

Economics II

Open Economy and the Determination of Equilibrium Output

Open Economy and the Determination of Equilibrium Output

The aim of the course is to deepen knowledge of determination of equilibrium output in an open economy with an emphasis on explaining the influence of export and import in shaping the equilibrium of supply and demand balance of foreign trade, explaining the structure of the IS-LM-BP model and its significance as analytical tools for evaluating the effectiveness of macroeconomic policy measures. An integral part of the aim of the lecture is to analyze the fundamental problems of determining the exchange rates in the short and long run.



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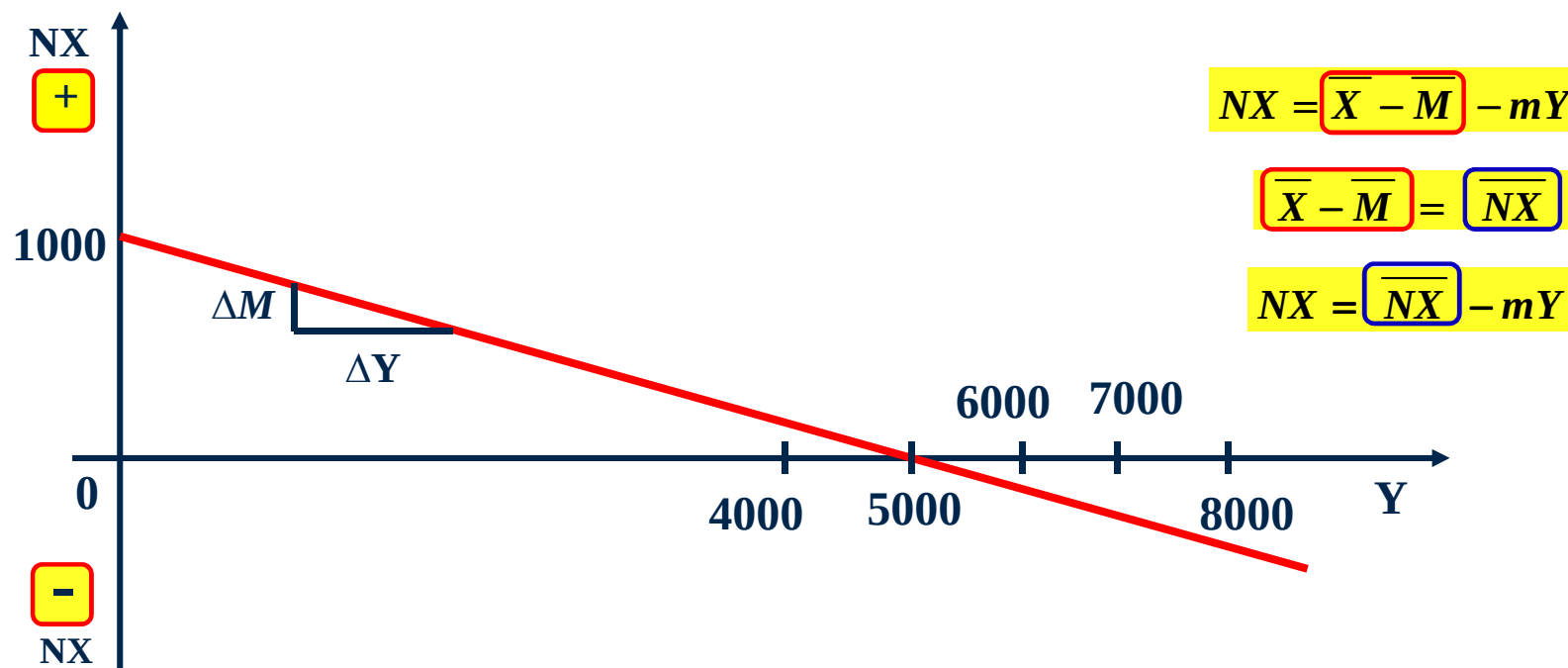
Open Economy and the Determination of Equilibrium Output

Content:

- ❖ Introduction
- ❖ Net export, IS curve and production market in an open economy
- ❖ Balance of payments, BP curve and output determination
- ❖ Fiscal and monetary policy, fixed and flexible exchange rates, Mundell-Fleming model
- ❖ Exchange rate determination in the short and long run
- ❖ Devaluation (depreciation), current account and output determination
- ❖ Conclusion – summary, list of tasks for students



Net export function and fixed exchange rate



Aggregate demand in an open economy:

$$AD = \overline{A} + \overline{NX} + c(1 - t)Y - bi - mY$$

Net export and IS curve in an open economy

❖ Equilibrium output determination

Aggregate demand - equation

$$AD = \bar{A} + \bar{NX} + c(1 - t)Y - bi - mY$$

$$Y_0 = \frac{1}{1 - c(1 - t) + m} \cdot (\bar{A} + \bar{NX} - bi)$$

Simple spending multiplier in an open economy:

$$\bar{\alpha} = \frac{1}{1 - c(1 - t) + m} \Rightarrow \frac{1}{s + m}$$

Marginal rate of leakages:

$$MLR = s(1 - t) + t + m$$

Induced saving

2-sectoral economy

$$I = S$$

3-sectoral economy

$$Y_0 [s(1 - t) + t] = \bar{A}$$

Open economy

$$Y_0 [s(1 - t) + t + m] = \bar{A} + \bar{NX} - bi$$

Net export and output equilibrium determination in an open economy

❖ Multiplier of current account (net export)

$$\Delta NX = - \frac{m}{1 - c(1 - t) + m} \cdot \Delta \bar{G}$$

$$\frac{\Delta NX}{\Delta \bar{G}} = - \frac{m}{1 - c(1 - t) + m}$$

Increased government spending on ΔG leads to a deterioration of the current account (net exports), as domestic entities spend part of the pension on imports, which were caused by the growth of income due to government spending.

