

# Chapter 12: The Open Economy Revisited: The Mundell-Fleming Model and the Exchange-Rate Regime

September 13, 2010

# This chapter

- Basic structure of Mundell-Fleming model
- The small open economy under floating exchange rates
  - Fiscal policy, monetary policy, trade policy
- The small open economy under fixed exchange rates
  - How a fixed-exchange-rate system works
  - Fiscal policy, monetary policy, trade policy
- Interest rate differentials (a self-fulfilling story again)
- Should exchange rates be floating or fixed?
- From the short run to the long run: The Mundell-Fleming model with a changing price level

# Basic structure of Mundell-Fleming model

- The key assumption: small open economy with perfect capital mobility

$$r = r^*$$

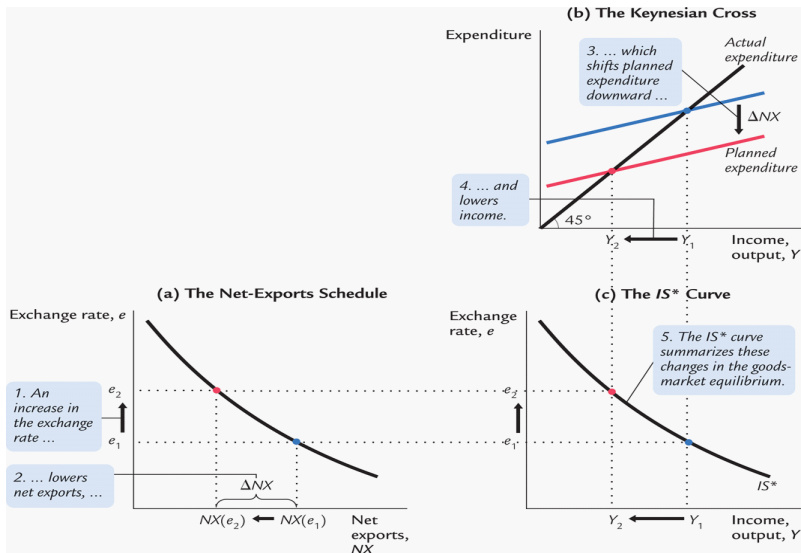
- The goods market and the  $IS^*$  curve

$$Y = C(Y - T) + I(r^*) + G + NX(e)$$

- Why  $NX(e)$ ? Why not  $NX(\varepsilon)$ ?
  - In the short run  $P$  and  $P^*$  is constant. Thus  $\varepsilon$  moves with  $e$ . Remember

