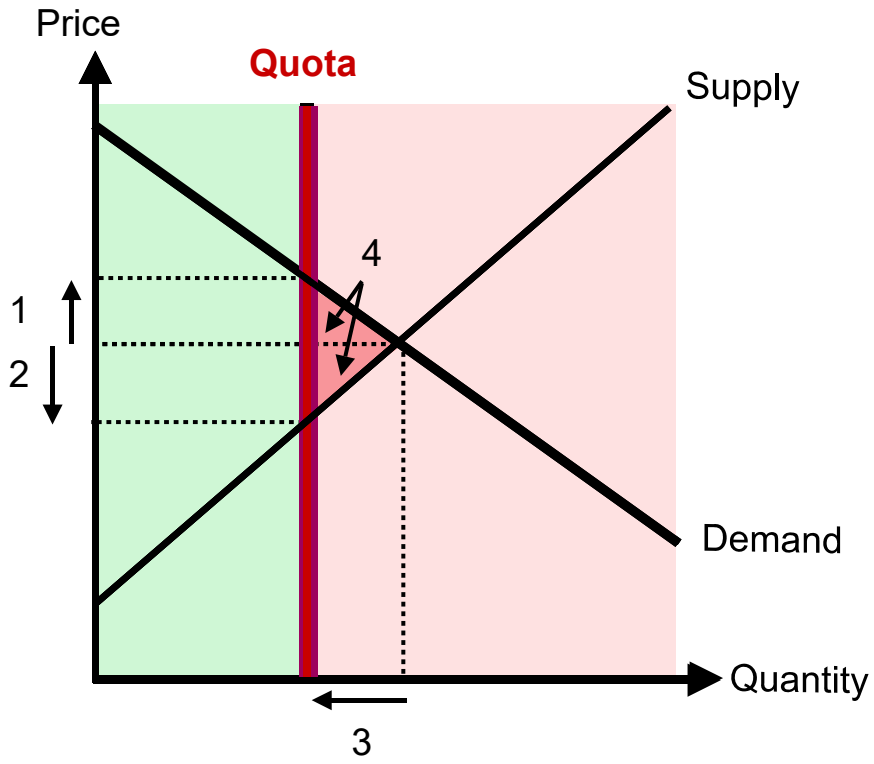
- Points like 1 (on the curve):
  attainable and efficient
- Points like 2 (inside the curve):
  atteinable, but inefficient (with unemployment)
- Points like 3 (outside the curve):
  unattainable

Production quota

① Nature of production quotas

The state determines the quantity that each producer is allowed to produce. Any production quantity in excess of this is illegal. Production quotas can also be linked to minimum prices in order to avoid inefficient overproduction.

② Impacts of production quotas

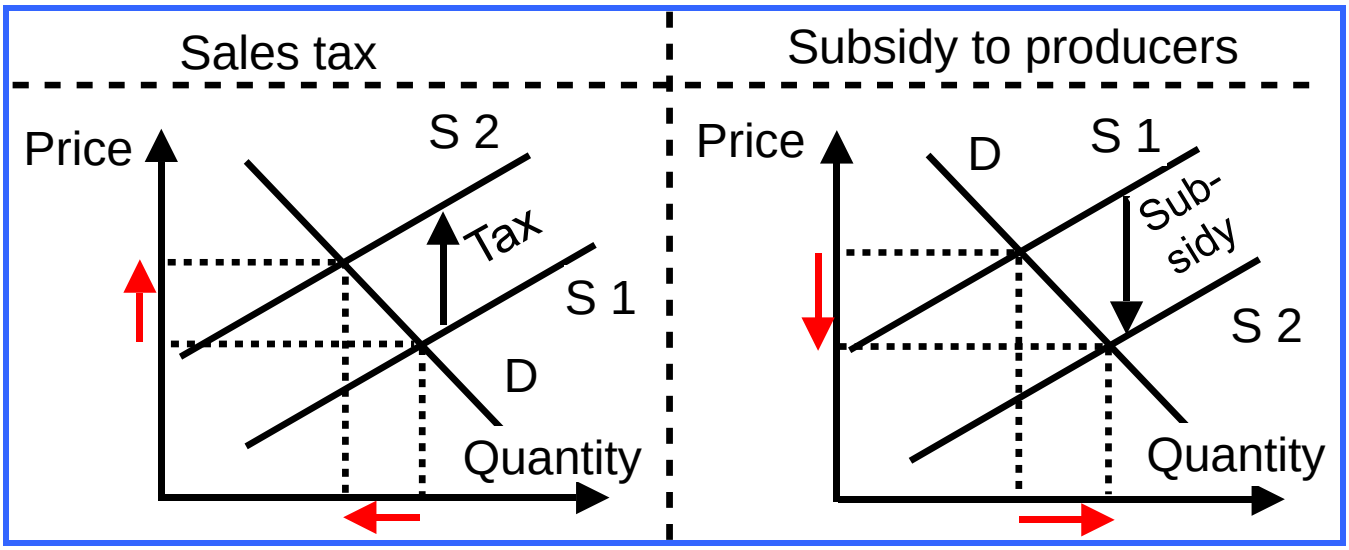


Impacts 1 to 4:

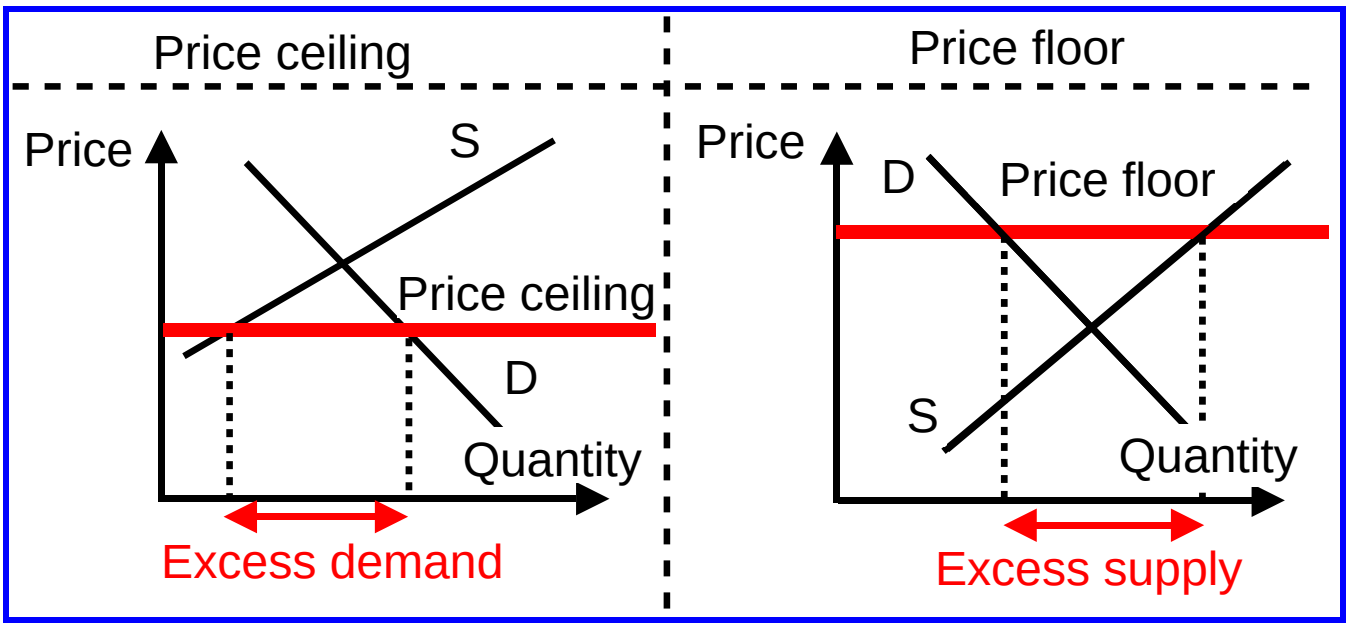
1 Price increases
2 Marginal cost decreases
3 Production quantity falls compared to market equilibrium
4 Welfare loss

