UNIWERSYTET WARSZAWSKI
Wydział Nauk Ekonomicznych

Macroeconomics 1
The AS-AD model

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The AS-AD model

- The considerations regarding product designation concerned the short term because we assumed that the prices of products and services remained constant.
- In the AS-AD model, we waive this assumption.
- We determine the dependence of real production on the price level.
- In long-run equilibrium, the level of real production depends on the supply of production factors that are then fully employed.

The AS-AD model

- AD (from Aggregate Demand) – i.e. The dependence of the willingness to buy on the price level.
- AS (from Aggregate Supply) – i.e. The dependence of the readiness to produce (sell) on the price level.
- Balancing aggregate demand and supply, taking into account the price level

Algebraic of AD curve

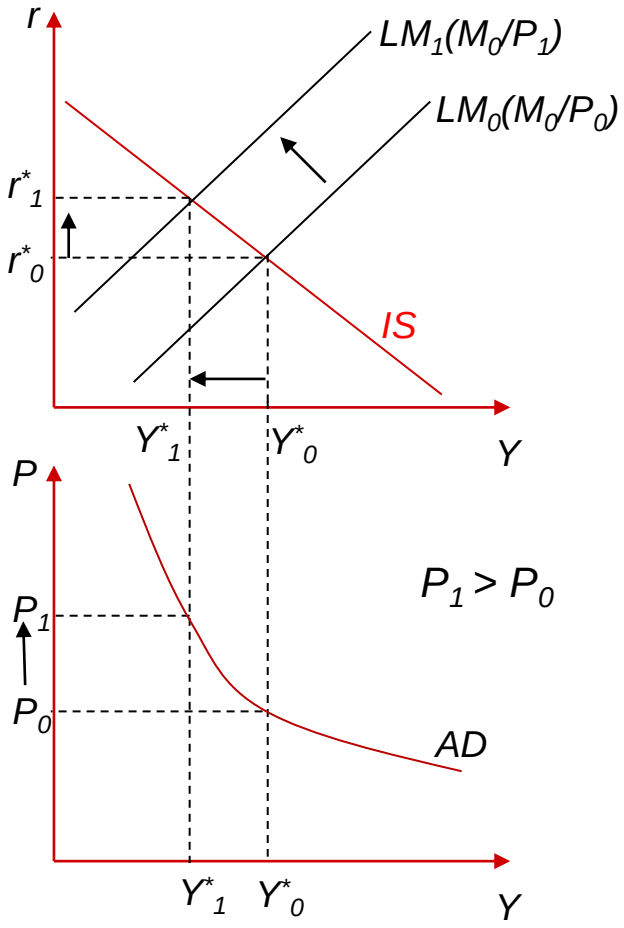
From equilibrium in the IS-LM model:

$$Y = \overline{A} \cdot \beta + \frac{M}{P} \cdot \gamma \text{, where } \begin{cases} \beta = \dfrac{\alpha h}{h + \alpha k b} = \dfrac{\alpha}{1 + \dfrac{\alpha k b}{h}} \\ \gamma = \dfrac{\alpha b}{h + \alpha k b} = \dfrac{b}{h} \dfrac{\alpha}{1 + \dfrac{\alpha k b}{h}} \end{cases}$$

$$PY = \overline{A} \cdot \beta \cdot P + M \cdot \gamma$$

$$P\left(Y - \overline{A} \cdot \beta\right) = M \cdot \gamma \Rightarrow P = \frac{M \cdot \gamma}{Y - \overline{A} \cdot \beta}$$

AD curve - graphically



The AD curve shows the quantities of goods and services purchased at a given price level.

Each point on the AD curve represents the equilibrium from the IS-LM model (simultaneous equilibrium in the goods and services market and the money market).

AD is negatively sloped because price increases reduce the real money supply, increase interest rates, and decrease investment spending.

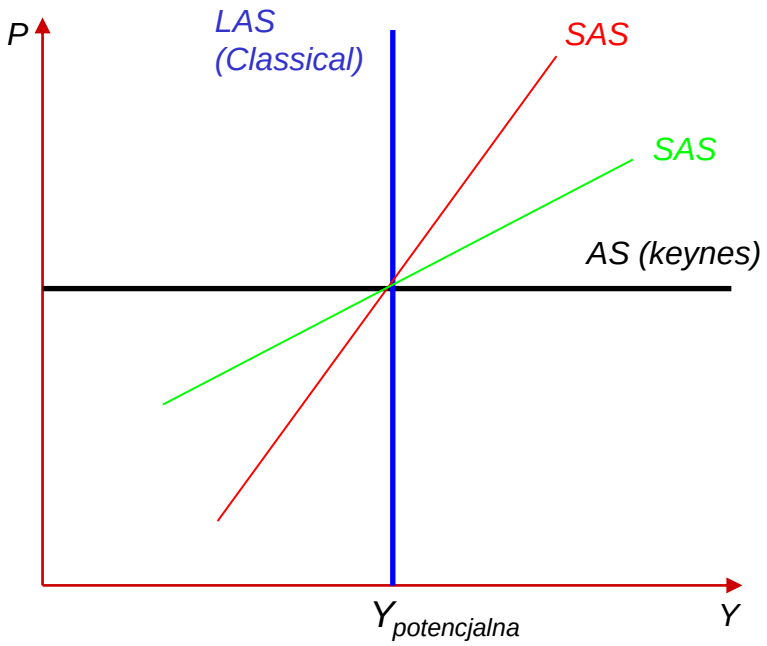
$$P = \frac{M \cdot \gamma}{Y - \bar{A} \cdot \beta}$$

