Chapter 12: The Mundell-Fleming Model & Exchange-Rate Regime *

MACROECONOMICS

Seventh Edition

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* Slides based on Ron Cronovich's slides, adjusted for course in Macroeconomics for International Masters Program at the Wang Yanan Institute for Studies in Economics at Xiamen University.

Learning Objectives

This chapter introduces you to understanding:

- The Mundell-Fleming model
- The small open economy under floating and fixed exchange rates
- Interest rate differentials
- Arguments for fixed vs. floating exchange rates
- Deriving the aggregate demand curve

12.1) The Mundell-Fleming Model

➔ The Model

- *Key assumption:*
  Small open economy with perfect capital mobility.

  $r = r^*$

- Goods market equilibrium – the *IS** curve:

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

where

e = nominal exchange rate

= foreign currency per unit domestic currency

12.1) The Mundell-Fleming Model

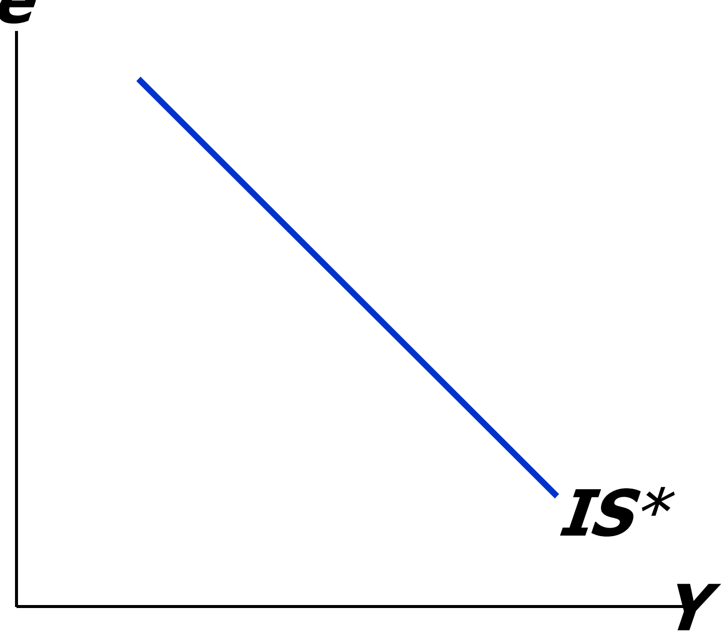
→ The *IS** Curve: Goods Market eq'm

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

The *IS** curve is drawn for a given value of ***r****.

Intuition for the slope:

$\downarrow e \Rightarrow \uparrow NX \Rightarrow \uparrow Y$



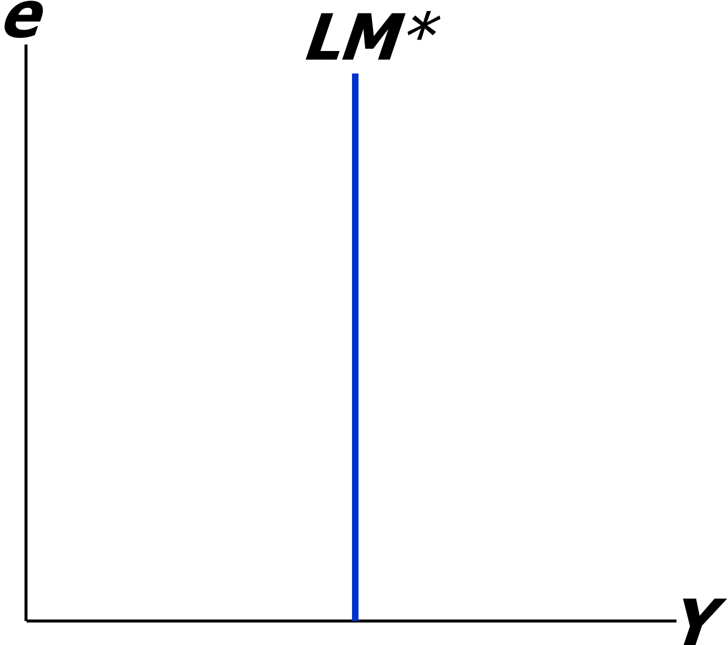
12.1) The Mundell-Fleming Model

➔ The *LM** Curve: Money Market eq'm

$$M/P = L(r^*, Y)$$

The *LM** curve

- is drawn for a given value of ***r****.
- is vertical because: given ***r****, there is only one value of ***Y*** that equates money demand with supply, regardless of ***e***.