$$\varepsilon = e \frac{P}{P^*} = \frac{eP}{P^*}$$

# The IS-star curve

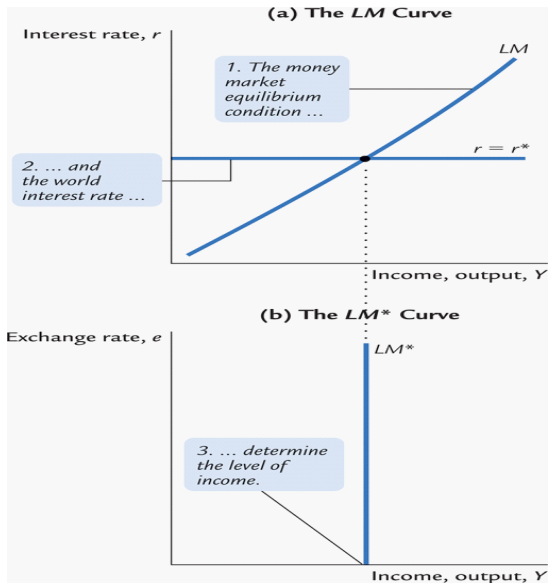


# The money market and the LM-star curve

- The equation of  $LM^*$  curve

$$\frac{M}{P} = L(r^*, Y)$$

# The LM-star curve



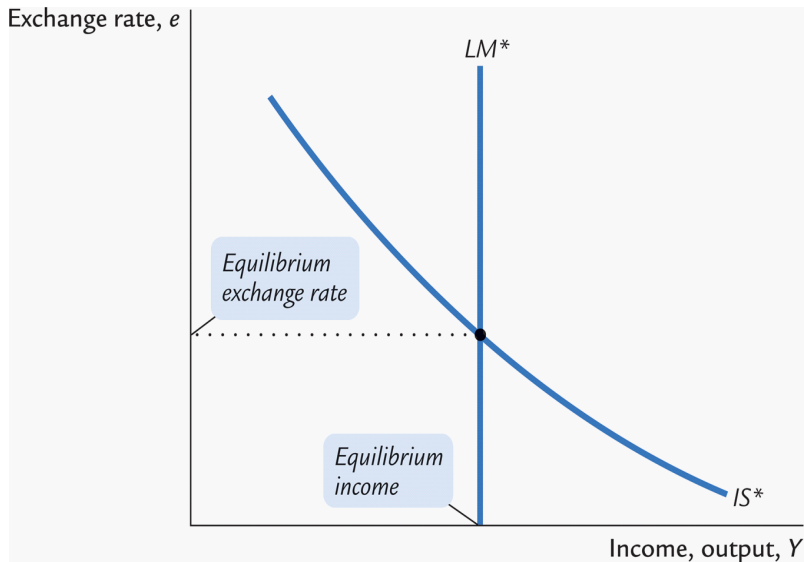
# Putting the pieces together

- The mathematical expressions of Mundell-Fleming model

$$Y = C(Y - T) + I(r^*) + G + NX(e) \quad IS^*$$

$$\frac{M}{P} = L(r^*, Y) \quad LM^*$$

# The Mundell-Fleming model

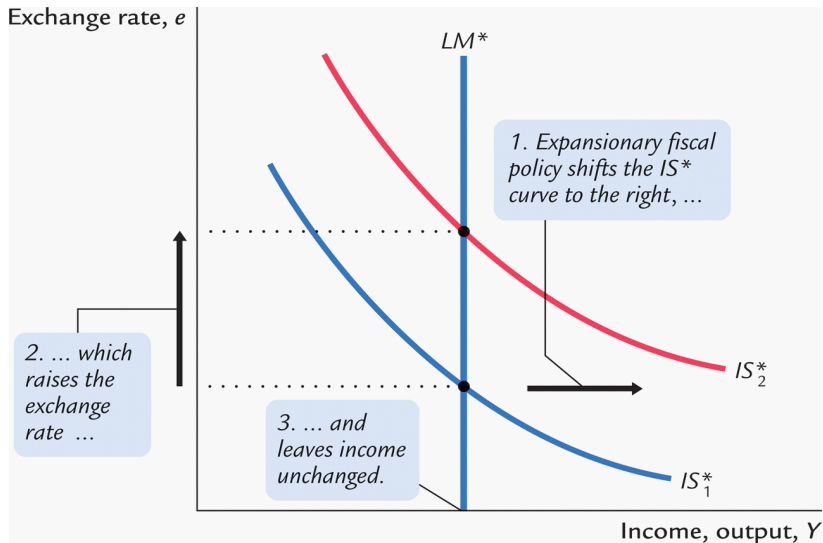




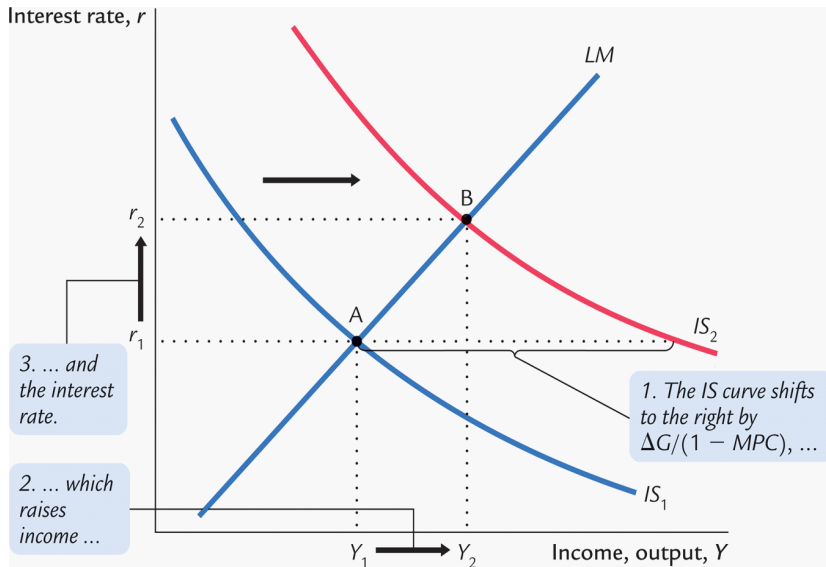
# The small open economy under floating exchange rates