Public interference and market

① The public interference creates a **new equilibrium.**

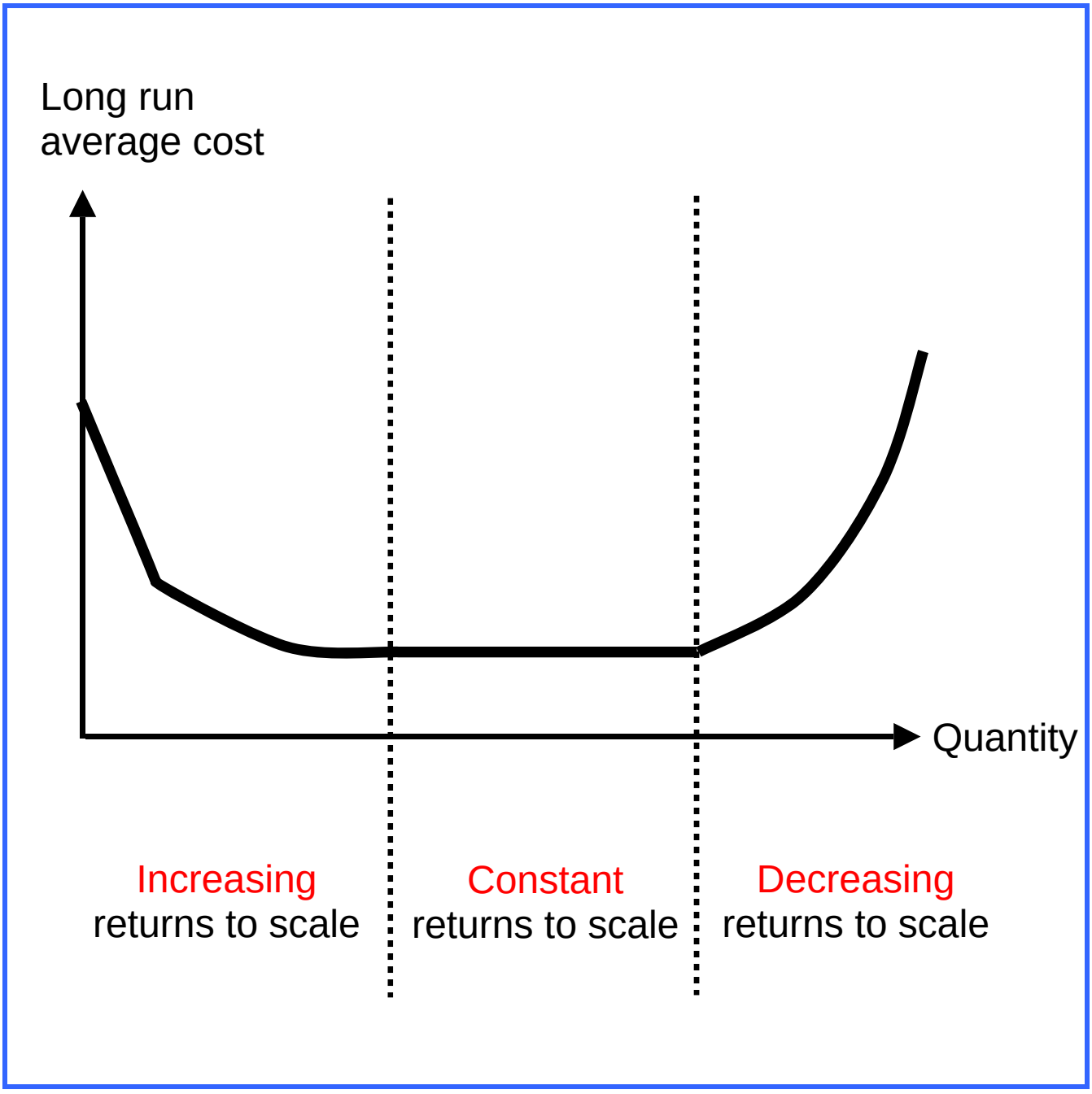


② The public interference creates a **disequilibrium.**

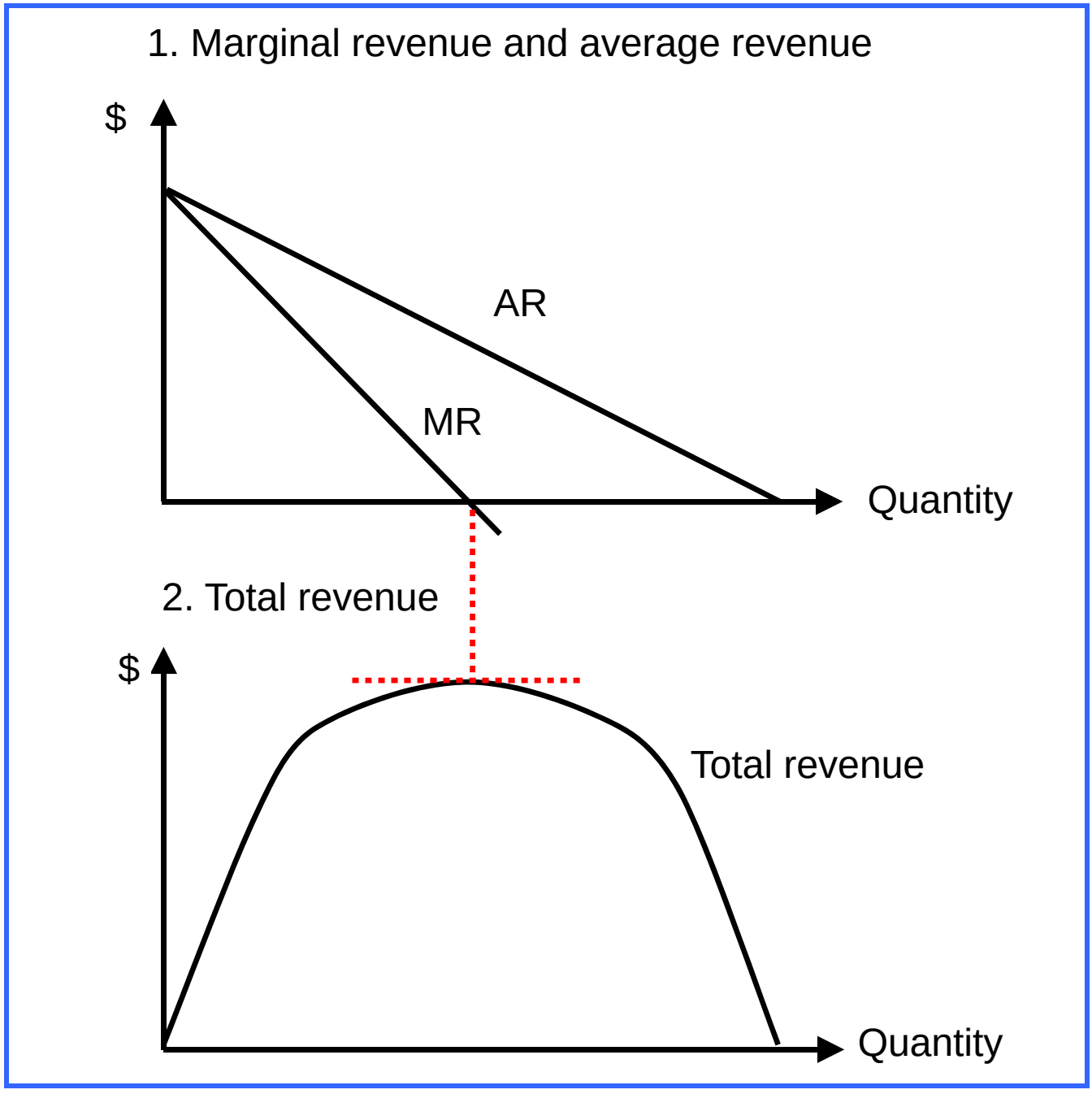


D = Demand	S = Supply

Returns to scale

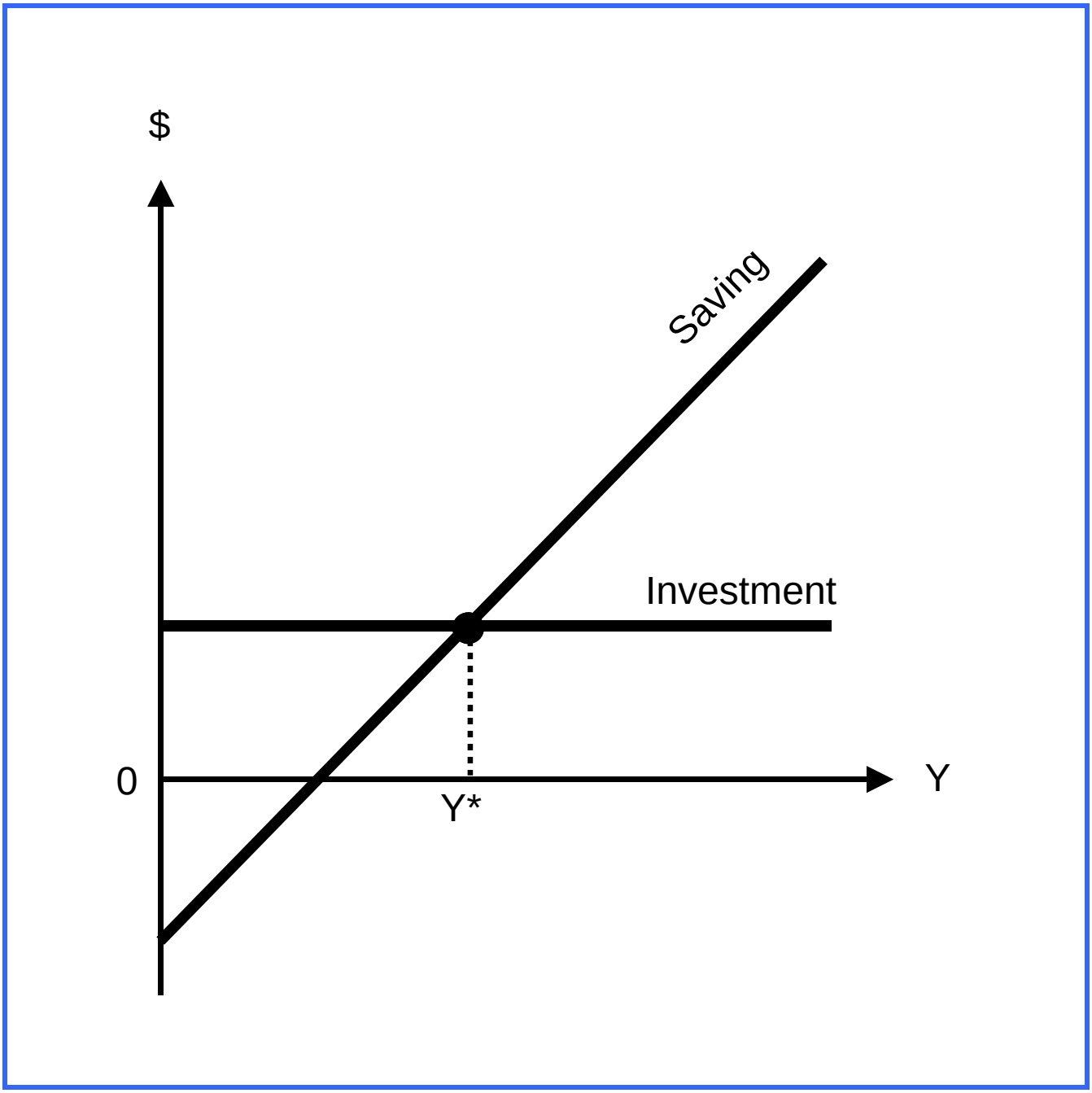


Revenue - marginal, average and total



MR = Marginal revenue
AR = Average revenue

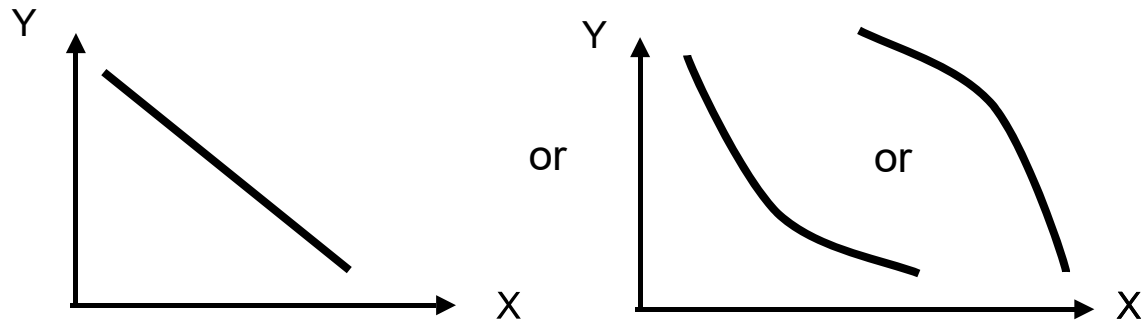
Saving and investment



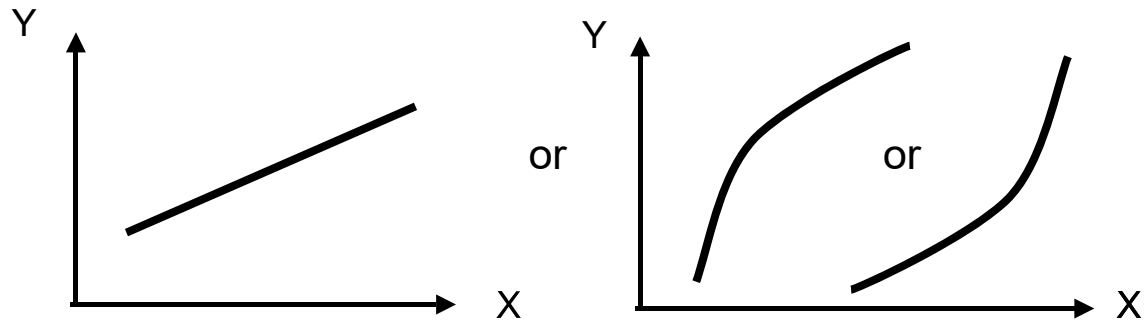
Y = Output, income
Y* = Equilibrium of Y

Slope

Negative slope (slope **<** 0)

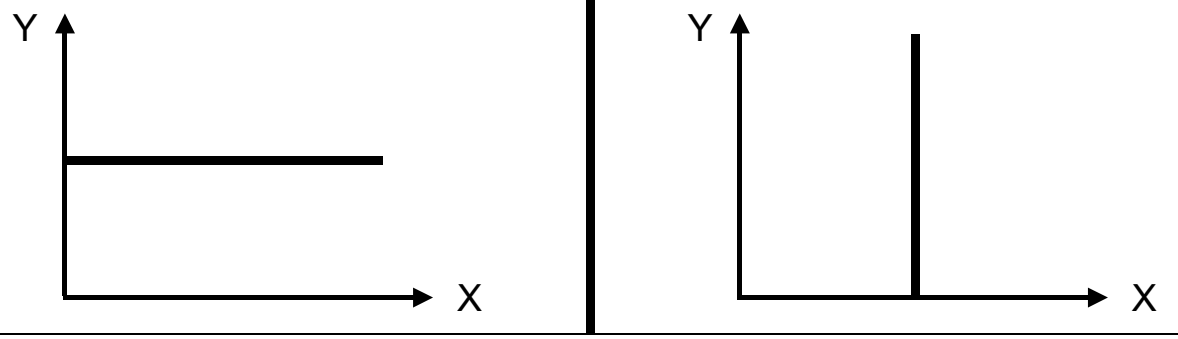


Positive slope (slope **>** 0)