12.1) The Mundell-Fleming Model

➔ Equilibrium in the Mundell-Fleming Model

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

$$M/P = L(r^*, Y)$$

e

LM*

equilibrium exchange rate

IS*

Y

equilibrium level of income

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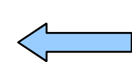
- The small open economy under floating and fixed exchange rates 
- Interest rate differentials
- Arguments for fixed vs. floating exchange rates
- Deriving the aggregate demand curve

12.2) Floating & Fixed Exch. Rates

➔ Introduction

- In a system of **floating exchange rates**, ***e*** is allowed to fluctuate in response to changing economic conditions.
- In contrast, under **fixed exchange rates**, the central bank trades domestic for foreign currency at a predetermined price.
- Next, policy analysis:
  - first, in a floating exchange rate system
  - then, in a fixed exchange rate system

12.2) Floating & Fixed Exch. Rates

➔ Fiscal Policy under Floating Exch. Rs

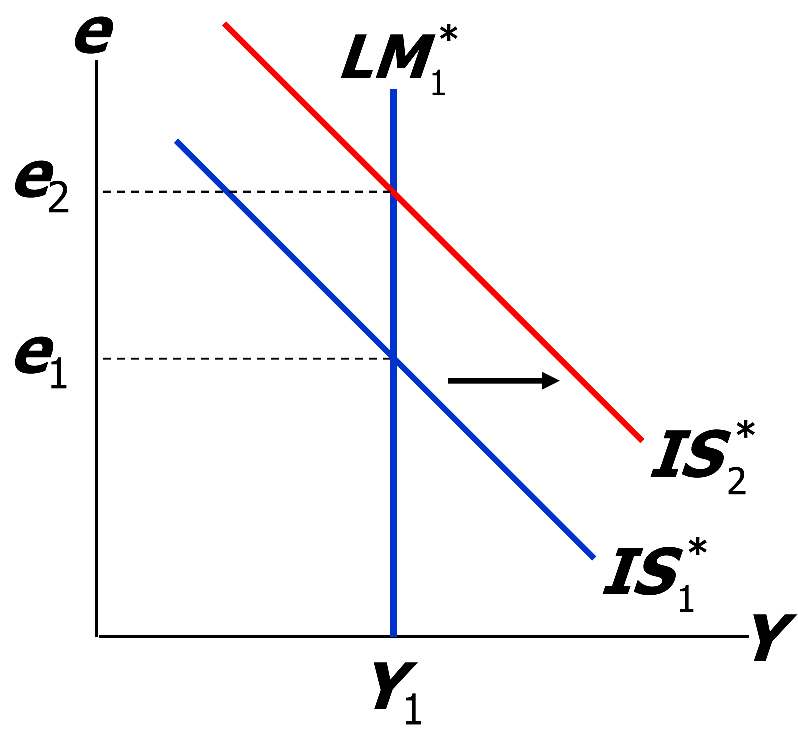
$$Y = C(Y - T) + I(r^*) + G + NX(e)$$

$$M/P = L(r^*, Y)$$

At any given value of **e**, a fiscal expansion increases ***Y***, shifting *IS** to the right.

Results:

$$\Delta e > 0, \ \Delta Y = 0$$



12.2) Floating & Fixed Exch. Rates

➔ Lessons about Fiscal Policy

- In a small open economy with perfect capital mobility, fiscal policy cannot affect real GDP.
- "Crowding out"
  - *closed economy:*
    Fiscal policy crowds out investment by causing the interest rate to rise.
  - *small open economy:*
    Fiscal policy crowds out net exports by causing the exchange rate to appreciate.