❖ Net export and floating exchange rates

Real exchange rate $R = E \cdot \frac{P_f}{P}$ represents international competitiveness

a) If R is increasing, the competitiveness is rising

b) If R decreasing, the competitiveness is lowering

NX function:

$$NX = \bar{NX} - mY + vR \Rightarrow NX = \bar{X} - \bar{M} - mY + vR$$

1) If Y_f is rising, NX and AD are increasing

2) If R is rising, NX and AD are increasing

3) If Y is rising, NX and AD are decreasing

Net export and the output determination in an open economy

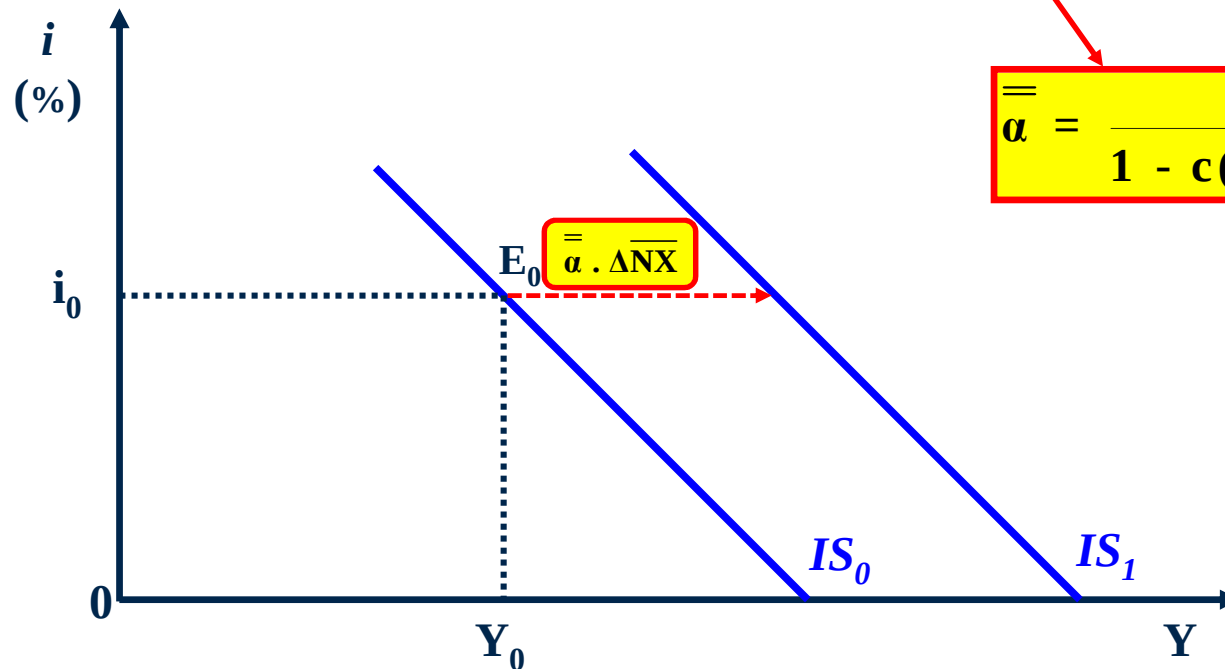
❖ IS curve equation in an open economy

$$Y = cY - ctY - c\overline{TA} + c\overline{TR} + \overline{I} - bi + \overline{G} + \overline{NX} - mY + vR$$

IS curve equation and flexible exchange rates

$$Y_0 = \overline{\alpha} (\overline{A} + \overline{NX} - bi + vR)$$

$$\overline{\alpha} = \frac{1}{1 - c(1 - t) + m}$$



Balance of payment, BP curve and equilibrium output

- ❖ Balance of payment (BP) = total payments going from the home country to other countries to total payments from other countries into home

$$BP = CA + CF$$

- ❖ BP curve (= balanced Balance of Payment)