- Under a system of floating exchange rates, the exchange rate is set by market forces and is allowed to fluctuate in response to changing economic conditions.

# Fiscal policy



# The closed economy-fiscal policy



# What causes the difference?

- In a closed economy, higher income causes higher interest rate. In a small open economy,  $r = r^*$ .
- The fiscal policy is powerless to influence income in a small open economy under floating exchange rate.
  - Expansionary fiscal policies (increase of government expenditure or tax cutting) put pressure to push  $r$  to be higher than  $r^*$
  - The foreign investors buy the domestic currency to invest in the domestic economy to grasp the higher return,  $r$
  - The capital inflow increases the value of domestic currency (appreciation of domestic currency)
  - Domestic goods become more expensive relative to foreign goods
  - Net exports decrease and it fully offsets the fiscal expansion
  - The capital inflow pushes  $r$  back to  $r^*$ .

- In a small open economy under floating exchange rates, the income level is determined by the  $LM^*$  curve

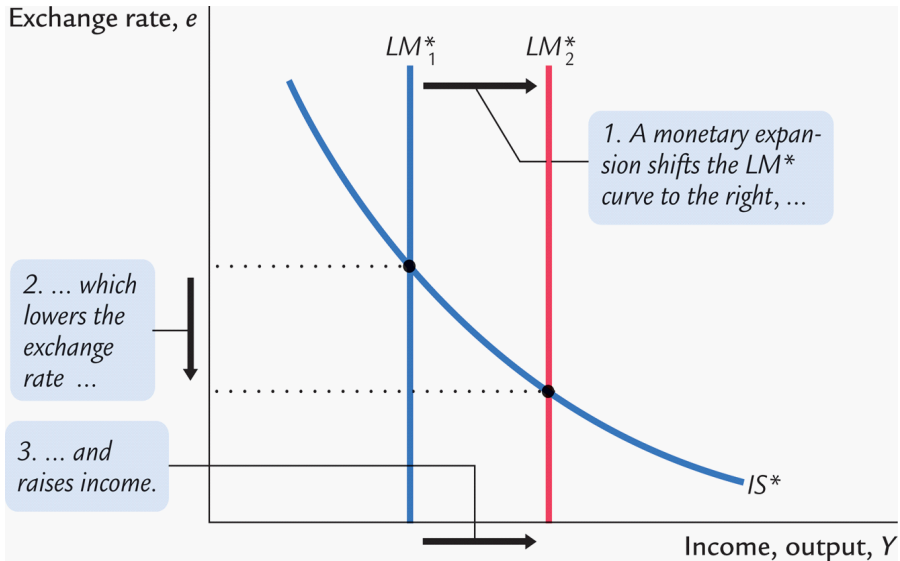
$$\frac{M}{P} = L(r^*, Y)$$

The fiscal policies are powerless.