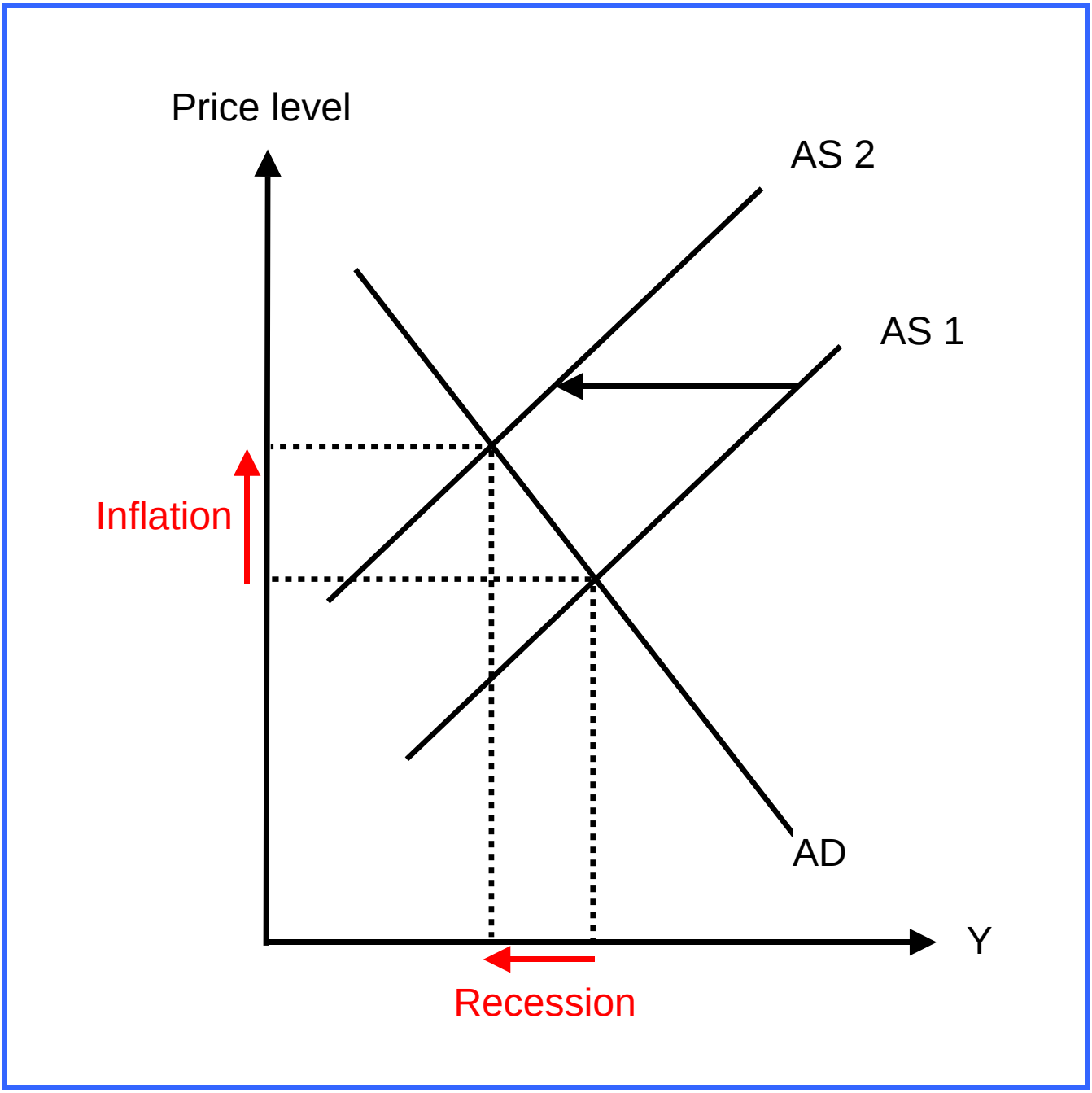
Special cases

Slope = **0**	Slope = ∞



Source: Baumol William J., Blinder Alan S., Solow John L., Economics, Principles and Policy, 14th ed., p. 16

Stagflation

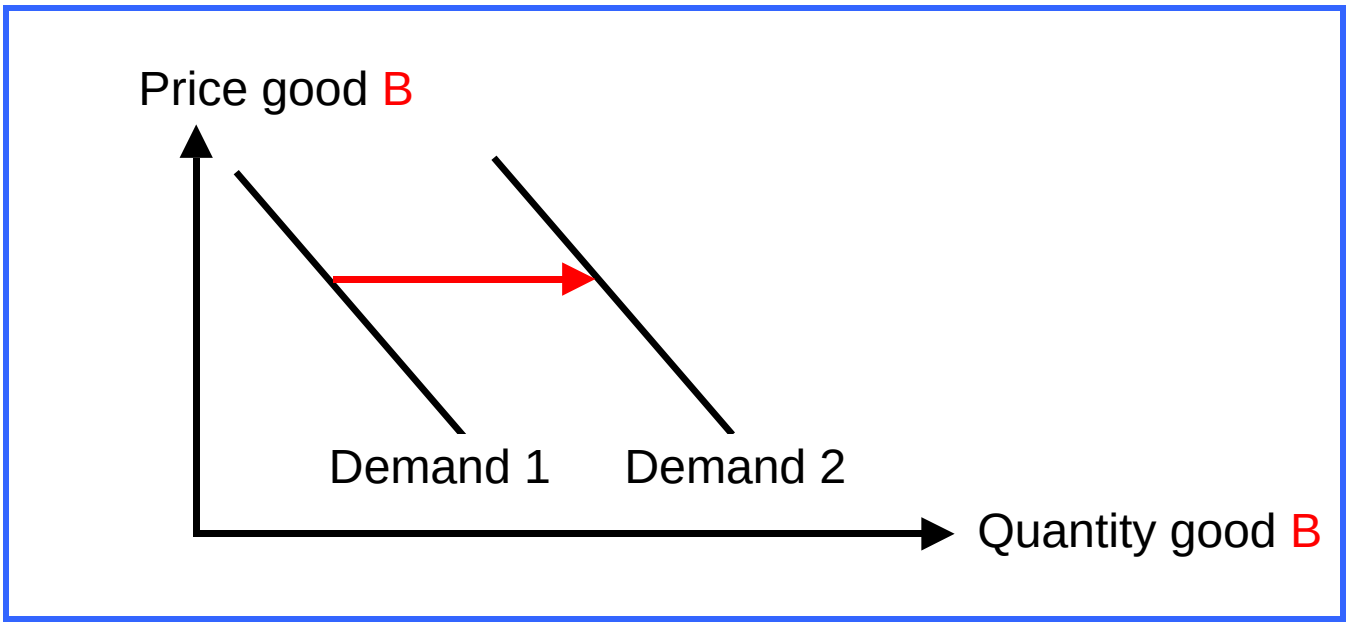


Y = Output, income
AD = Aggregate demand
AS = Aggregate supply

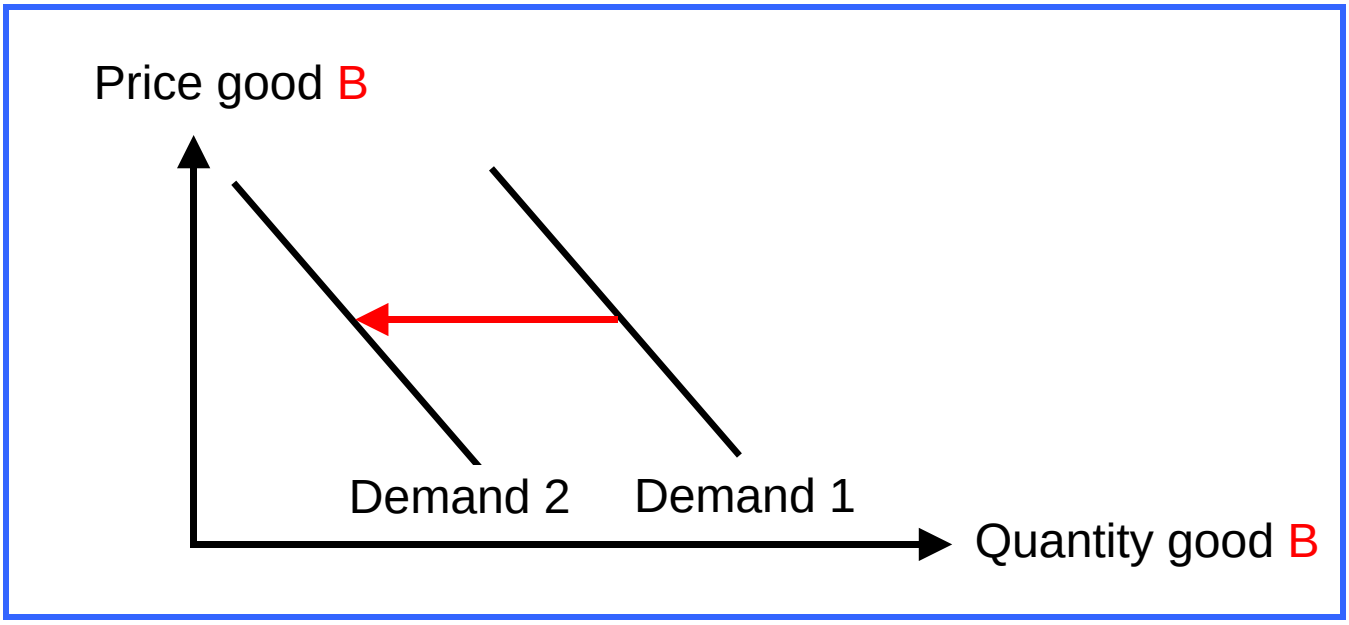
Substitutes

The goods A and B are substitutes.

① The price of good **A rises.** What happens to B?

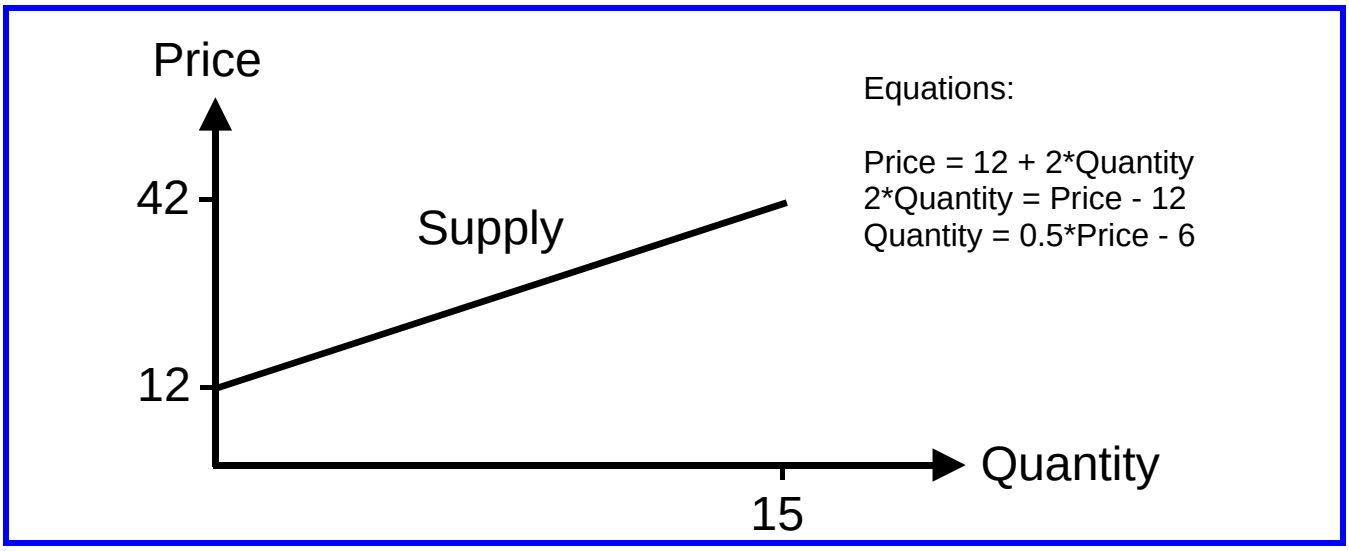


② The price of good **A falls.** What happens to B?