← *The AD curve is a hyperbola*

AS curve

- The AS curve is the aggregate supply curve. It describes the amount of output firms are willing to supply to the market for each price level.
- The volume of potential production depends on the prices of produced goods and the prices of production factors, in particular labor.
- The AS curve presents the situation both on the market for production factors and on the goods market, as well as the relationships between the level of prices and production, as well as between the remuneration of production factors and their employment.

AS curve



We assume that the slope of the AS curve depends on the analyzed period - the longer it is the more vertical period:

- in the long run, the AS curve is vertical (LAS) and is located at the point of potential production (classical AS) - regardless of the price level, companies always supply the same amount of goods, and the labor market is always in a state of equilibrium and the level of employment corresponds to full employment,

- in the medium term, AS is positively sloped (SAS) (in practice, it is often assumed that AS is also positively sloped in the short term),

- in the short term AS is horizontal (the assumption of constant prices in the Keynes and IS-LM models means horizontal AS) - companies are willing to supply to the market any quantity of goods for which there is demand at a given price level (involuntary unemployment occurs, which causes that companies can employ any number of workers at a given level of wages and prices).

SAS movement

SAS shifts occur as a result of changes in the costs of production factors:
- nominal wages,
- energy cost,
- cost of raw materials.

SAS curve (short term)

- The positive relationship between current products and prices can be written as follows:

$$Y = \overline{Y} + \alpha(P - P^e),$$

Where: P^e-expected price level, $\overline{Y}$ -potential product,

α–positive parameter

- When the actual price level exceeds the expected price level, output rises above potential output
- After moving the prices to the left side of the equation, we obtain the equation for SRAS:

$$\mathrm{P} = P^e + \frac{1}{\alpha}\,(Y - \overline{Y}),$$

SAS curve

The SAS curve is flatter when:

- the percentage of fixed prices in the economy is greater
- a higher percentage of fixed wages
- companies attribute a greater probability to the situation that the observed changes in demand are idiosyncratic in nature (they apply only to them and not to all companies)

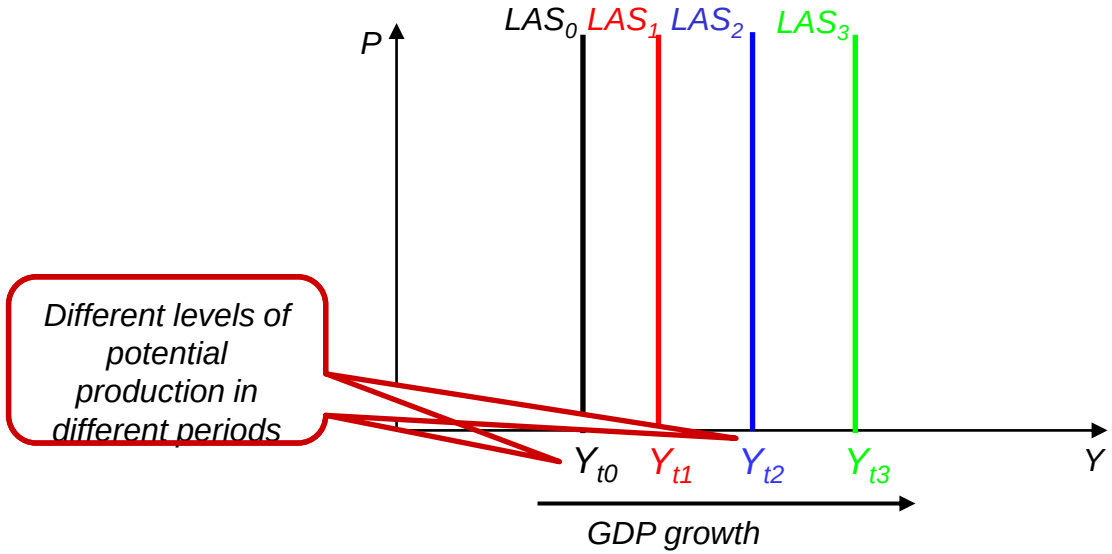
SAS curve

- The nature of price expectations is crucial for the model's results P^e :
- **Adaptive expectations** - we expect prices to be exactly the same as the realized prices from the previous period (expectations looking back to the past)
- **Rational expectations -** expectations are based on the entire available knowledge, e.g., if we know in advance that in period t, the money supply will increase by x%, expected prices and nominal wages will increase by x%

In the case of rational expectations, product change can only be triggered by unexpected changes (the SAS curve is positively sloped only for unexpected changes)

LAS movement

- Economic growth will shift the long-run LAS supply curve to the right as the economy's production capacity increases. According to the growth theory, this process occurs due to technological changes that increase the productivity of production factors and an increase in their supply.