- From the  $IS^*$  curve we can see that the change of  $NX$  fully offsets the change of fiscal policies

$$Y = C(Y - T) + I(r^*) + G + NX(e)$$

# Monetary policy



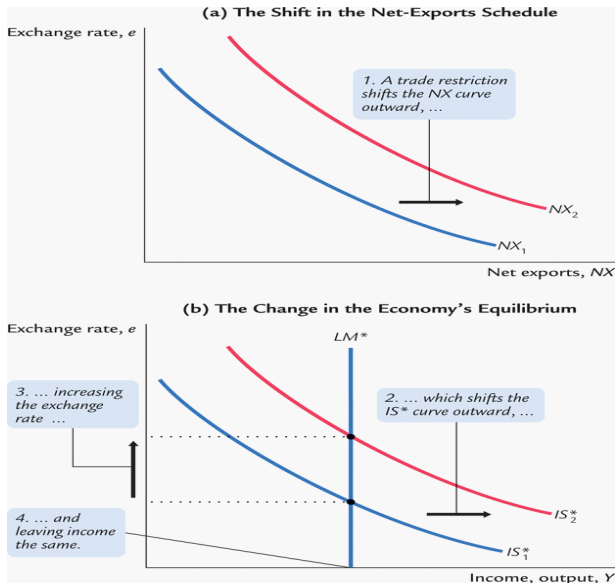
- Monetary expansion causes income to increase and nominal exchange rate to decrease.
  - The increase of money supply puts downward pressure to push  $r$  to be lower than  $r^*$
  - The domestic investors buy the foreign currency to invest in the international finance market to grasp the higher return,  $r^*$
  - The capital outflow decreases the value of domestic currency (depreciation of domestic currency)
  - Domestic goods become cheaper relative to foreign goods
  - Net exports increase and income increases
  - The capital outflow pushes  $r$  back to  $r^*$ .
- In a small open economy, monetary policy influences income by altering the exchange rate rather than the interest rate.

- The government reduces the demand for imported goods by imposing an import quota or a tariff.
- Other things equal,  $\downarrow IM \Rightarrow \uparrow NX$ , since

$$NX = EX - IM$$



# Trade policy



# Economic mechanism

- Import restriction has no influence on income in a small open economy under floating exchange rate.
  - Increase of net exports puts pressure to push  $r$  to be higher than  $r^*$
  - The foreign investors buy the domestic currency to invest in the domestic economy to grasp the higher return,  $r$
  - The capital inflow increases the value of domestic currency (appreciation of domestic currency)
  - Domestic goods become more expensive relative to foreign goods
  - Net exports decrease and it fully offsets the decrease of import
  - The capital inflow pushes  $r$  back to  $r^*$ .
- The effects of a trade restriction
  - $NX$  doesn't change

$$NX(e) = Y - C(Y - T) - I(r^*) - G$$

- Trade volume decreases (less trade). Recall that

$$NX = EX - IM$$

# The small open economy under fixed exchange rates

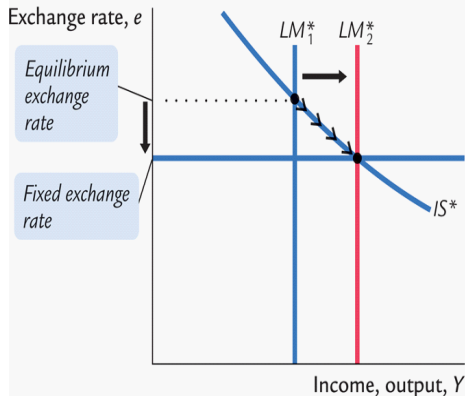
- Under a fixed exchange rate, the central bank announces a value for the exchange rate and stands ready to buy and sell the domestic currency to keep the exchange rate at its announced level.

# How a fixed-exchange-rate system works

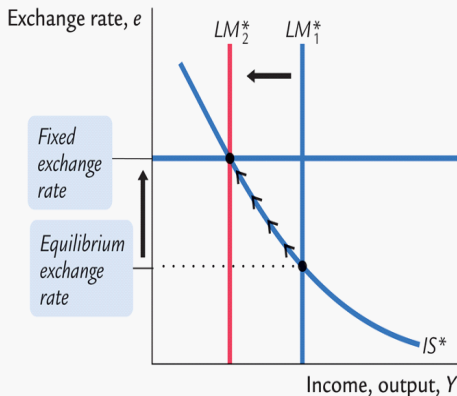
- A fixed exchange rate dedicates a country's monetary policy to the single goal of keeping the exchange rate at the announced level.