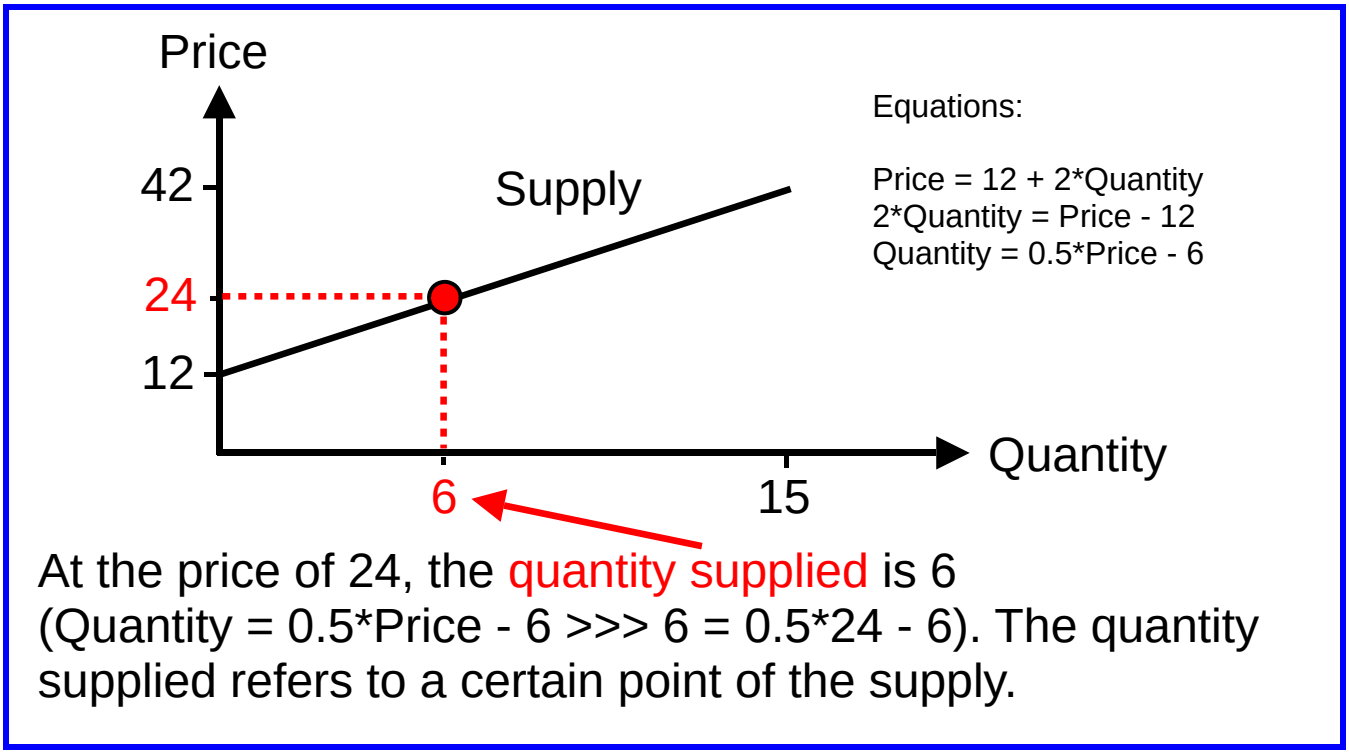


Supply and quantity supplied

① Supply

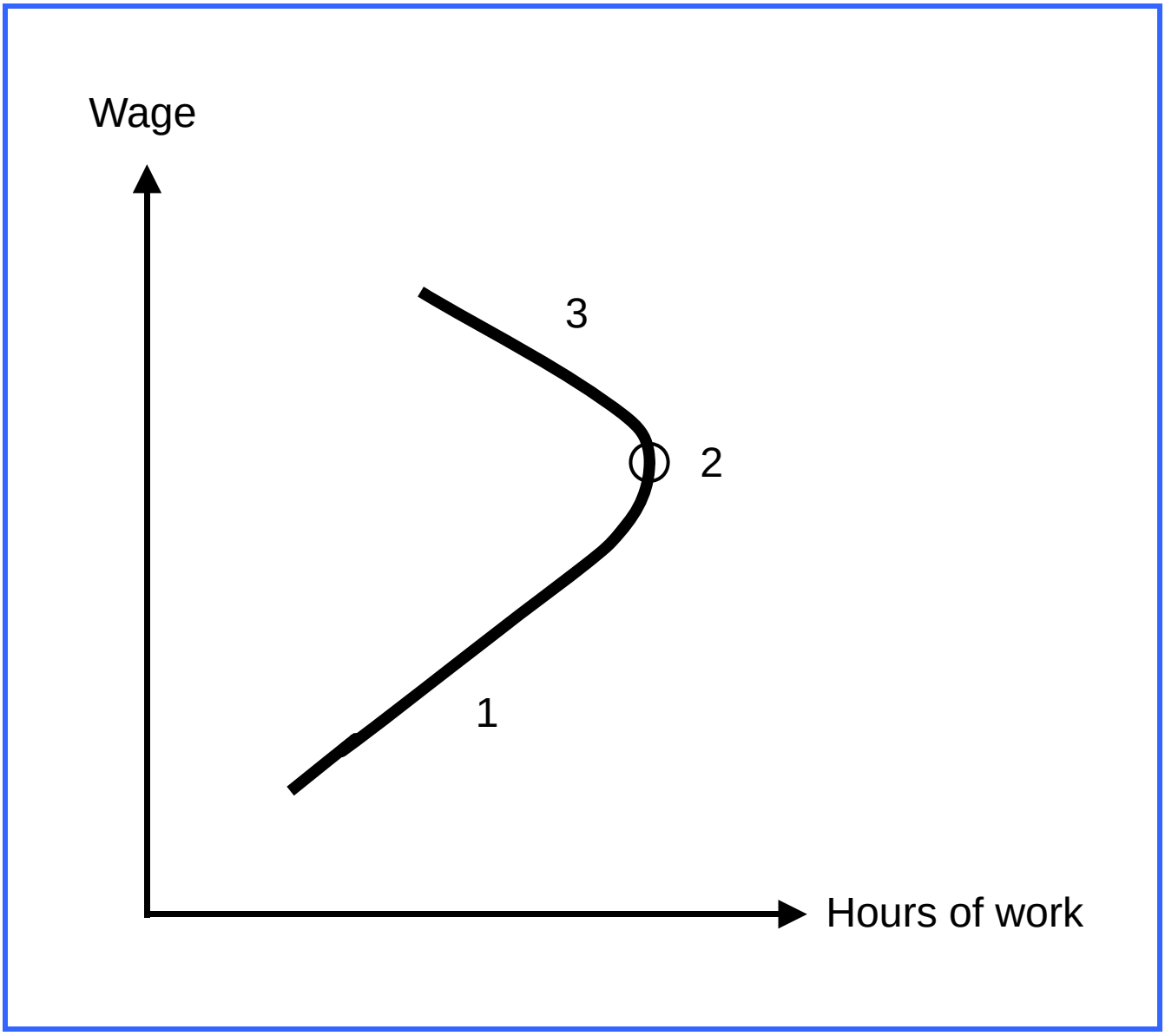


② Quantity supplied



At the price of 24, the quantity supplied is 6 (Quantity = 0.5*Price - 6 >>> 6 = 0.5*24 - 6). The quantity supplied refers to a certain point of the supply.

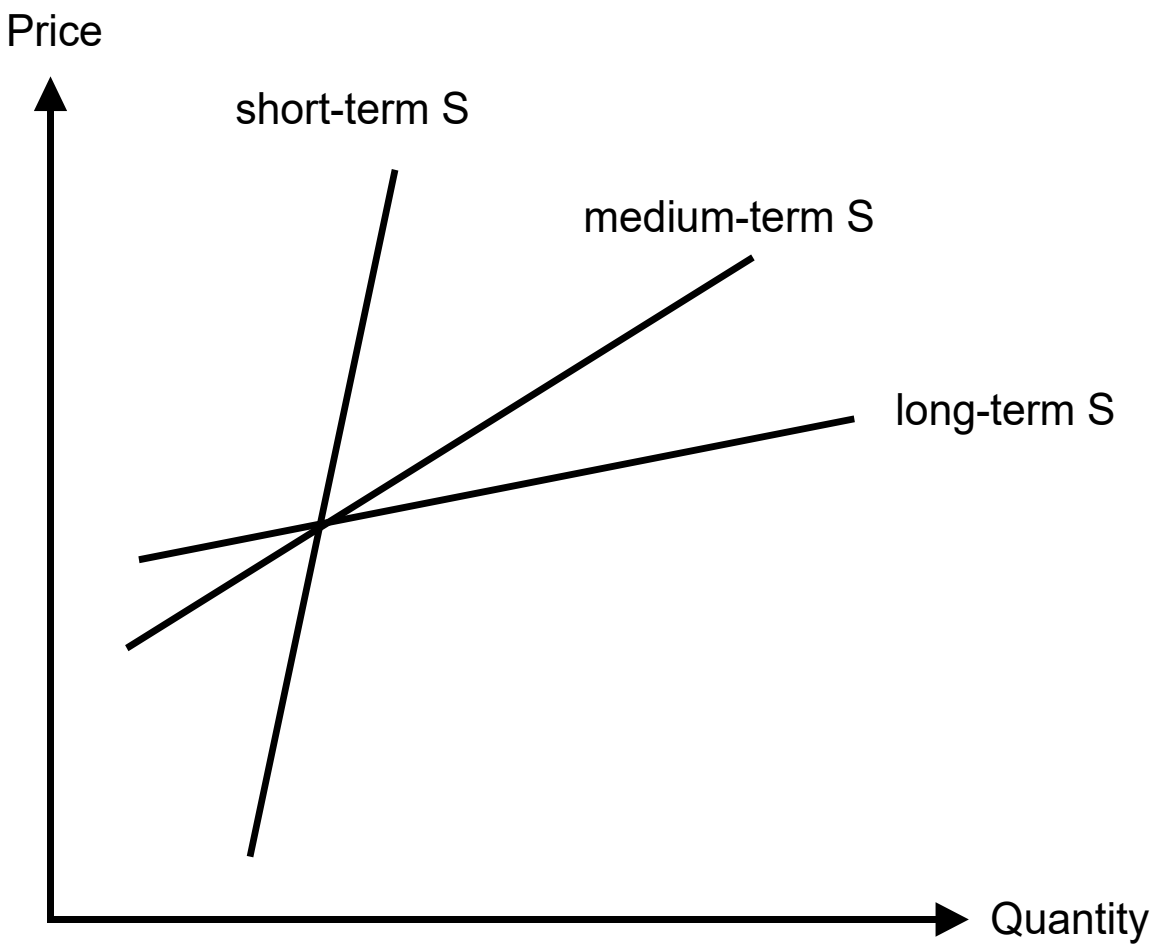
Supply of labour - individual



1 Substitution effect **>** Income effect
2 Substitution effect **=** Income effect
3 Substitution effect **<** Income effect