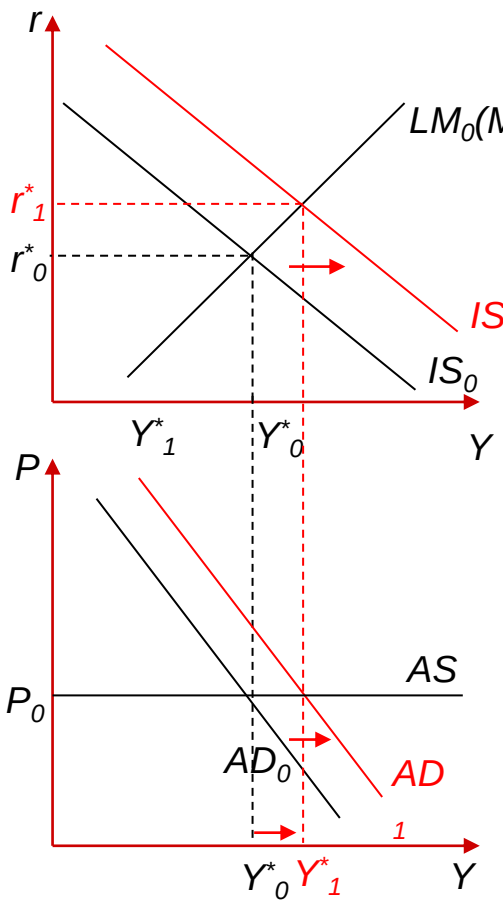


LAS movement

- Also, changes in the supply of production factors, e.g. , the discovery of new natural resources, and increased professional activity will shift the LAS to the right.

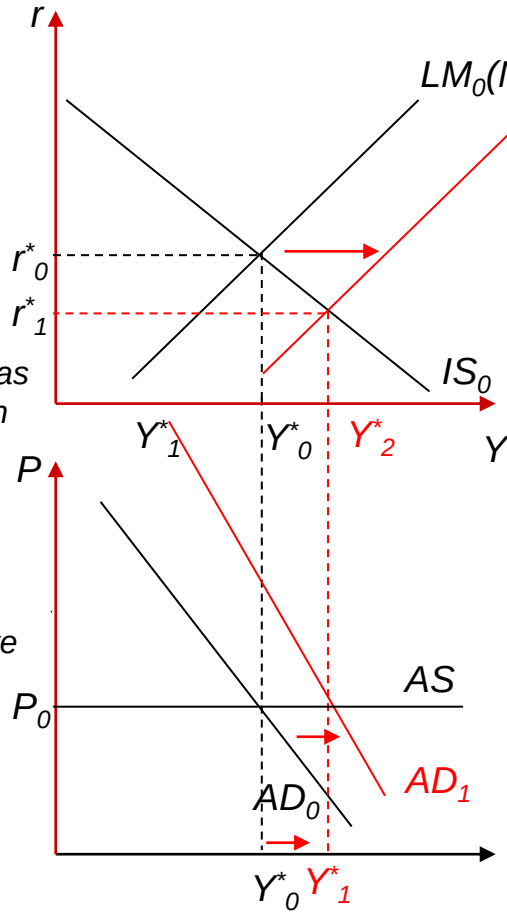
- Natural disasters, wars, etc. that reduce the available capital and labor supply will shift the LAS to the left.

The IS-LM model change – horizontal AS



Shift of the AD curve as a result of a change in autonomous expenditure (smaller than the IS shift because of the crowding out effect) - fiscal policy is effective in this case and does not lead to price increases.

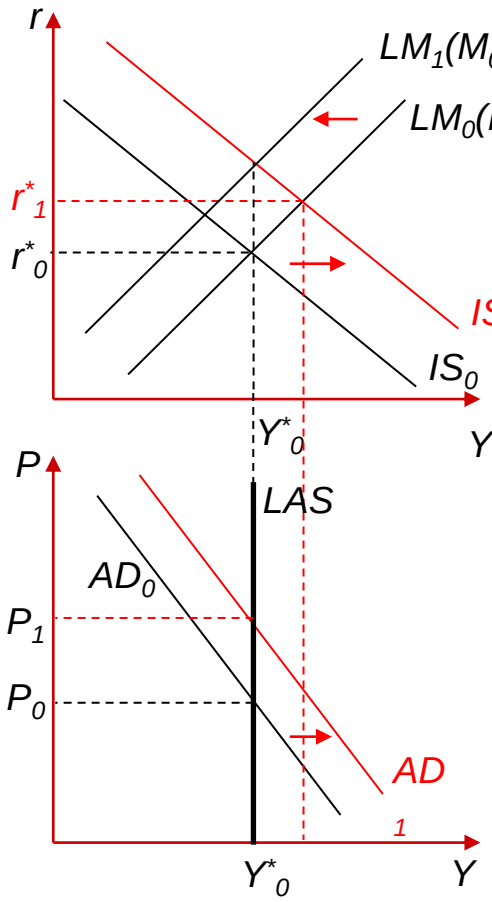
$$\overline{A} \uparrow \Rightarrow Y \uparrow, P \leftrightarrow$$