# How a fixed exchange rate governs the money supply

(a) The Equilibrium Exchange Rate Is Greater Than the Fixed Exchange Rate



(b) The Equilibrium Exchange Rate Is Less Than the Fixed Exchange Rate



# Mathematical explanation-what determines what

- Endogenous variables under floating exchange rate

- income,  $Y$
- nominal exchange rate,  $e$

$$Y = C(Y - T) + I(r^*) + G + NX(e) \quad IS^*$$

$$\frac{M}{P} = L(r^*, Y) \quad LM^*$$

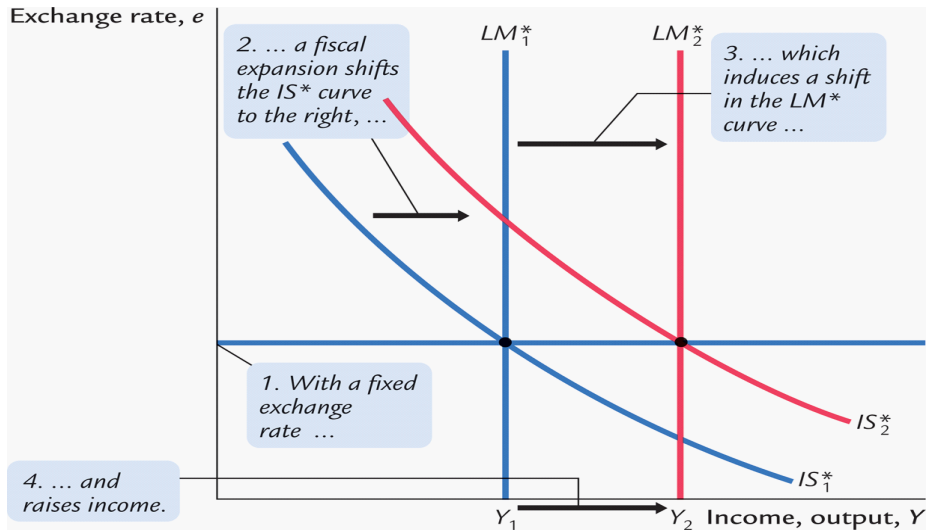
- Endogenous variables under fixed exchange rate

- income,  $Y$
- money supply,  $M$

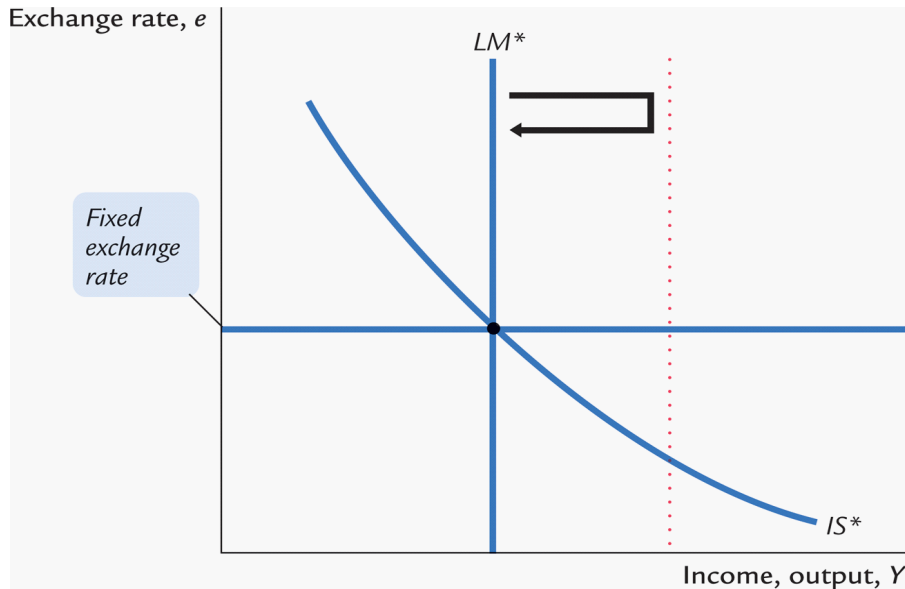
$$Y = C(Y - T) + I(r^*) + G + NX(e) \quad IS^*$$