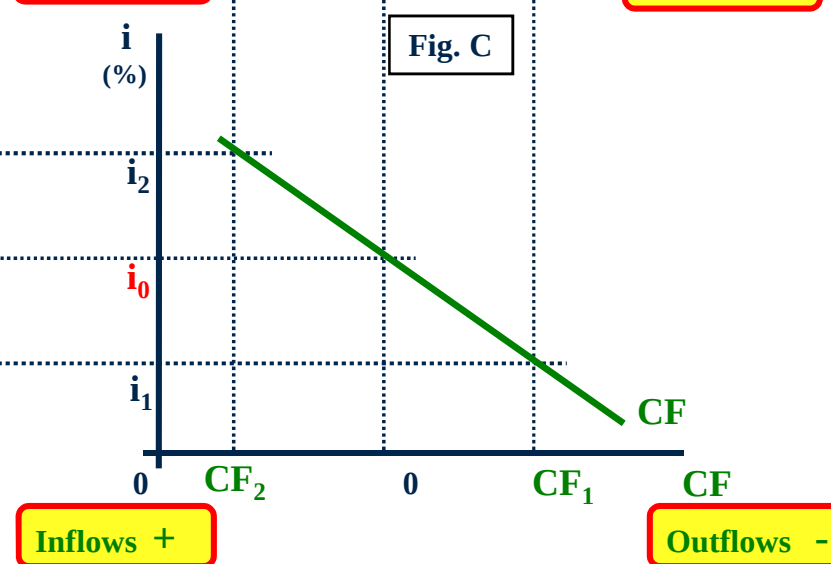
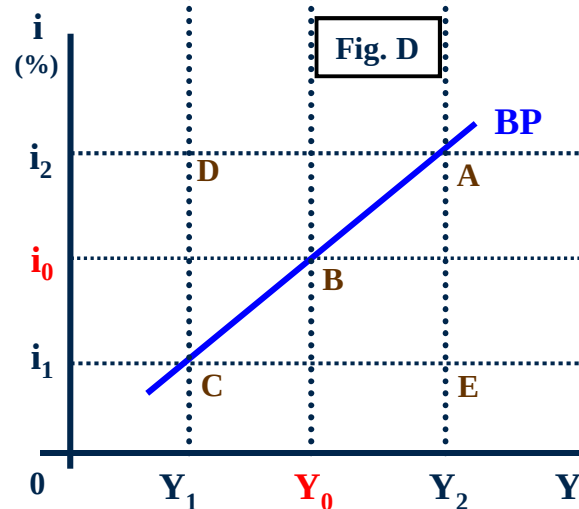
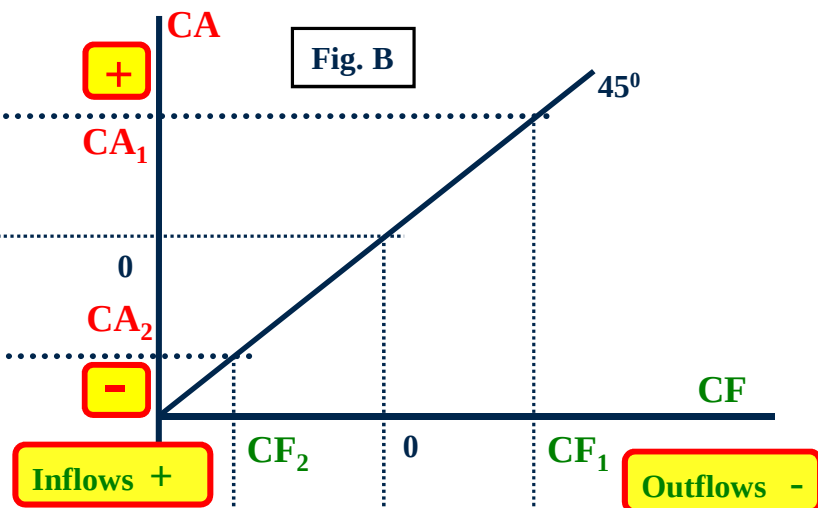
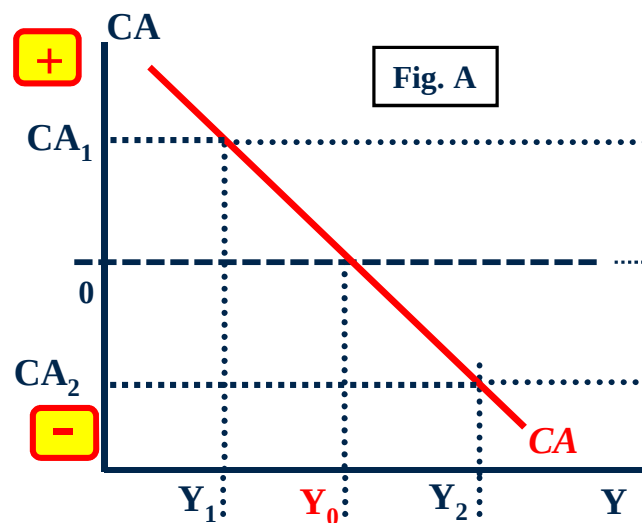
Assuming Central Bank currency reserves are constant.

BP is in balance when:

- a) surplus (deficit) of CA is compensated by deficit (surplus) of CF*
- b) $CF = f(i - i_f)$, when $i_f < i$ there is net capital inflow and there is a surplus of CF and when $i_f > i$ there is net capital outflow and there is a deficit of CF*

$$BP \text{ is in balance when: } CA + CF = 0$$

BP curve - derivation



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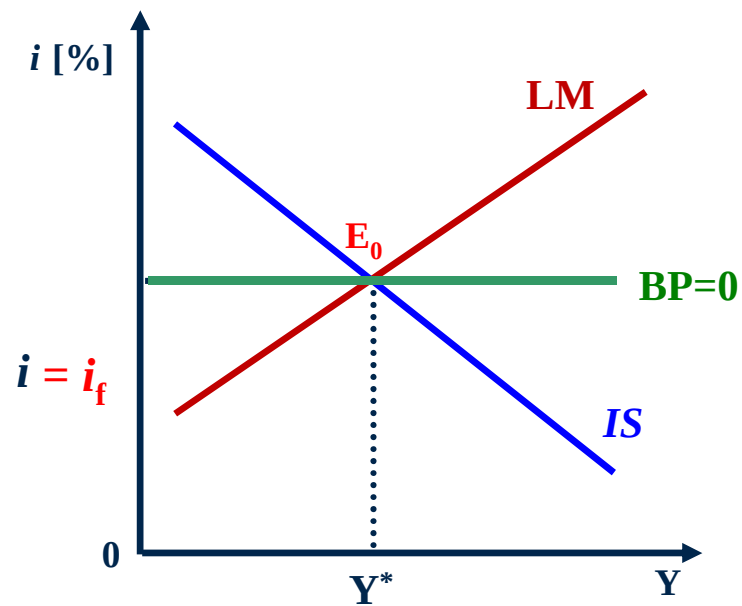


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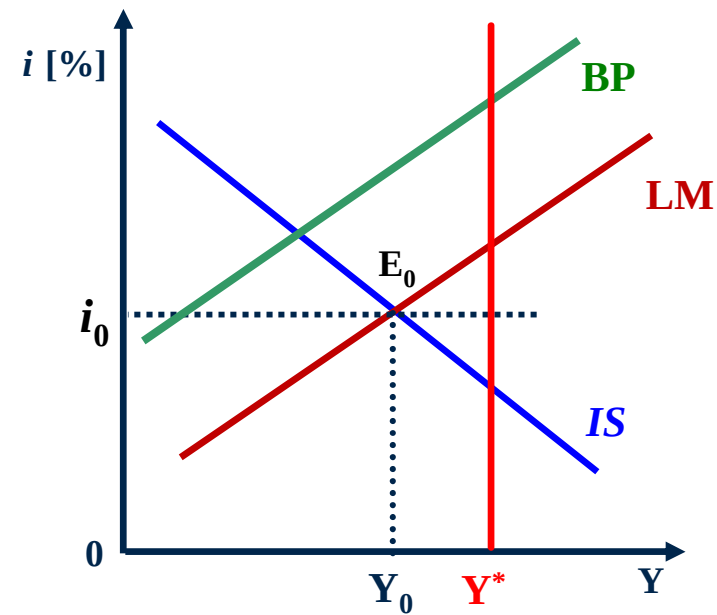
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IS-LM-BP model and perfect (imperfect) capital mobility