A shift combined with a change in the angle of inclination AD due to an increase in the money supply - monetary policy is effective in this case and does not lead to price increases.

$$M \uparrow \Rightarrow Y \uparrow, P \leftrightarrow$$

Changes in the IS-LM model – vertical AS



Shift of the AD curve as a result of a change in autonomous expenditure (smaller than the IS shift because of the crowding out effect) - fiscal policy is ineffective in this case and leads to price increases.

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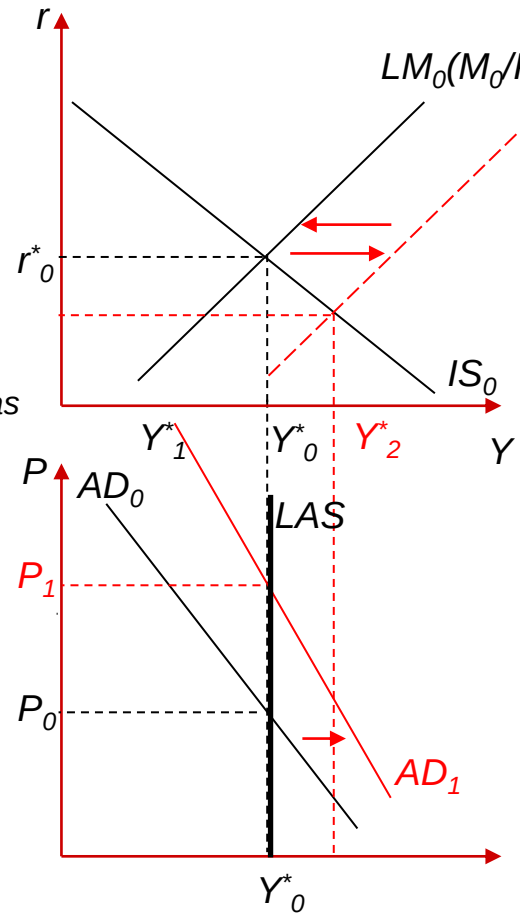


A shift combined with a change in the angle of inclination AD due to an increase in the money supply - monetary policy is ineffective in this case and leads to an increase in prices.

$$M \uparrow \Rightarrow Y \leftrightarrow, P \uparrow$$

PIENIĄDZAMONEY NEUTRALITY HYPOTHESIS

In the long run, changes in the money supply lead only to adjustments in nominal values and do not affect real economic variables such as production or employment.

Exam questions

Please explain in detail, using known relationships and appropriate drawings, what short- and long-term effects should be expected as a result of the Monetary Policy Council's decision to reduce the required reserve rate?

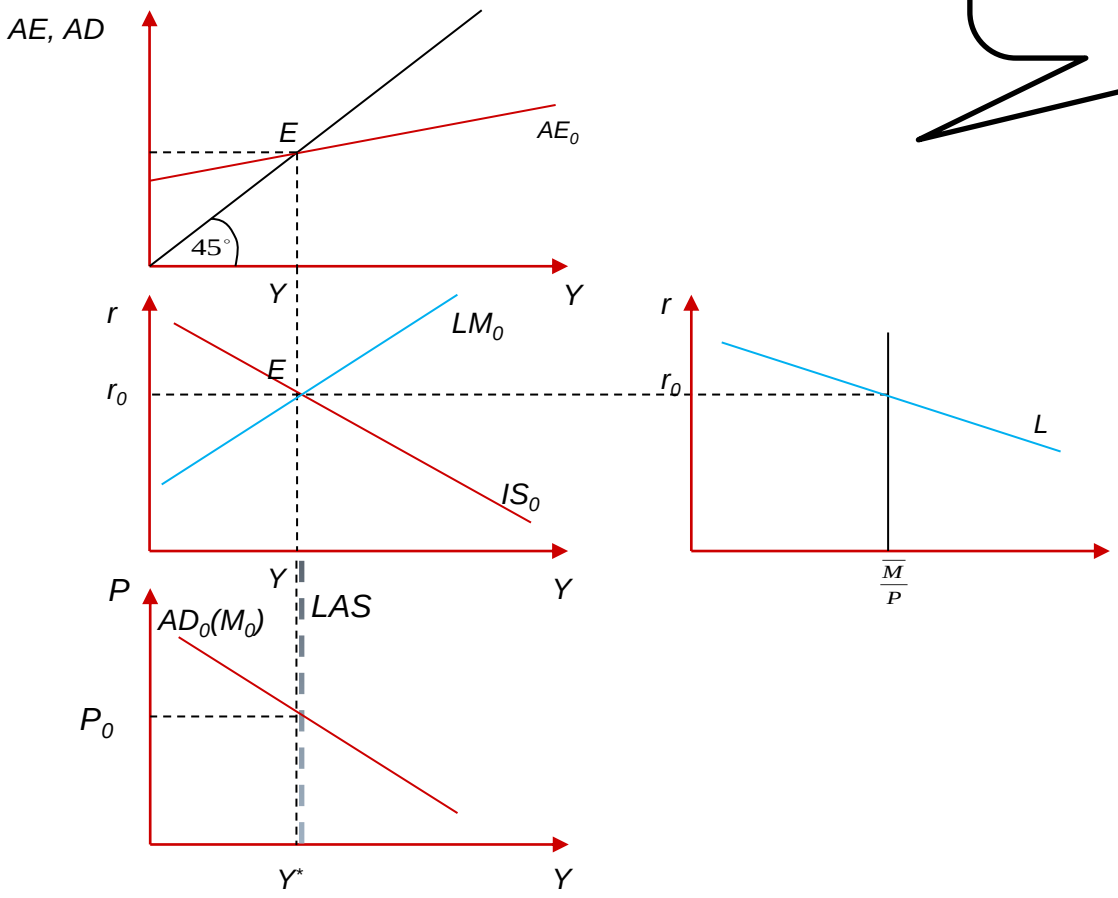
Changes in the short (and medium) and long term compared to the initial situation