$$\frac{M}{P} = L(r^*, Y) \quad LM^*$$

# Fiscal policy

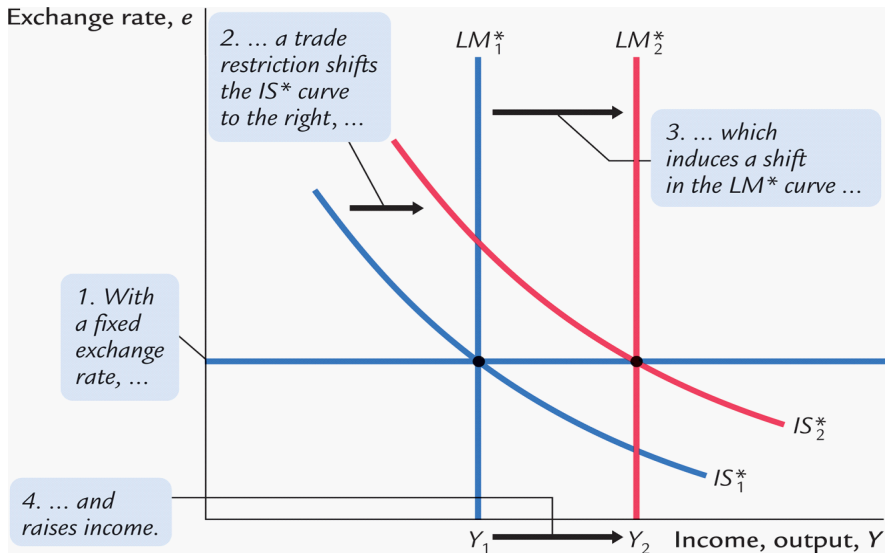


# Monetary policy





# Trade policy



# What happens for net exports?

- Recall that

$$\begin{aligned}NX &= S - I \\ &= Y - C(Y - T) - G - I(r^*)\end{aligned}$$

- When  $Y$  increases,  $Y - C(Y - T)$  also increases, since

$$0 < MPC < 1.$$

Hence private saving  $Y - C(Y - T) - T$  increases.

# A summary of policy

**TABLE 12-1**

## The Mundell-Fleming Model: Summary of Policy Effects

Policy	EXCHANGE-RATE REGIME					
	FLOATING			FIXED		
	IMPACT ON:					
	$Y$	$e$	$NX$	$Y$	$e$	$NX$
Fiscal expansion	0	↑	↓	↑	0	0
Monetary expansion	↑	↓	↑	0	0	0
Import restriction	0	↑	0	↑	0	↑

*Note:* This table shows the direction of impact of various economic policies on income  $Y$ , the exchange rate  $e$ , and the trade balance  $NX$ . A “↑” indicates that the variable increases; a “↓” indicates that it decreases; a “0” indicates no effect. Remember that the exchange rate is defined as the amount of foreign currency per unit of domestic currency (for example, 100 yen per dollar).

# Interest rate differentials

- Reasons causing the domestic interest rate to be different from the world interest rate
  - Country risk. Such as the default caused by a revolution or other political upheaval.
  - Expected changes in the exchange rate.

# Differentials in the Mundell-Fleming model

- We assume that the interest rate in the small open economy is determined by the world interest rate plus a risk premium  $\theta$