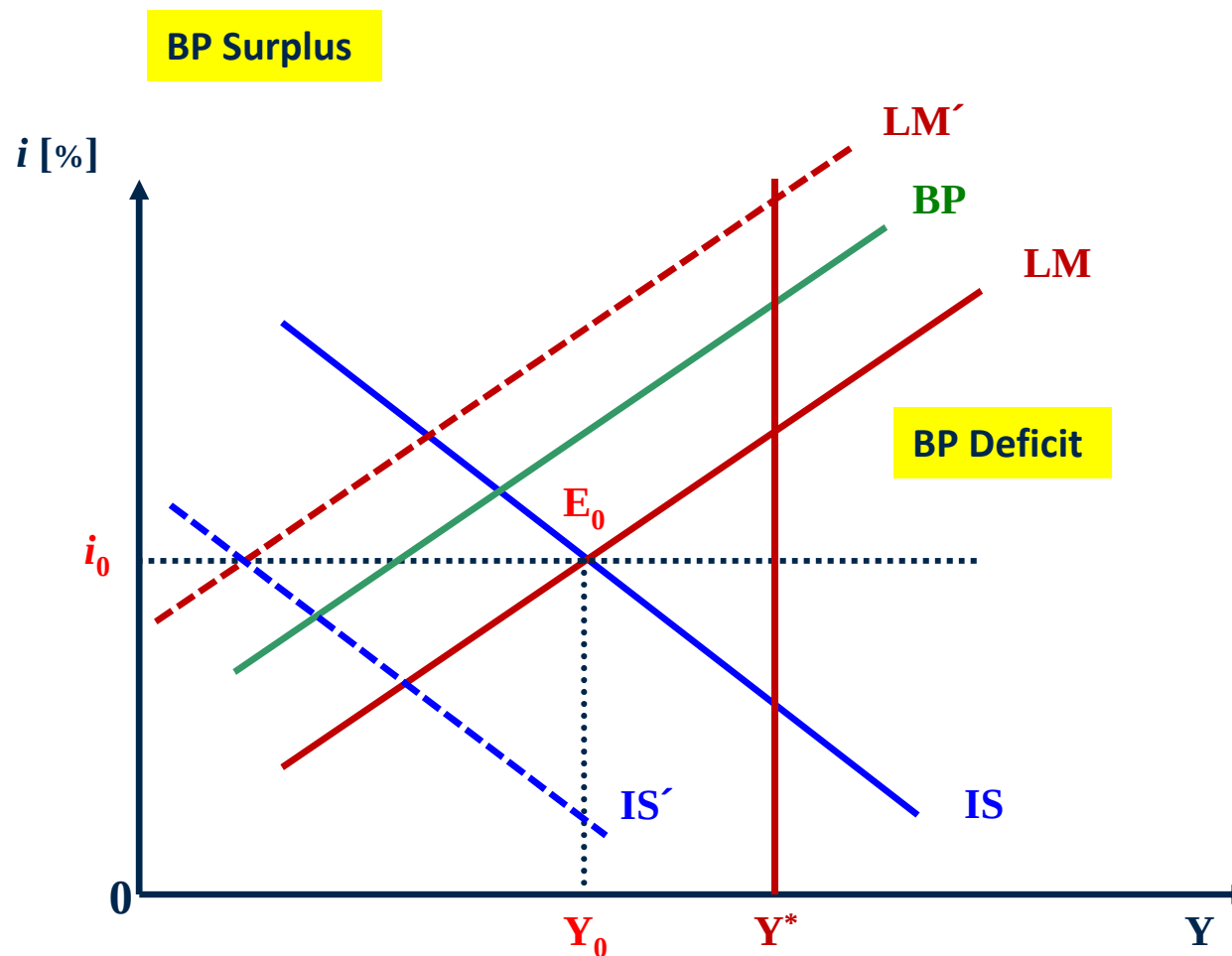
IS-LM-BP Model
Perfect capital mobility



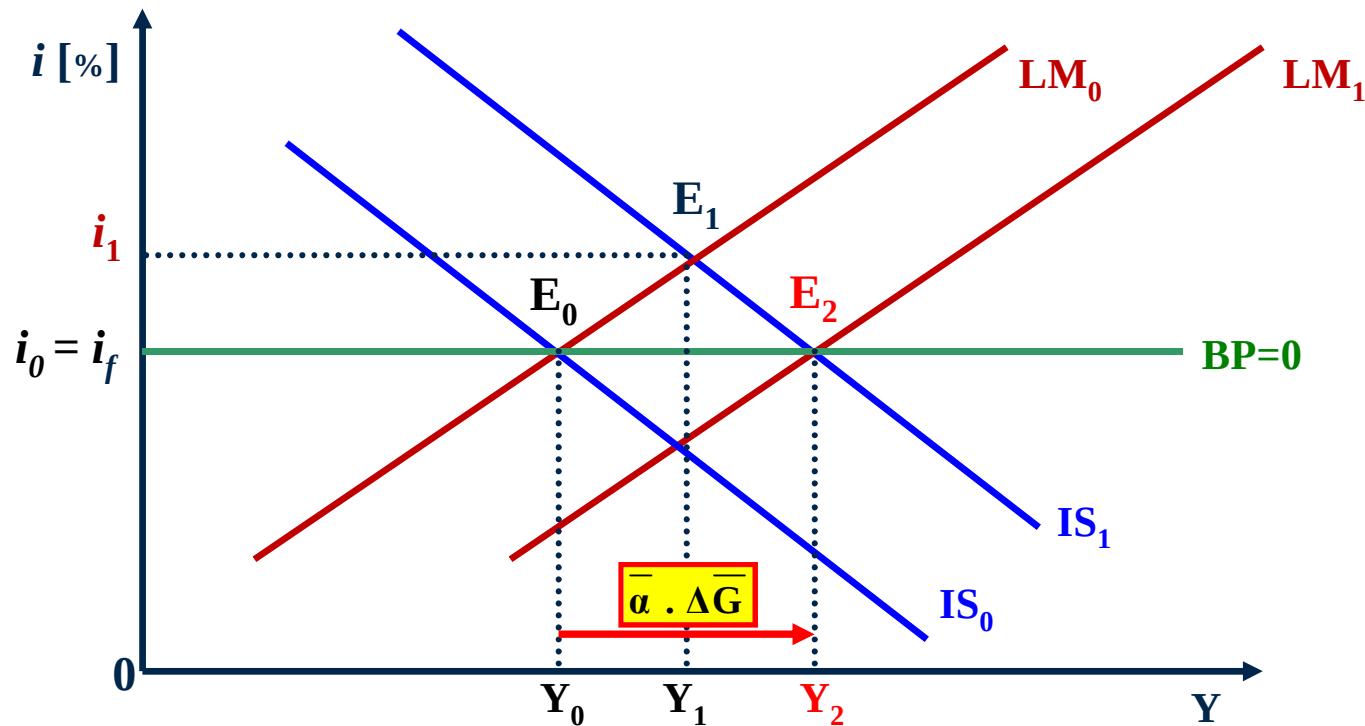
IS-LM-BP Model
Imperfect capital mobility