GDP (Y)		Prices (P)		Employment N		Unemployment U		Nominal interest rate		Nominal wage		Real wage	
SR	LR	SR	LR	SR	LR	SR	LR	SR	LR	SR	LR	SR	LR

Legend :
„+" – Increase
„–" – decrease
„0" – neutral

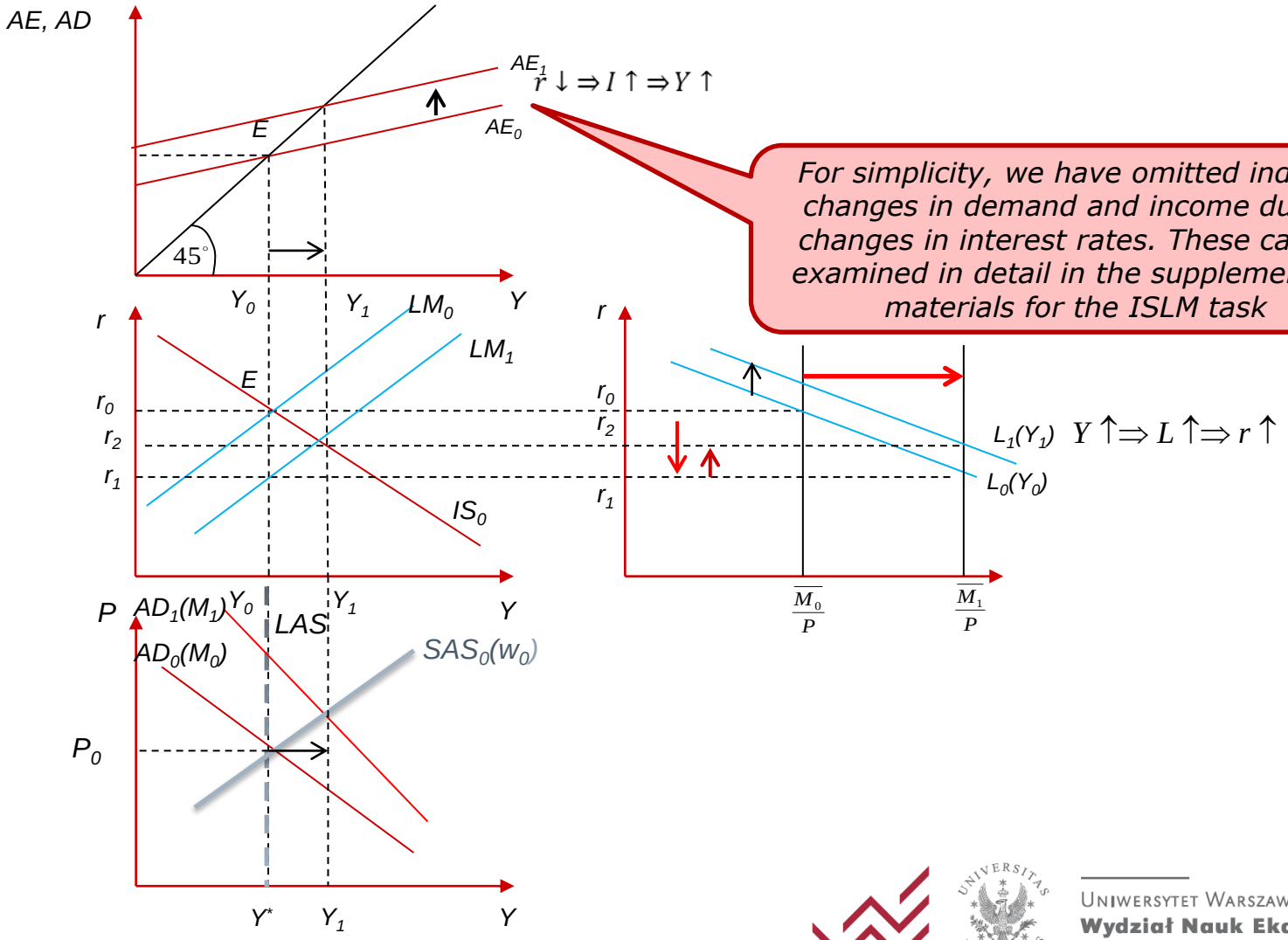
Exam questions

In the analysis, we will use a set of connected charts.