Supply over time and elasticity

① Supply (S) over time

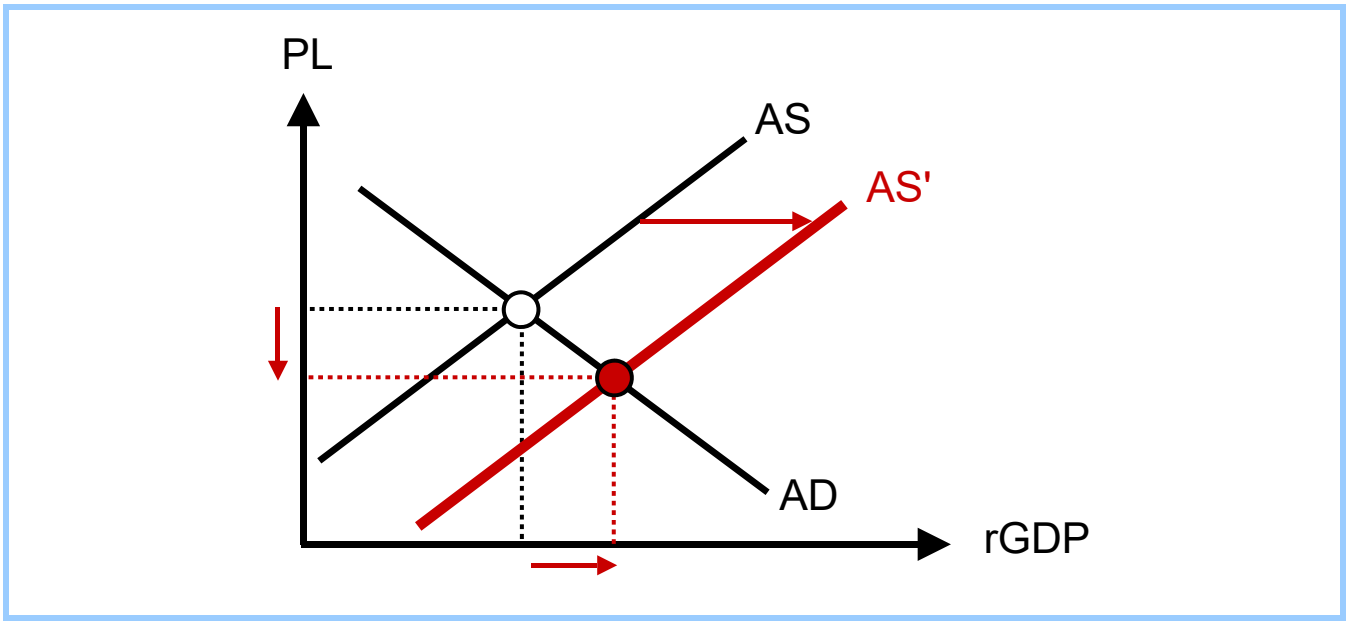


② Price elasticity of supply (e):

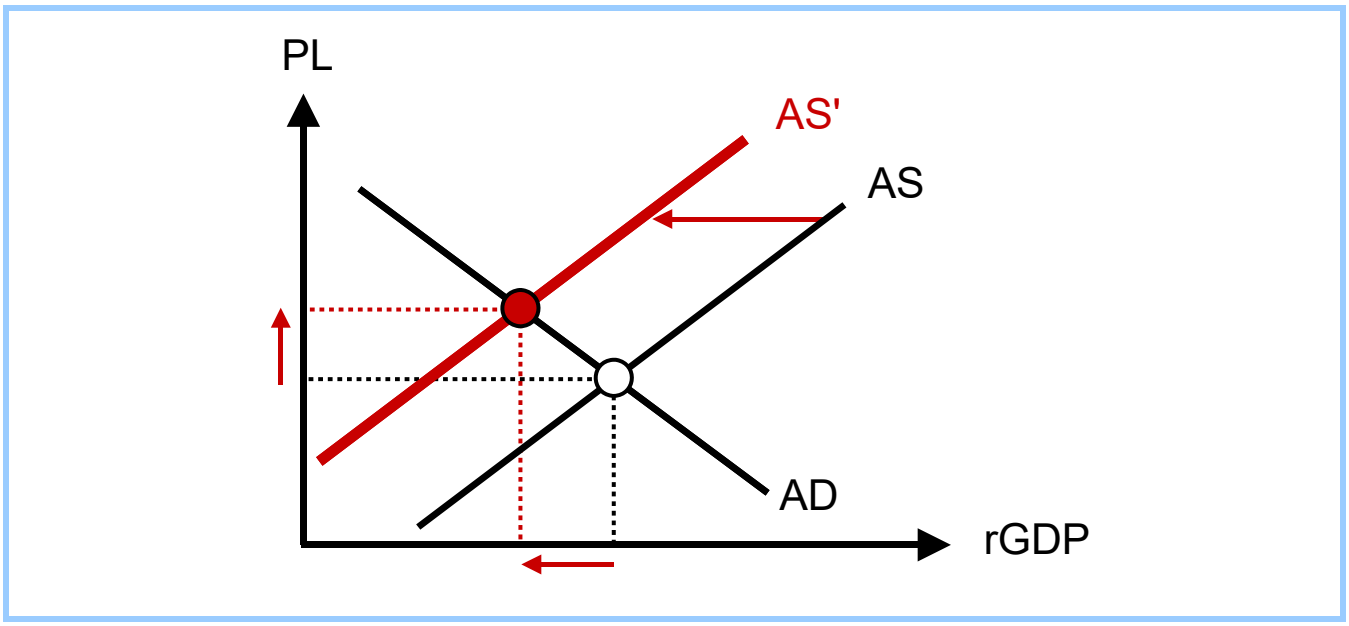
e short-term < e medium-term < e long-term

Supply shocks

① *Positive* supply shock

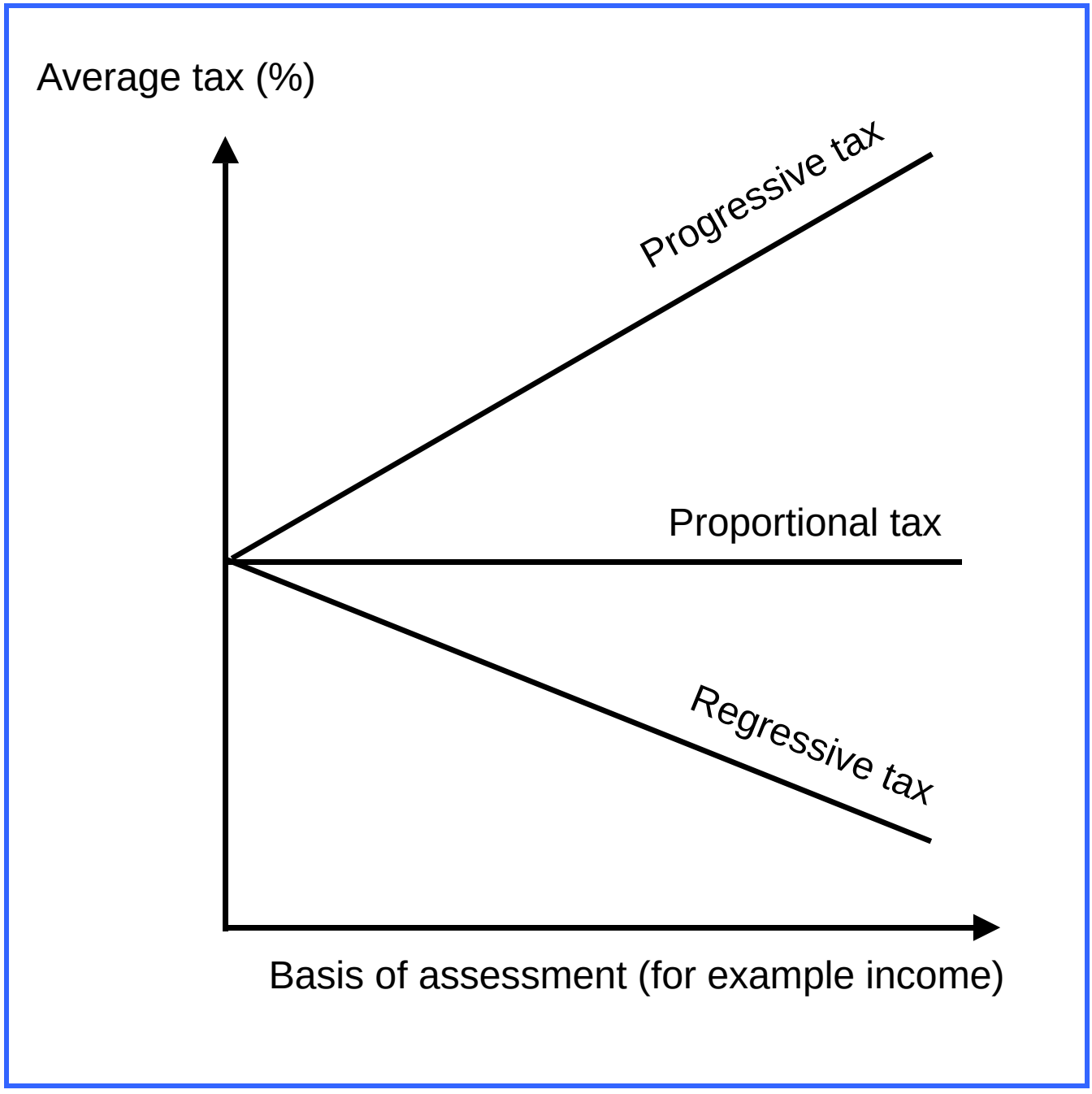


② *Negative* supply shock



AS = Aggregate supply	PL = Price level
AD = Aggregate demand	rGDP = real gross domestic product