IS-LM-BP model and the equilibrium



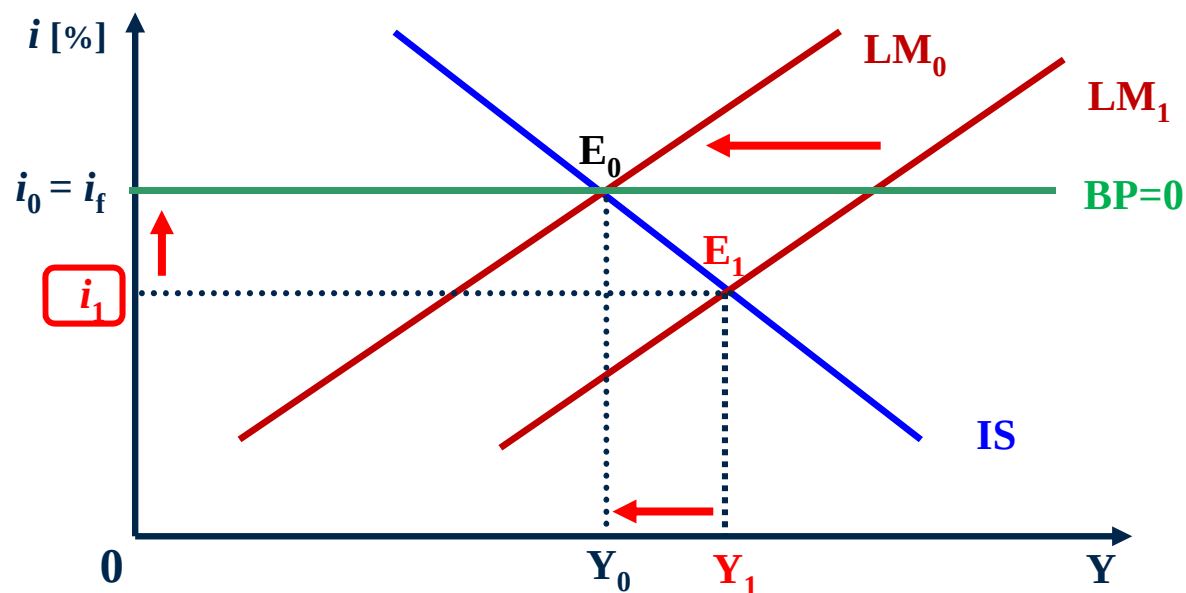
Fiscal expansion, Mundell-Fleming model and fixed exchange rates



Conclusion:

Fiscal expansion is fully effective.