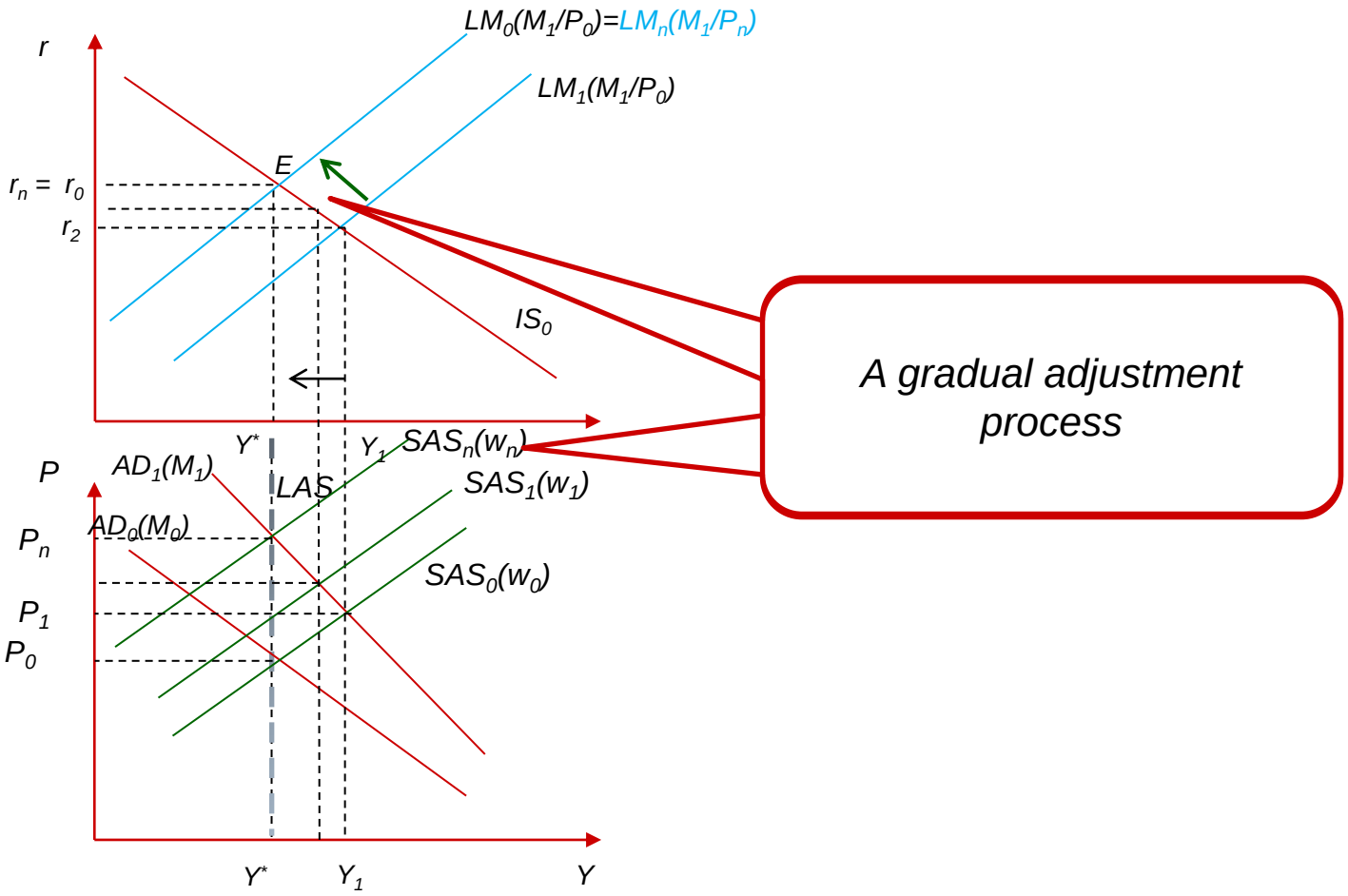


Exam questions

$$re\downarrow \rightarrow M\uparrow = H \cdot \frac{1+cu}{(cu+re\downarrow)\downarrow}\uparrow$$



Exam questions



Changes in the short (and medium) and long term compared to the initial situation