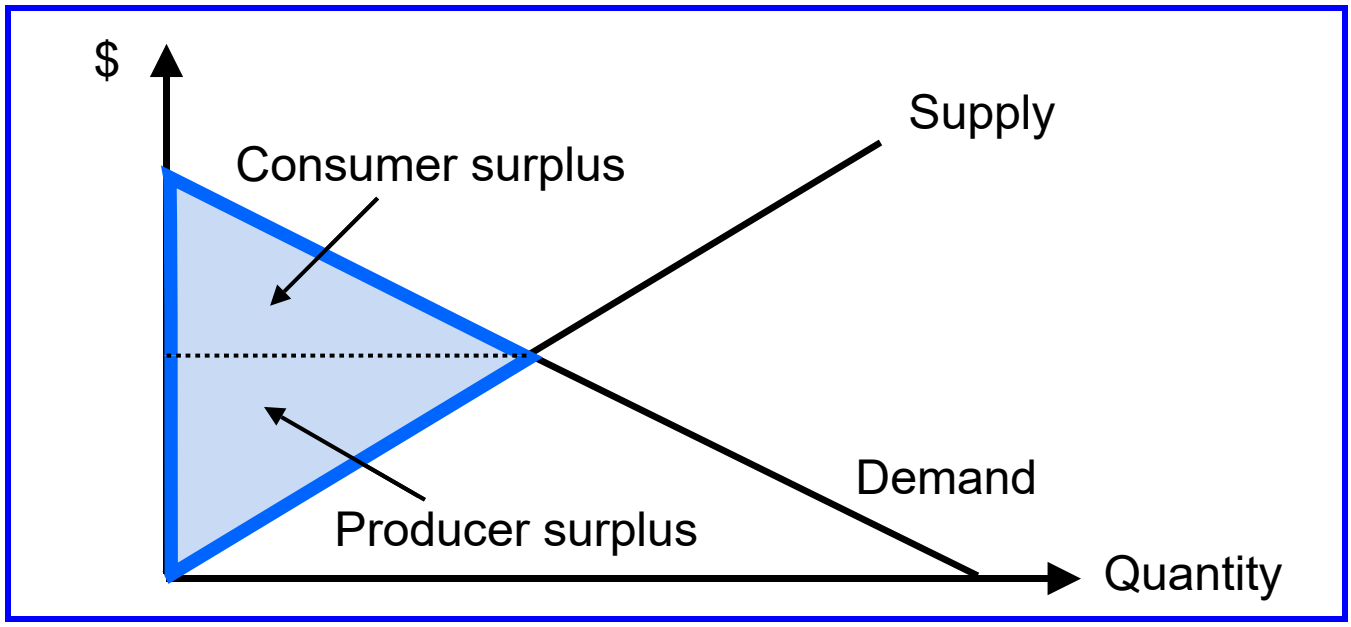
Tax - progressive, proportional and regressive



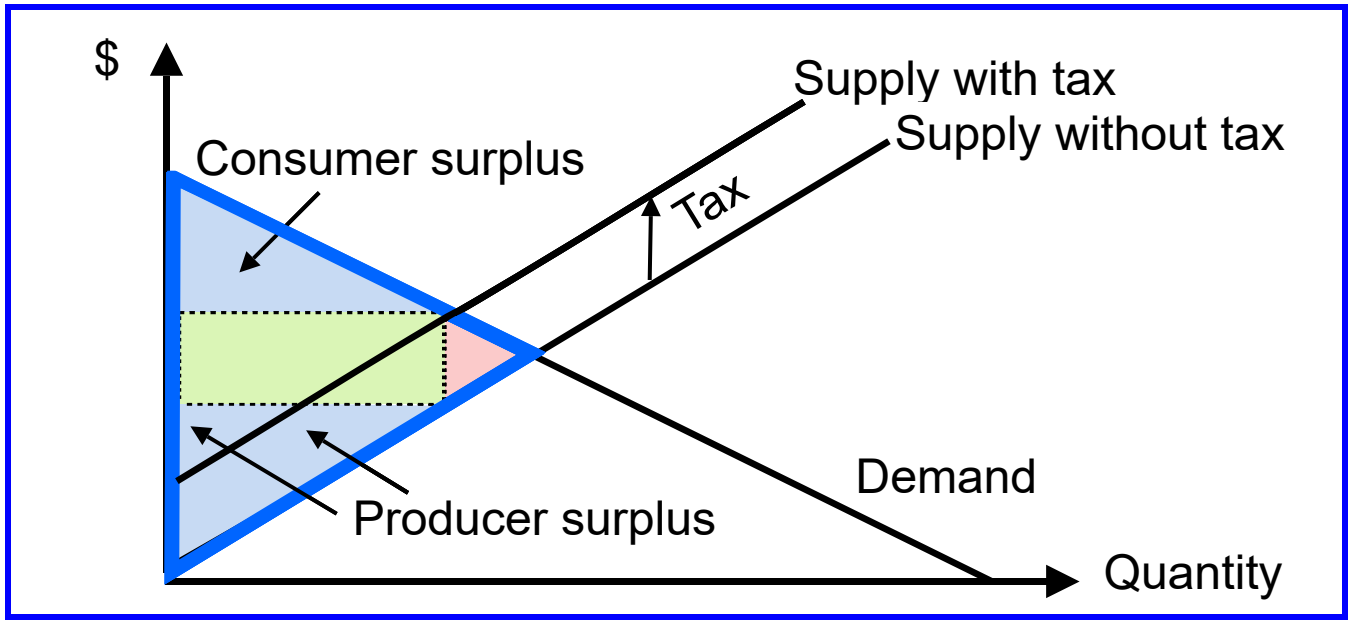
Tax and total surplus

Total surplus (SP) (social SP) = Consumer SP + producer SP

① Situation **without** tax



② Situation **with** tax (total surplus is reduced)

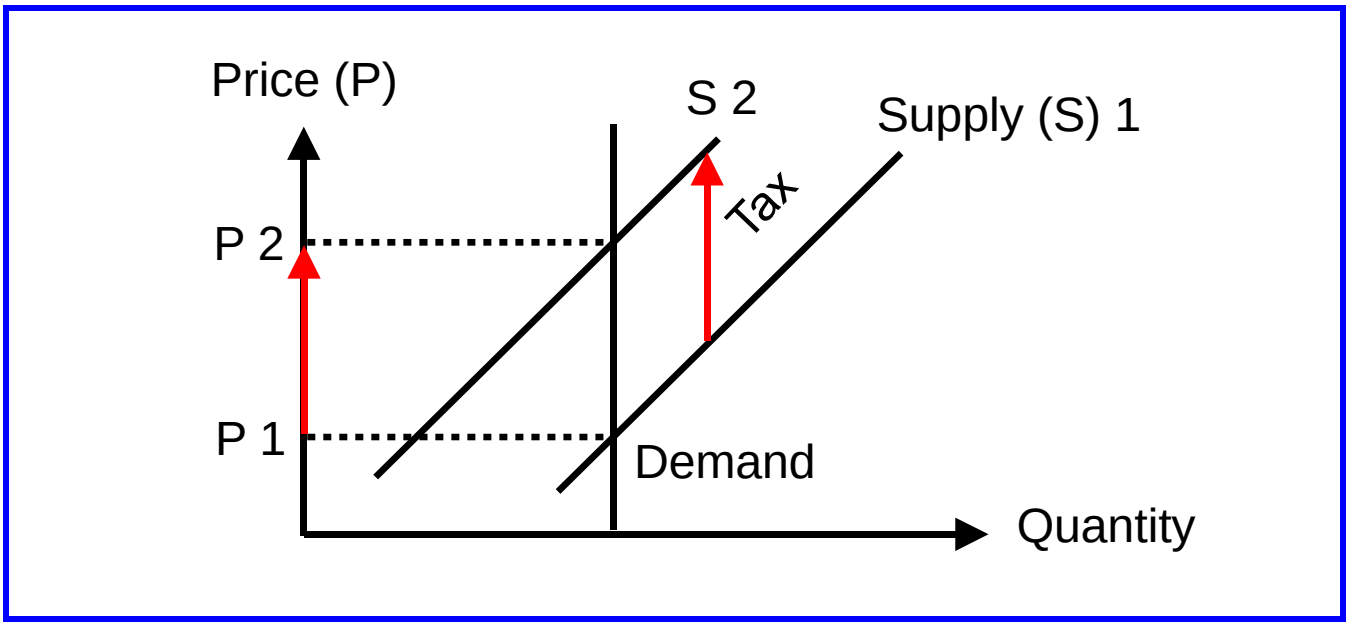


= Tax receipts

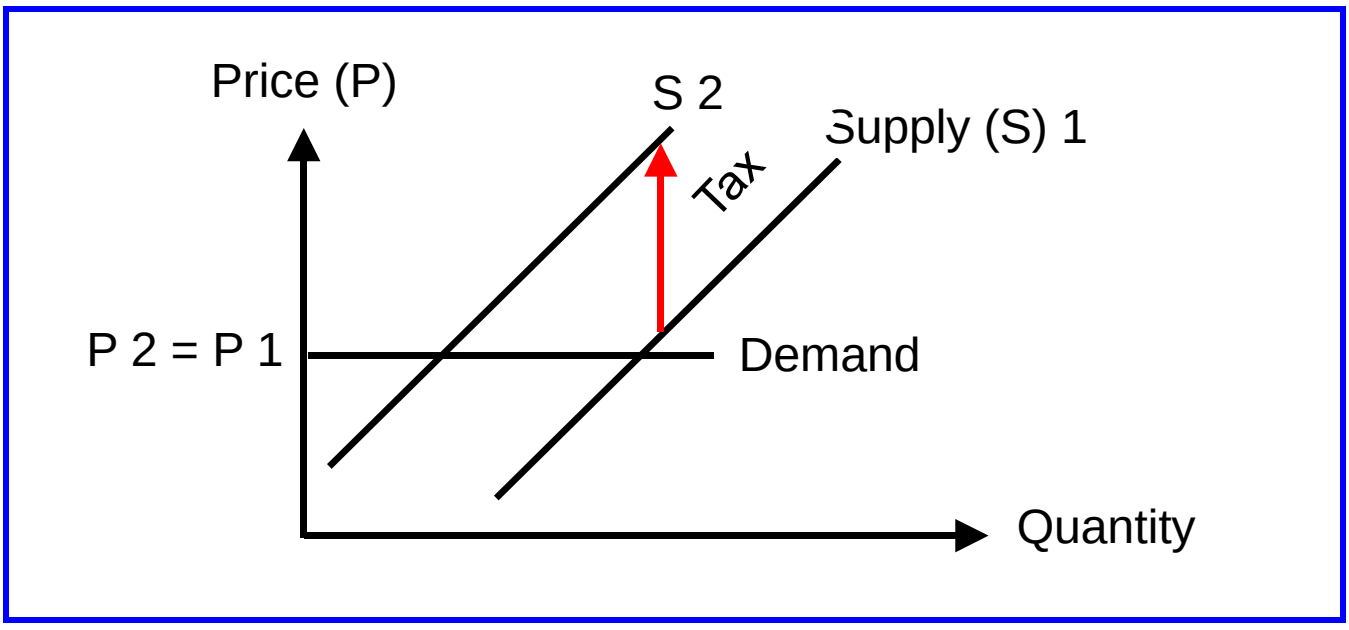
= Deadweight loss

Tax incidence - extreme cases

① The tax is borne entirely by the **buyer**.