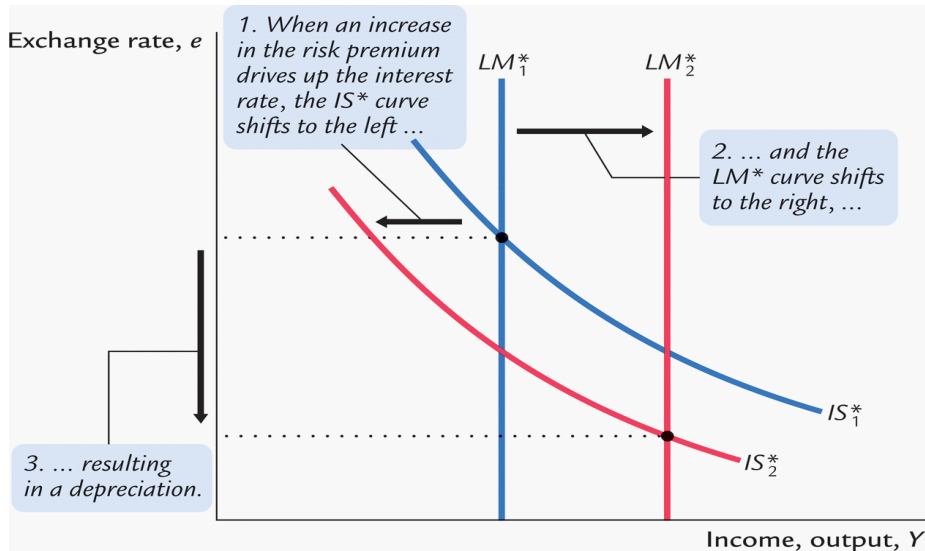
$$r = r^* + \theta$$

- The Mundell-Fleming model now becomes

$$Y = C(Y - T) + I(r^* + \theta) + G + NX(e) \quad IS^*$$

$$\frac{M}{P} = L(r^* + \theta, Y) \quad LM^*$$

# An increase in the risk premium



# A self-fulfilling story

- The expectations about the exchange rate could be self-fulfilling.
  - Suppose that people believe that the Mexican peso will not be valuable in the future
  - Risk premium  $\theta \uparrow$
  - This expectation will drive up Mexican interest rates
  - The value of the Mexican peso decreases.
- The expectation that a currency will lose value in the future causes it to lose value today.

# Inaccurate prediction-Country risk pushes up income

- Three reasons why such a boom in income does not occur in practice.
  - Central bank decreases money supply to avoid currency depreciation
  - Depreciation of domestic currency may suddenly increase the price of imported goods, causing an increase of price level,  $P$
  - Domestic residents may increase their demand for money
- In the short run, an increase in country risk leads to a depreciating currency and falling income. Thus, increases in country risk are not desirable.



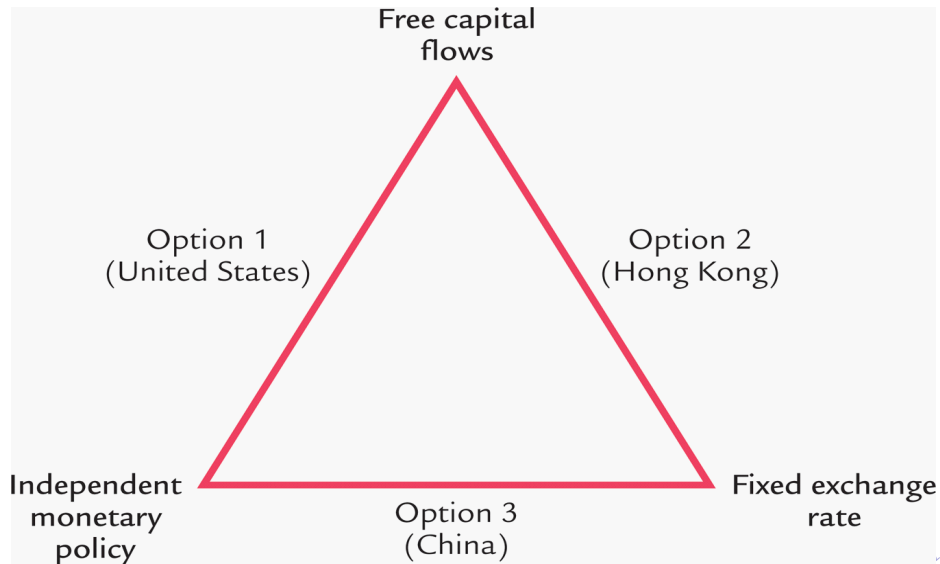
# Should exchange rates be floating or fixed?-prons and cons

- A system of floating exchange rates leaves monetary policymakers free to pursue other goals, such as stabilizing employment or prices.
- Support of fixed exchange rate
  - Exchange-rate uncertainty makes international trade more difficult
  - A fixed exchange rate can prevent inflation by binding the central bank.