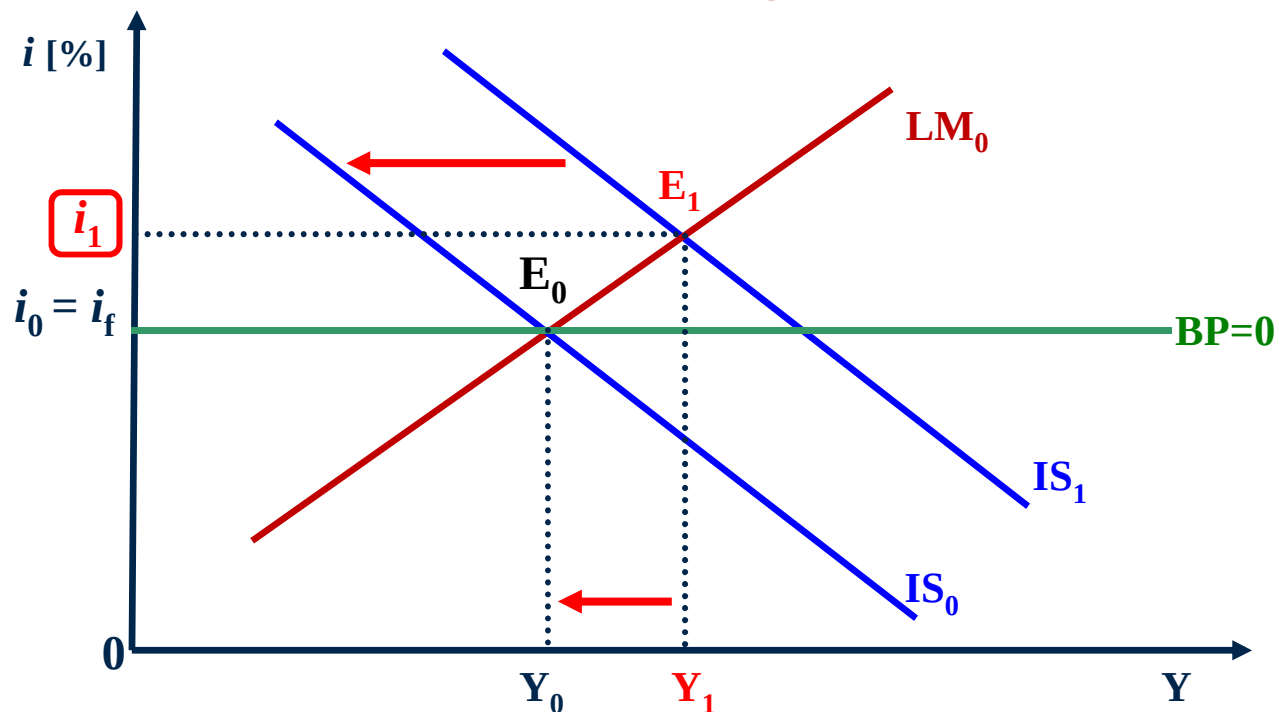
Monetary expansion, Mundell-Fleming model and fixed exchange rates



Conclusion:

Monetary expansion is fully ineffective.

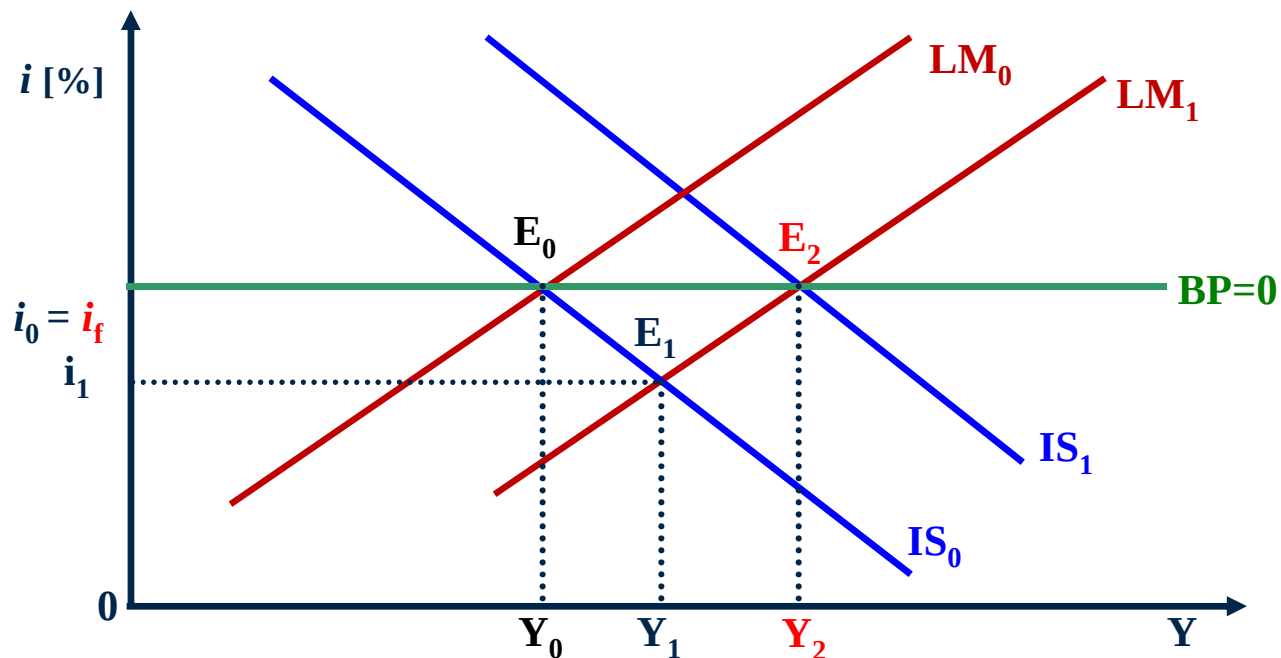
Fiscal expansion, Mundell-Fleming model and flexible exchange rates



Conclusion:

Fiscal expansion is fully ineffective.
International crowding-out effect.

Monetary expansion, Mundell-Fleming model and flexible exchange rates



Conclusion:

Monetary expansion is fully effective.

Exchange rate determination in the short and long run

❖ The law of one price

Assuming the same product is sold at the same price (expressed in one currency unit) in various countries. If there are no transportation and other costs and duties.

$$P_{CR}^i = E_{CZK/EUR} \cdot P_{SR}^i \Rightarrow E_{CZK/EUR} = \frac{P_{CR}^i}{P_{SR}^i}$$

a) Purchasing Power Parity (PPP)

❖ Absolute form → price levels comparison

$$E_{CZK/EUR} = \frac{P_{CR}}{P_{SR}} \Rightarrow P_{CR} = E_{CZK/EUR} \cdot P_{SR}$$

Conclusion:

1. The price levels of all countries are the same when expressed in the same currency.
2. External purchasing power of the currency is always the same as its internal purchasing power at a given nominal exchange rate.