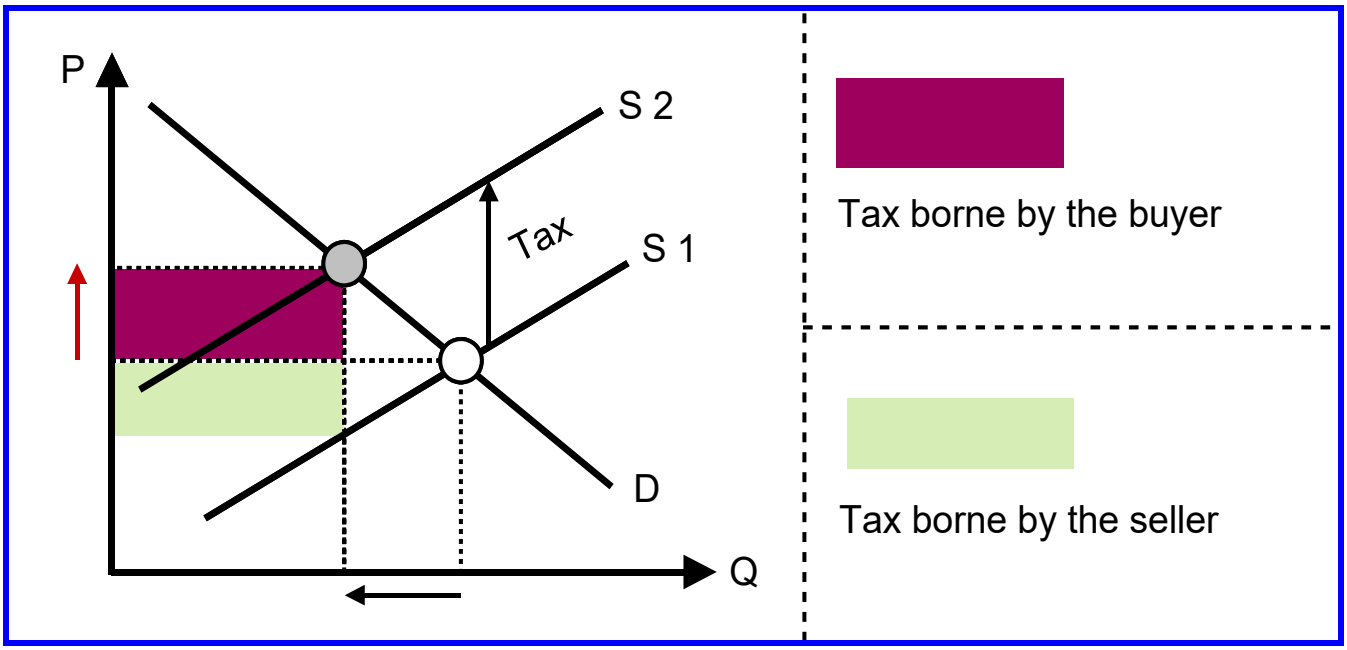


② The tax is borne entirely by the **seller.**

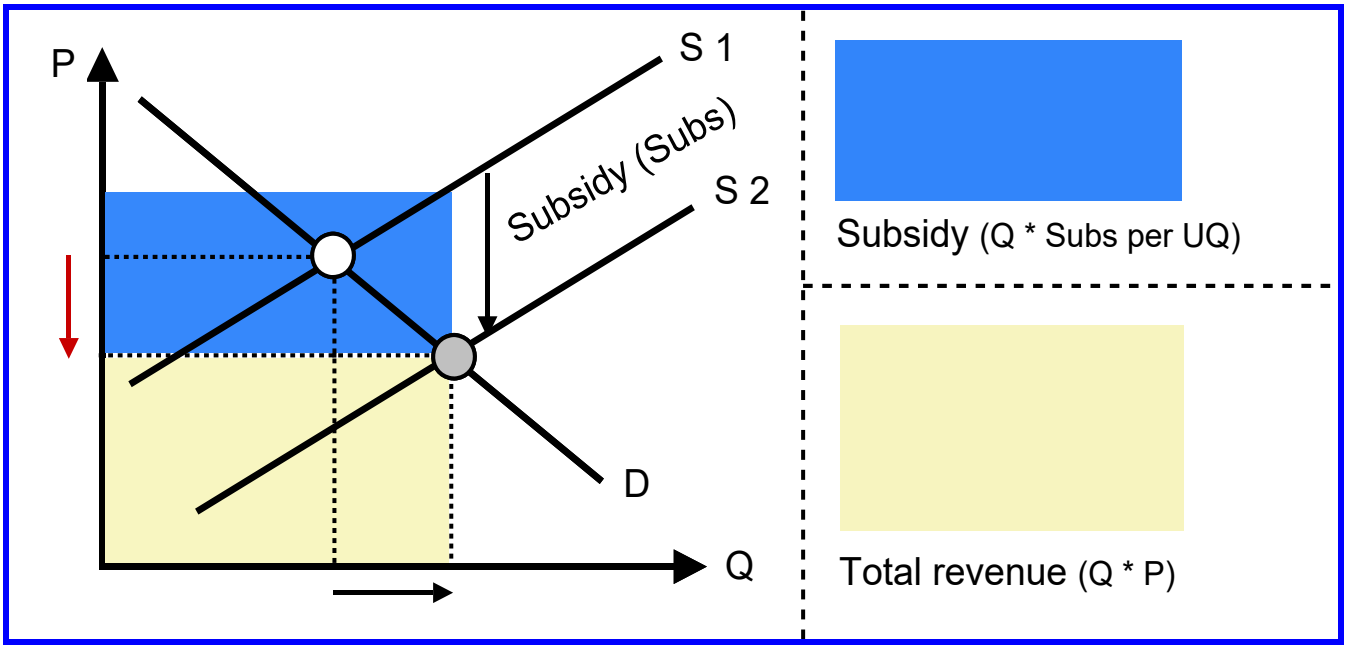


Tax versus subsidy

① **Sales tax** (per UQ, to be paid by the seller)



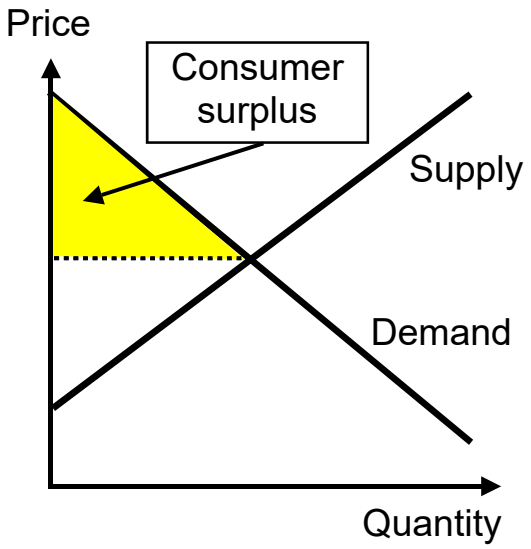
② **Subsidy** (per UQ, paid to suppliers)



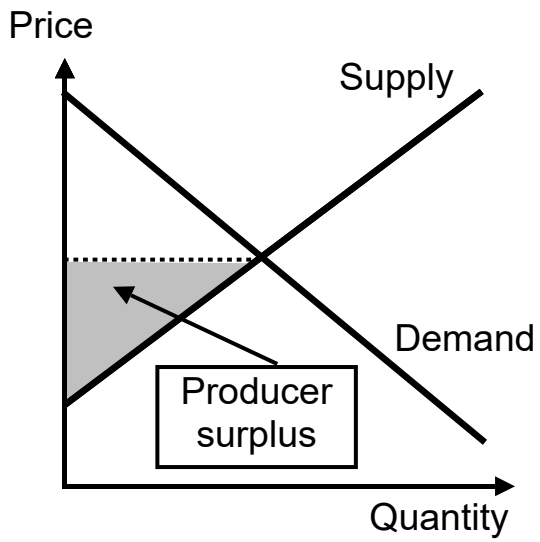
P = Price	S = Supply
Q = Quantity	D = Demand
UQ = Unit of quantity	