# Speculative attacks, currency boards, and dollarization

- Speculative attacks and the role of rumor. e.g. Thailand 1997.
  - Suppose that a rumor spreads that the central bank is going to abandon the exchange-rate peg
  - People would respond by rushing to the central bank to convert pesos into dollars before the pesos lose value
  - This rush would train the central bank's reserves and could force the central bank to abandon the peg. Then, the rumor would prove self-fulfilling.
- Currency board. The central government holds enough foreign currency to back each unit of the domestic currency. e.g. Argentina in the 1990s and Hong Kong today.
- Dollarization

# Impossible trinity



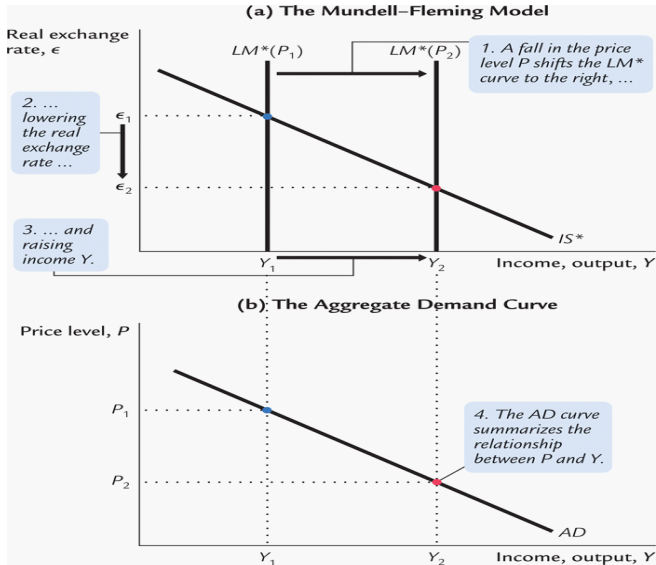
# From the short run to the long run: The Mundell-Fleming model with a changing price level

- We can write the Mundell-Fleming model as

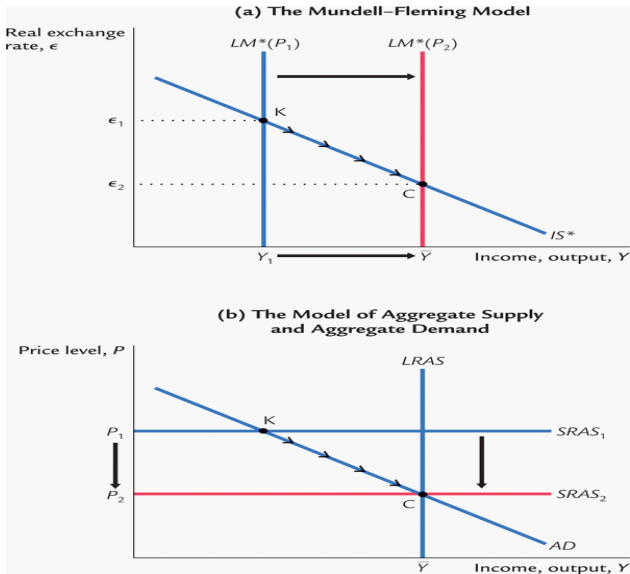
$$Y = C(Y - T) + I(r^*) + G + NX(\varepsilon) \quad IS^*$$

$$\frac{M}{P} = L(r^*, Y) \quad LM^*$$

# Derivation of AD curve for a small open economy



# The short-run and long-run equilibria



# Chapter summary

- Mundell-Fleming model
- Floating exchange rate
- Fixed exchange rate