Determination of the exchange rate in the long and short run

a) Purchasing Power Parity

❖ *Relative form of purchasing power parity theory → percentage change in the exchange rate between two countries (during the period), i.e. the rate of change is equal to the difference between the percentage changes in national price levels in these two countries (CR and SR).*

$$CR: \frac{P_{CR(t)} - P_{CR(t-1)}}{P_{CR(t-1)}} = \pi_{CR(t)}$$

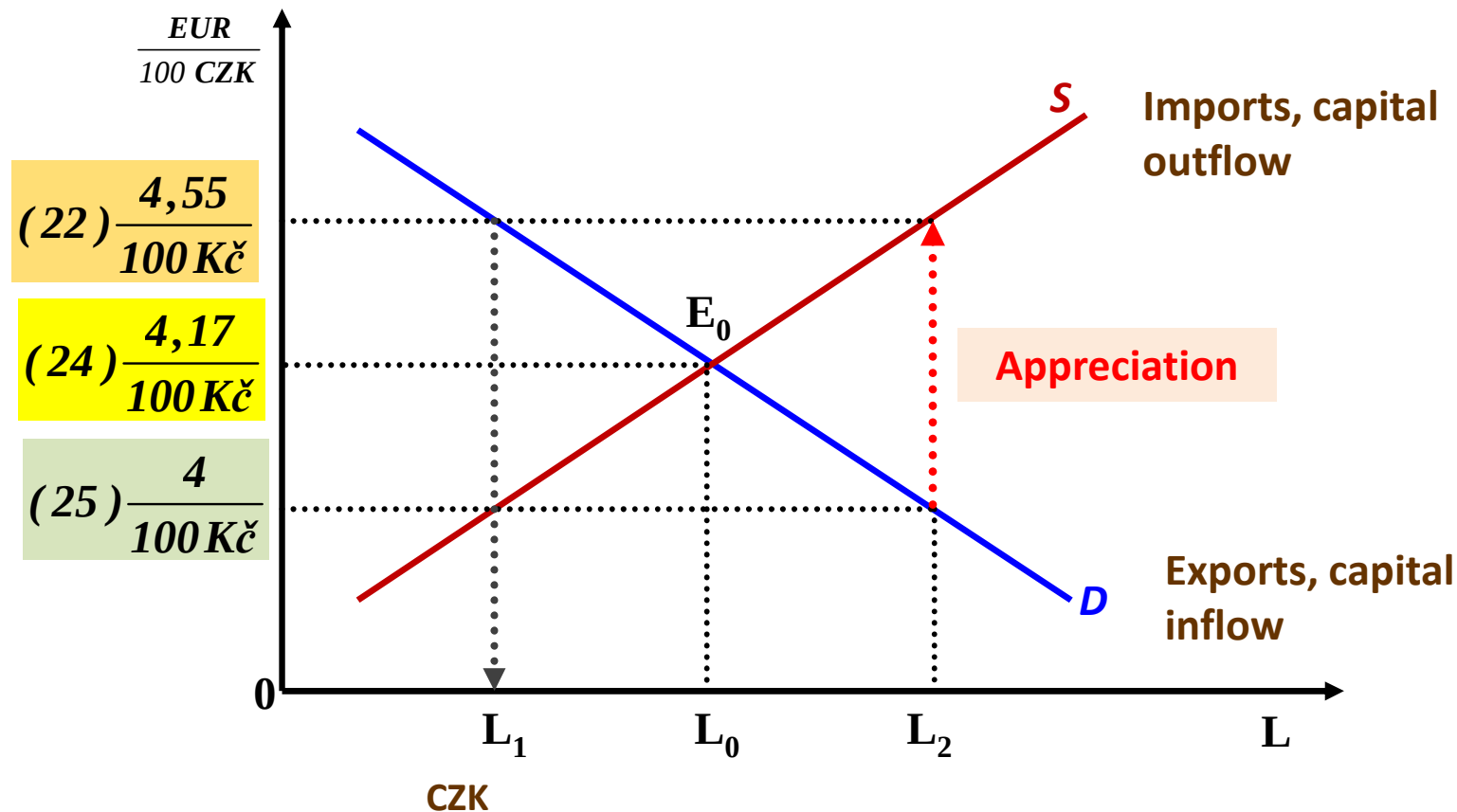
$$SR: \frac{P_{SR(t)} - P_{SR(t-1)}}{P_{SR(t-1)}} = \pi_{SR(t)}$$

$$\frac{E_{CZK/EUR(t)} - E_{CZK/EUR(t-1)}}{E_{CZK/EUR(t-1)}} = \pi_{CR(t)} - \pi_{SR(t)}$$

Supply and demand curve of currency unit (CZK)