Total surplus

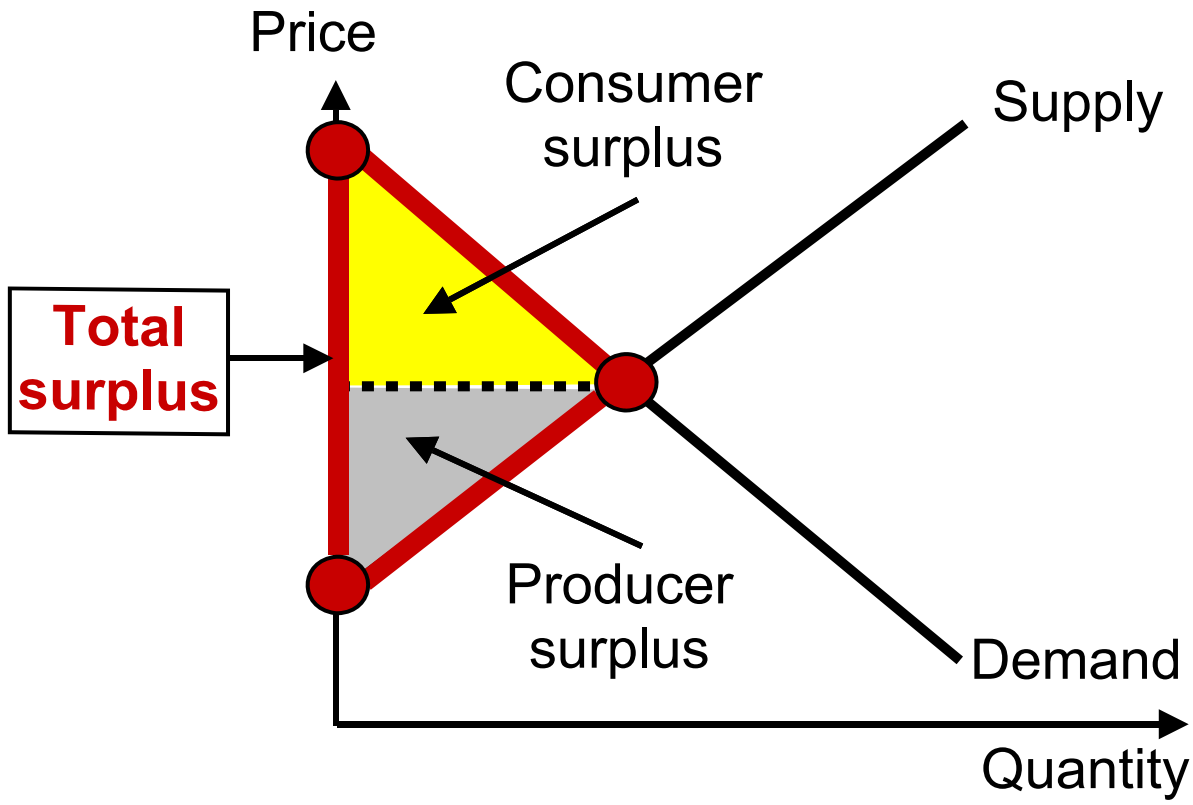
① Consumer surplus



② Producer surplus

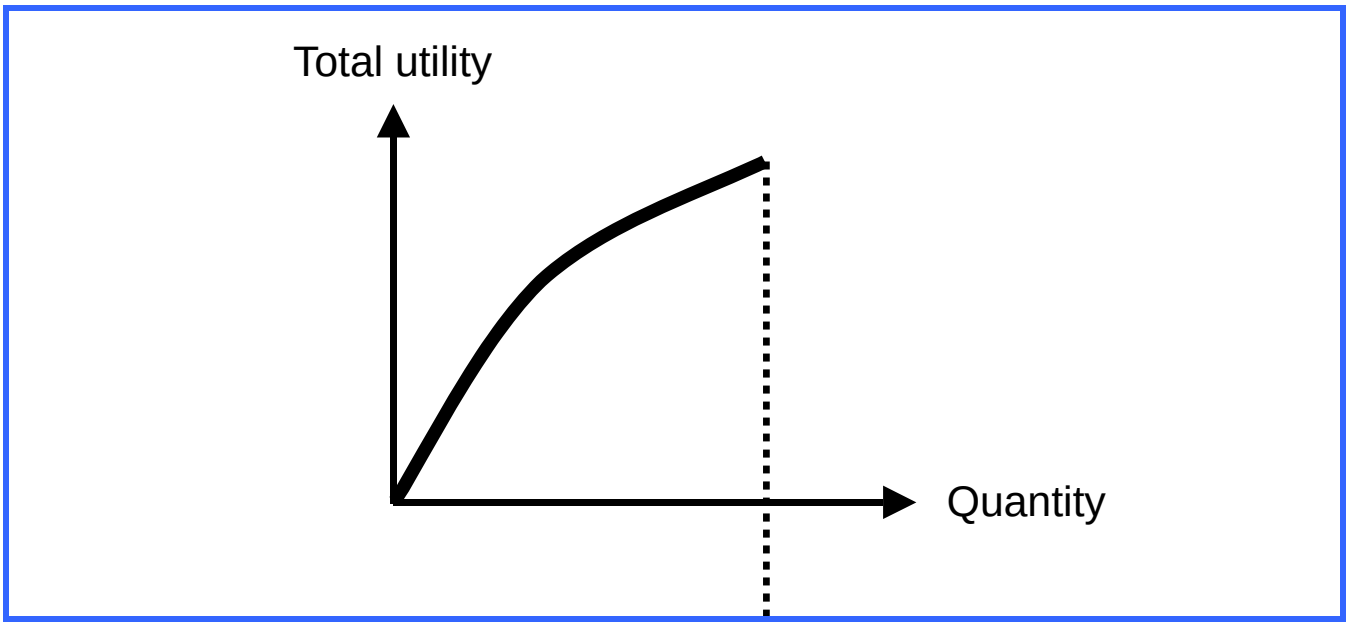


③ **Total surplus =** Consumer surplus **+** Producer surplus

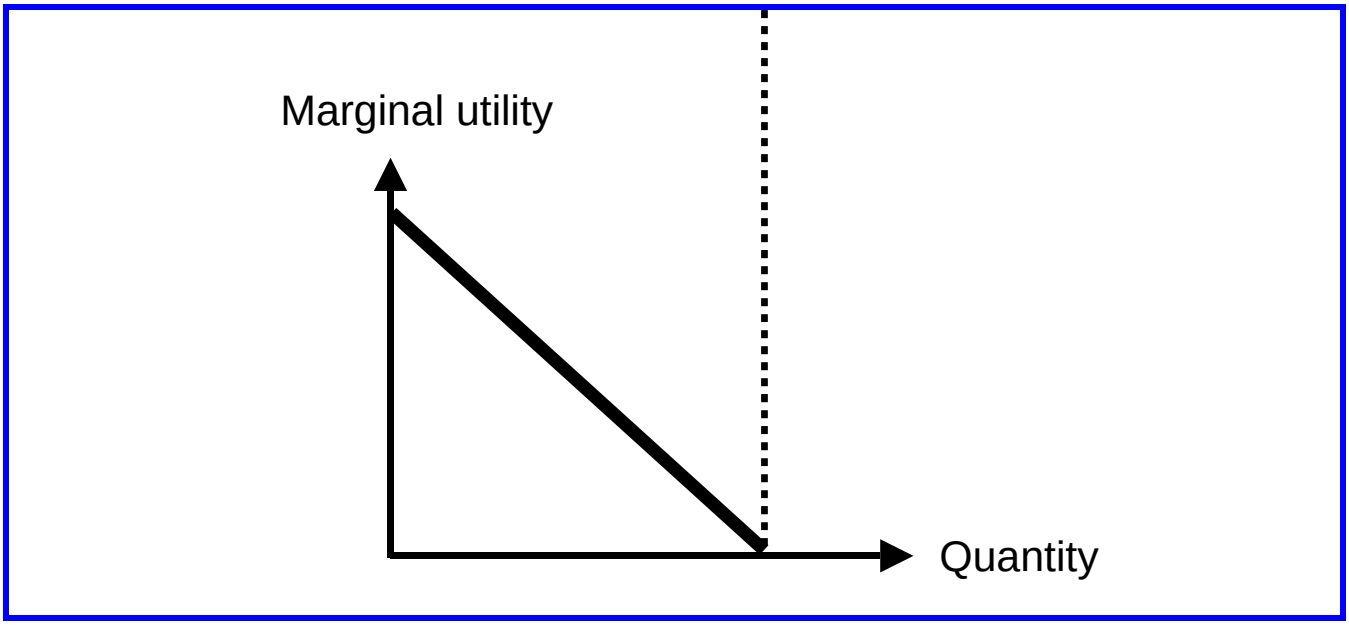


Utility - total and marginal

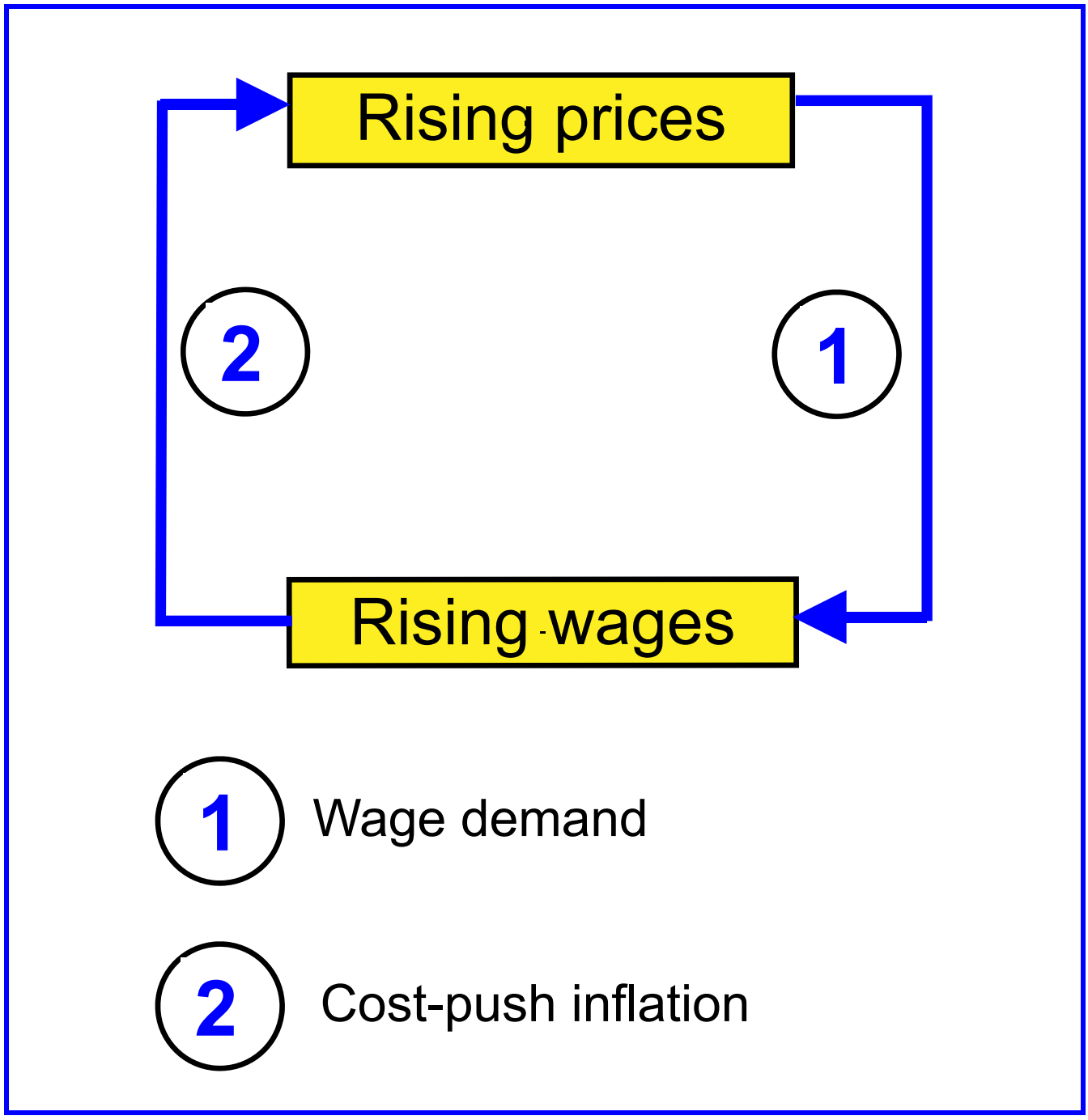
① **Total** utility



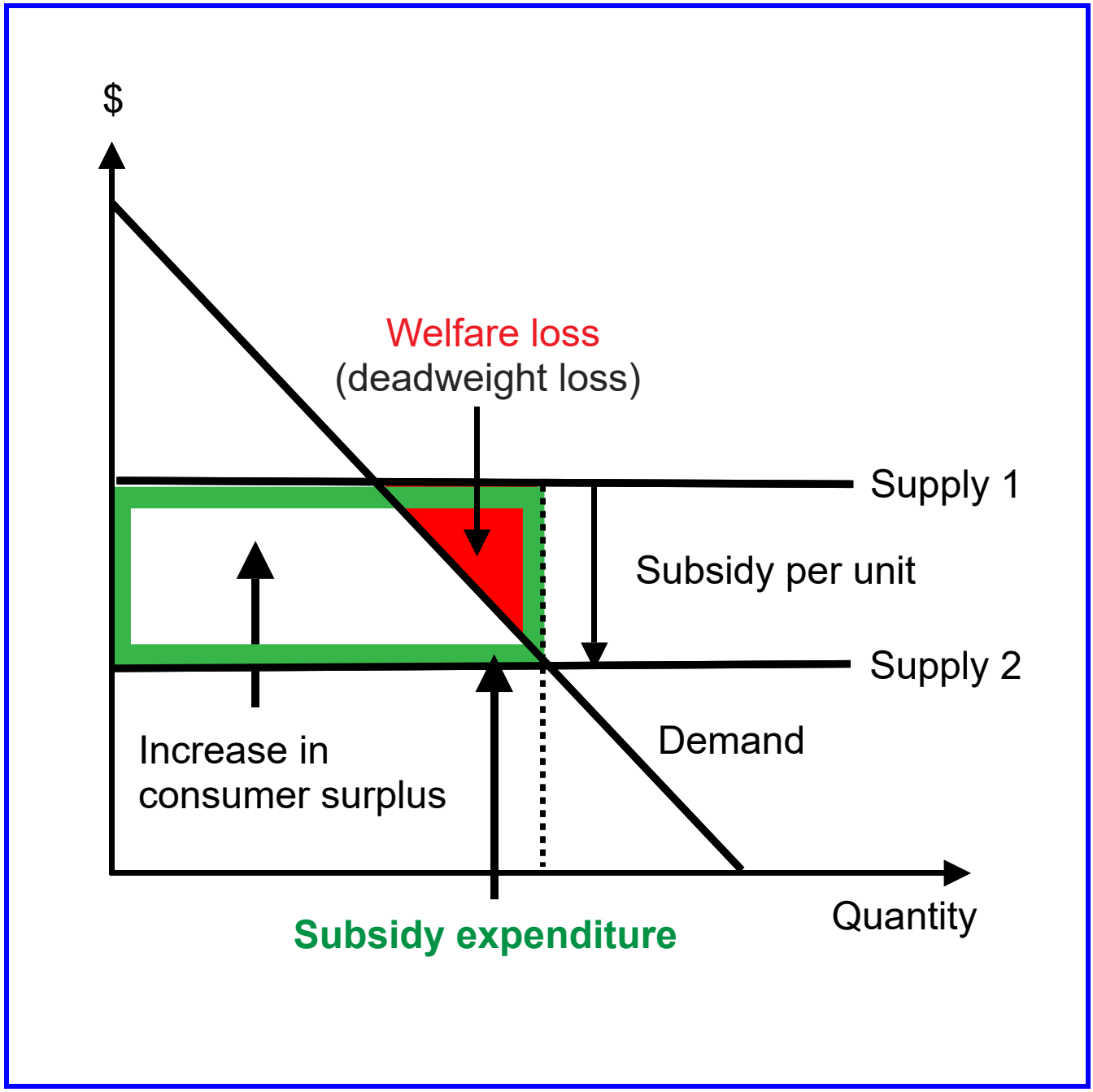
② **Marginal** utility



Wage price spiral



Welfare loss of a subsidy



Welfare loss of a tax