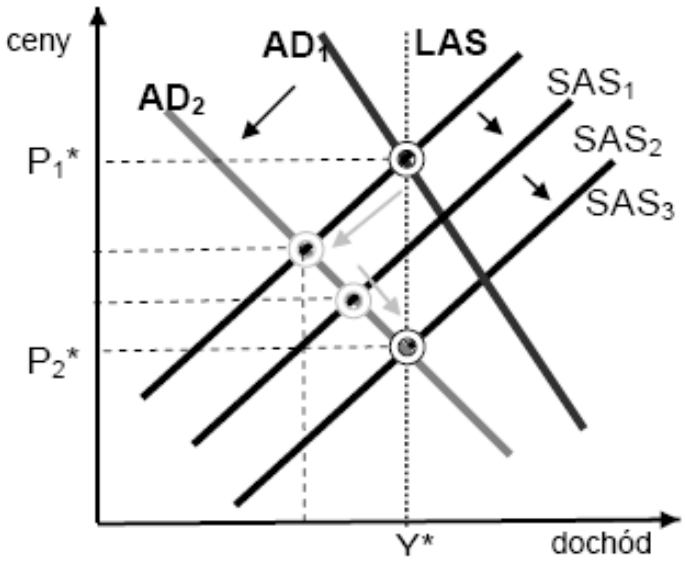
GDP (Y)		Prices (P)		Employment N		Unemployment U		Nominal interest rate		Nominal wage		Real wage	
SR	LR	SR	LR	SR	LR	SR	LR	SR	LR	SR	LR	SR	LR
+	0	0/+	++	0/+	0	0/-	0	-	0	0/+	++	0/-	0

short/middle

Legenda:
„+" – wzrost
„–" – spadek
„0" – neutralne

Restrykcja monetarna – krok po kroku

$$\overline{M} \downarrow \Rightarrow \ldots \Rightarrow P \downarrow$$



Na skutek spadku kwoty pieniężnej AD, która spada w dół. Wzrost zapasów stanowi sygnał do zabezpieczenia produkcji. Jest to możliwe poprzez zmianę czasu pracy, przy określonym wynegocjowanym poziomie ceny, dla którego wykreślono krzywą SAS1. Produkcja osiągalna na poziomie efektu końcowego.

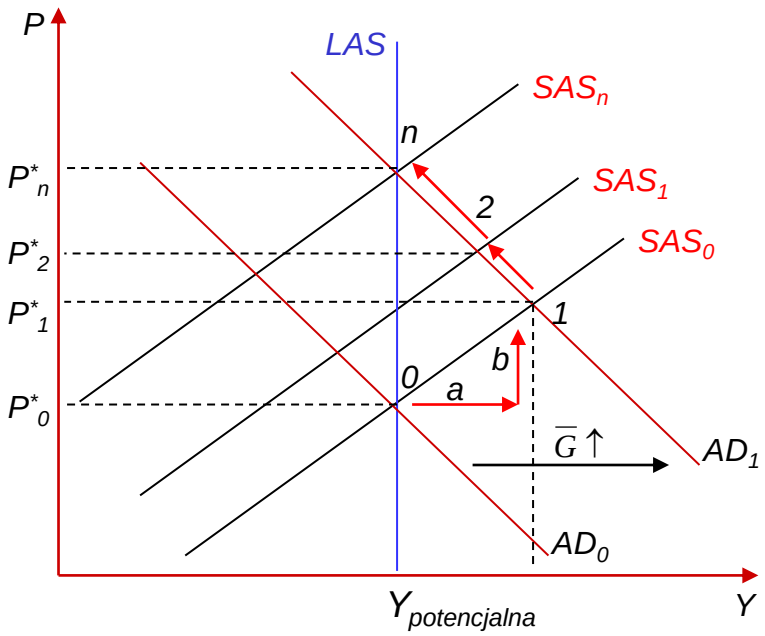
W przypadku podjęcia decyzji ostatecznej, do przedsiębiorstwa zastrzeżonego przez pracowników, a bezrobocie.

W przypadku wystąpienia, straty produkcyjne spowodowane spadkiem, powodują, że siła nabywcza wyłączona przez pracowników wystąpi.

W następującym okresie pojawia się presja na spadek nominalnych, a następnie zmniejsza się koszty produkcji i następuje spadek cen. Ten efekt skutkujący cenowo-płacowych będzie trwał do momentu, w którym płaca będzie realna do osiągnięcia poziomu końcowego, tzn. albo płaci nominalną, jak i ceny spadną o dziesięć procent.

Gospodarka powraca do ograniczenia stosowania i stosowania.

Fiscal expansion – step by step



$$\overline{G}\uparrow \Rightarrow \ldots \Rightarrow P\uparrow$$

0. At point 0, the economy is in long-run equilibrium.
Row increased G, which increases demand - moved to AD1. making available to the company for production:

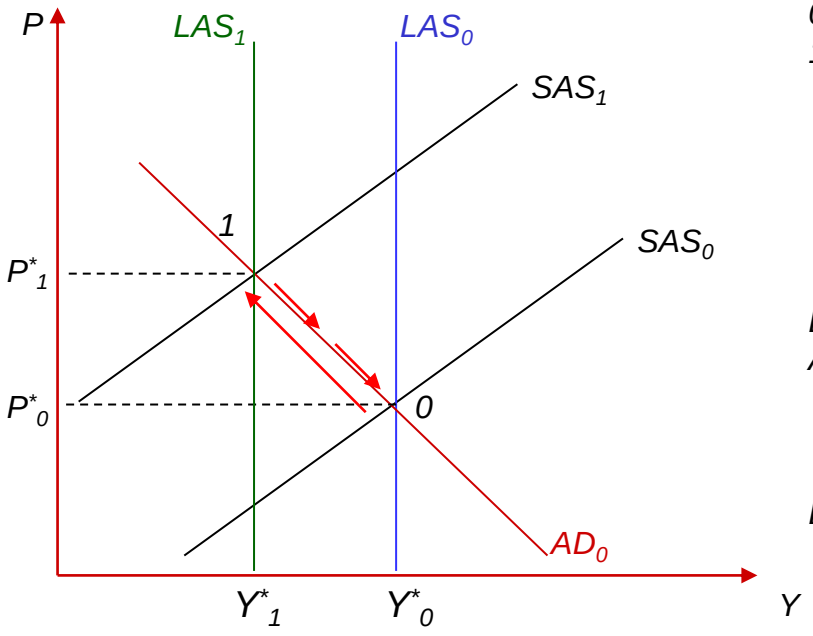
1. *varies by working time and overtime allowances, at a specific negotiated wage level (w), provided for by the SAS0 curve; production reaches efficiency levels from application;*
2. *if the amount is enterprises, then enterprises employ new employees - unemployment falls and the rate will be outside the basic law; period, the need to employ new employees and increase overtime rates causes an increase in production costs, which puts pressure on prices - point 1.*

An increase in prices forces the workers to negotiate cancellations (real wages decrease) and therefore, if they occur, there is pressure to increase wages, which increases the increased production costs and causes further price increases - the solution curve that will flow to SAS1.

n. Price-wage adjustment continuing until the real wage reaches the supplied level (i.e. nominal wage and transferred prices by ten percent) - point n. Balance in the labor market will be restored at the level of potential production, but with the use of drugs.

Negative supply shock

e.g. increase in oil prices.



0. At point 0, the economy is in long-run equilibrium.

1, A sudden increase in oil prices, while wages remain constant, increases production costs and companies must increase the prices of their products. The supply curve shifts left to the SAS1 position. Prices are rising and production volume is falling (production below potential) - stagflation (inflation combined with recession), unemployment is also rising.

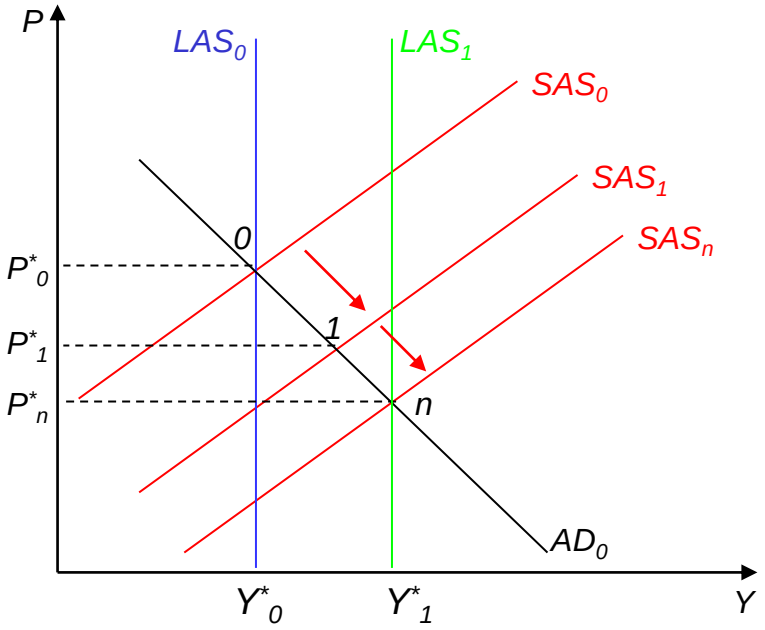
Long Run:

A. unemployment forces a reduction in wages and the supply curve returns to the SAS0 position, and the economy gradually returns along the AD0 curve to the initial equilibrium at point 0; or

B. companies seek to reduce the use of oil, which reduces the marginal product of labor; this lowers the level of full employment and potential output and the equilibrium remains at point 1; LAS1 now constitutes the new long-run supply curve.

A positive supply shock

e.g. increased professional activity of women.



0. At point 0, the economy is in long-run equilibrium. The supply of labor is increasing, but as long as this does not result in a reduction in wages, the short-term aggregate supply curve remains in the SAS0 position, so prices, production and employment do not change in the short term, however, due to the increase in the number of people willing to work, unemployment is increasing.

1. Over time, there is a downward pressure on wages (w) and the supply curve shifts to the SAS1 position and unemployment decreases, prices and wages decrease, and production increases.

n. However, only in the long run unemployment disappears and wages and prices decrease enough to ensure lasting equilibrium - point n; LAS1 now constitutes the new long-run supply curve.