S = supply curve of CZK

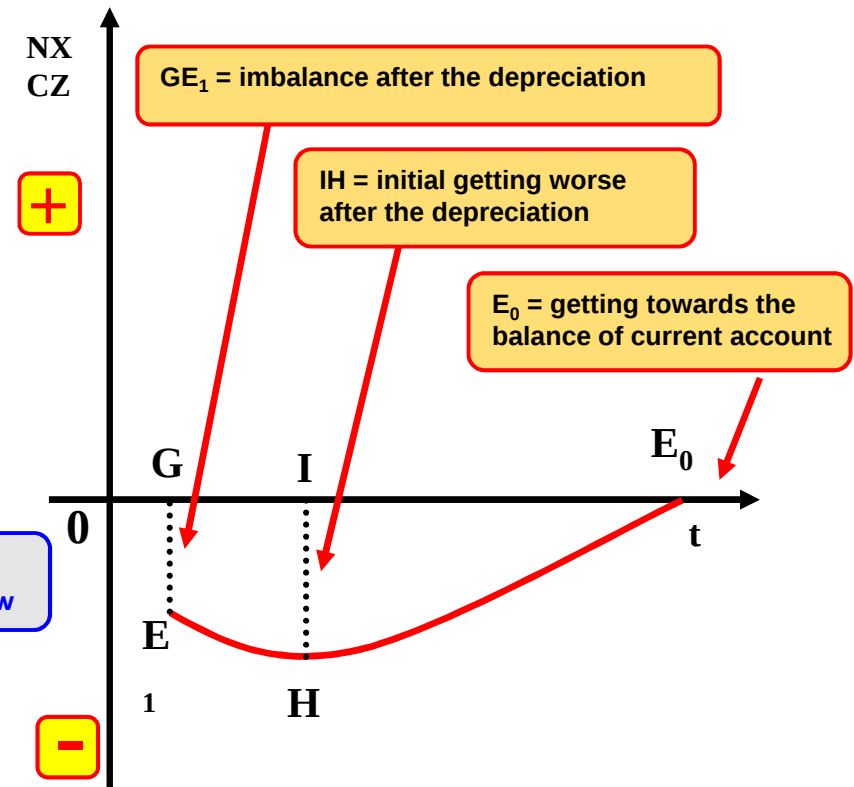
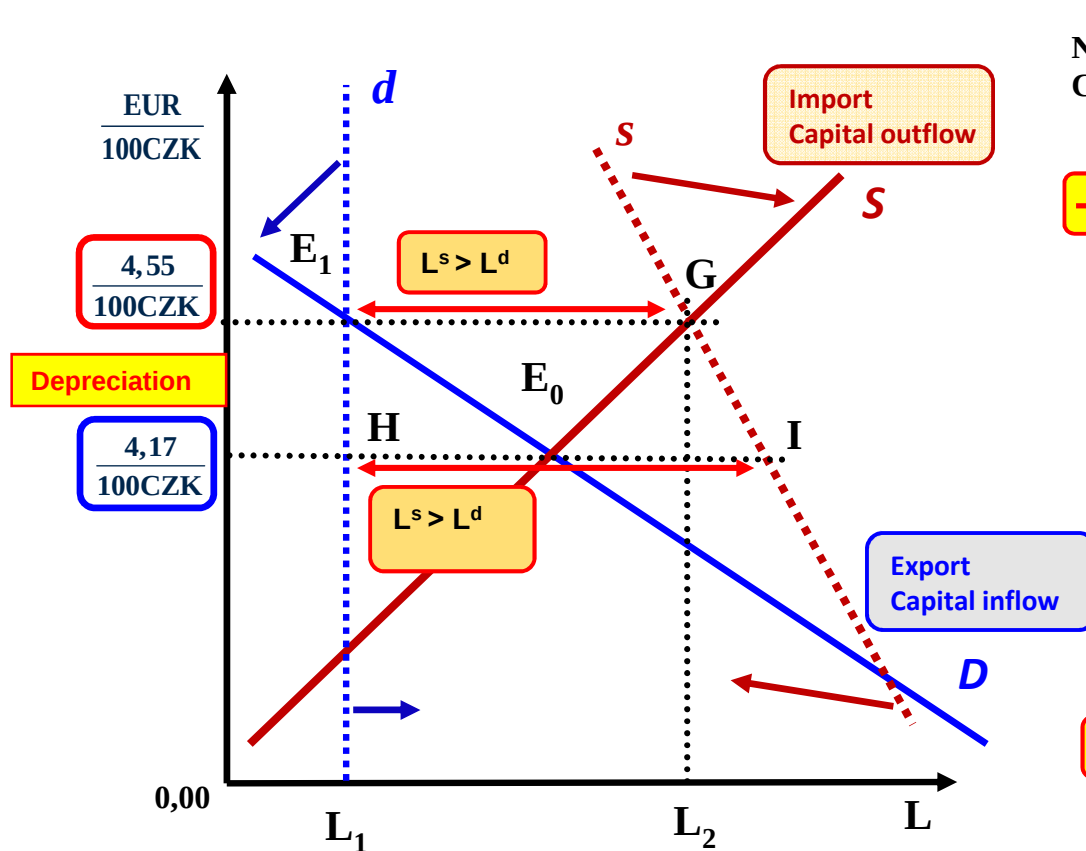
D = demand curve of CZK



Exchange rate in the short run

Curve marked „ d “ → inelastic short run demand for export

Curve marked „ s “ → inelastic short run supply of import



Devaluation (depreciation), current account and output level

Theory of elasticities

The issue: the impact of devaluation (depreciation) on current account of the Balance of Payments and on the output level in an economy

Assuming elastic supply and supply of exports and imports.

Initial equation:

$$CA = P \cdot X_v - E \cdot P_f \cdot M_v,$$

X_v ... volume of export; M_v ... volume of import

After adjustment:

$$\text{Marshall - Lernerova podmínka : } \frac{\Delta CA}{\Delta E} = M(\rho_x + \rho_m - 1)$$

Marshall-Lerner condition says that the devaluation (depreciation) will improve the current account (CA) only if $(\rho_x + \rho_m) > 1$; when $(\rho_x + \rho_m) < 1$, devaluation will lead to getting worse of the CA; if $(\rho_x + \rho_m) = 1$, then CA devaluation will not improve or getting worse the CA.

ρ_x ... foreign demand elasticity of exports in domestic country,

ρ_m ... domestic demand elasticity of imports

Effects of devaluation (depreciation):

1. Price effect – exports denominated in the currencies of other countries are cheaper.

2. Volume effect – export is cheaper and its volume is rising.

Price effect worsens; volume effect improves the current account in a domestic country, the resulting overall effect depends on which one prevails.

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List of tasks for students

Exercise „**Factors of equilibrium output determination in an open economy**“

1. Analyze the determinants of aggregate demand in an open economy and derive the IS curve for an open economy.
2. Explain mutual relationships between the balance of payments and equilibrium production and derive the LM curve for an open economy.
3. Characterize the nature of the Mundell-Fleming model (IS-LM-BP model) and discuss its importance.
4. Analyze the effects of fiscal and monetary policy, assuming the existence of perfect capital mobility and fixed exchange rates and then flexible exchange rates.
5. Discuss the basic problems of the exchange rate determination in the long and short term.



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