12.2) Floating & Fixed Exch. Rates

→ Monetary Policy under Floating Exch. Rs

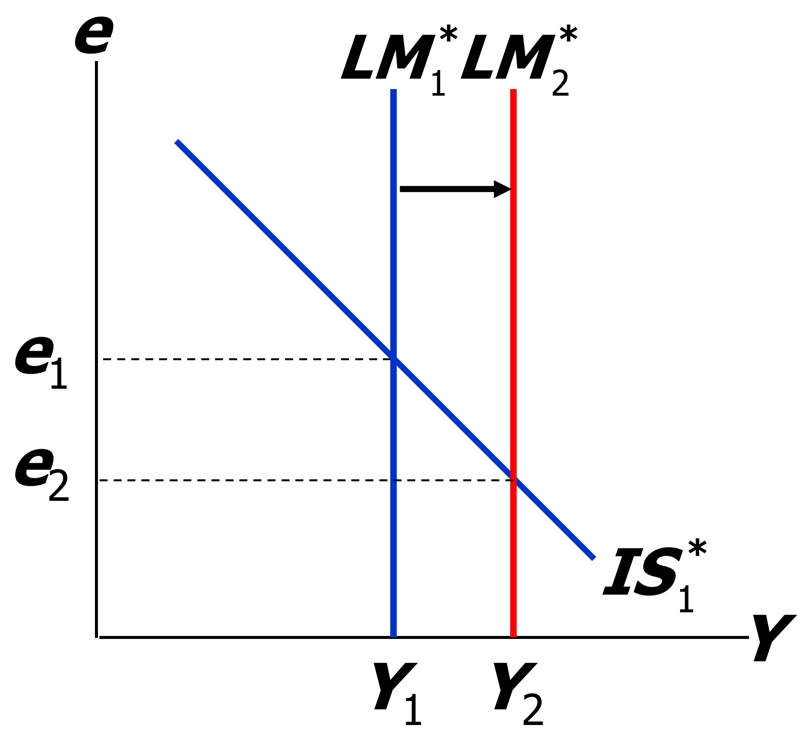
$$Y = C(Y - T) + I(r^*) + G + NX(e)$$

$$M/P = L(r^*, Y)$$

An increase in ***M*** shifts *LM** right because ***Y*** must rise to restore eq'm in the money market.

Results:

$$\Delta e < 0, \ \Delta Y > 0$$



12.2) Floating & Fixed Exch. Rates

➔ Lessons about Monetary

- Monetary policy affects output by affecting the components of aggregate demand:

closed economy: $\uparrow \boldsymbol{M} \Rightarrow \downarrow \boldsymbol{r} \Rightarrow \uparrow \boldsymbol{I} \Rightarrow \uparrow \boldsymbol{Y}$

small open economy: $\uparrow \boldsymbol{M} \Rightarrow \downarrow \boldsymbol{e} \Rightarrow \uparrow \boldsymbol{NX} \Rightarrow \uparrow \boldsymbol{Y}$

- Expansionary mon. policy does not raise world agg. demand, it merely shifts demand from foreign to domestic products.

  So, the increases in domestic income and employment are at the expense of losses abroad.

12.2) Floating & Fixed Exch. Rates

→ Trade Policy under Floating Exch. Rs

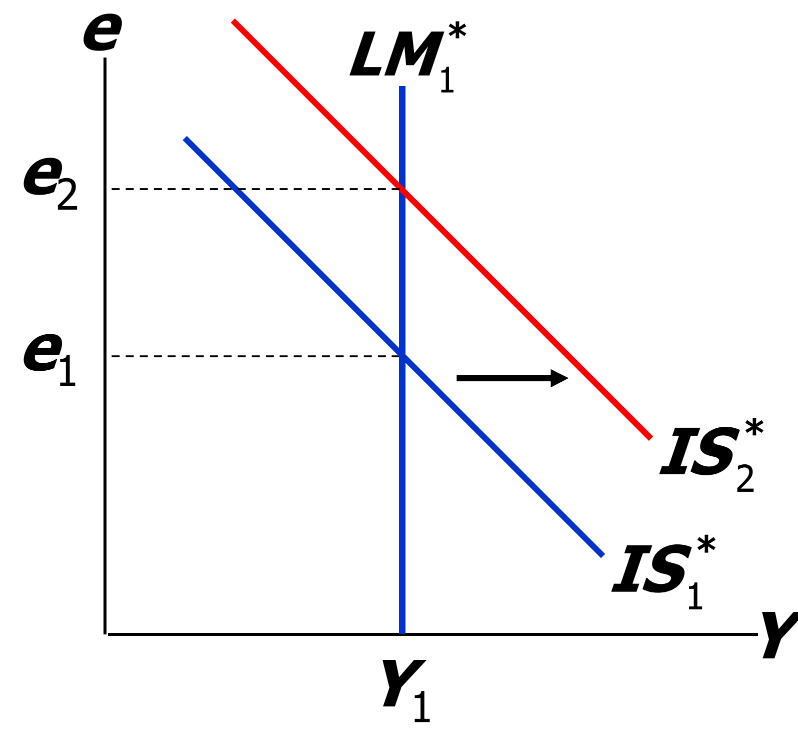
$$Y = C(Y - T) + I(r^*) + G + NX(e)$$

$$M/P = L(r^*, Y)$$

At any given value of ***e***, a tariff or quota reduces imports, increases ***NX***, and shifts *IS** to the right.

Results:

$$\Delta e > 0, \;\; \Delta Y = 0$$



12.2) Floating & Fixed Exch. Rates

➔ Lessons about Trade Policy

- Import restrictions cannot reduce a trade deficit.
- Even though ***NX*** is unchanged, there is less trade:
  - the trade restriction reduces imports.
  - the exchange rate appreciation reduces exports.
- Less trade means fewer "gains from trade."

12.2) Floating & Fixed Exch. Rates

➔ Lessons about Trade Policy (ctd.)

- Import restrictions on specific products save jobs in the domestic industries that produce those products, but destroy jobs in export-producing sectors.
- Hence, import restrictions fail to increase total employment.
- Also, import restrictions create “sectoral shifts,” which cause frictional unemployment.

12.2) Floating & Fixed Exch. Rates

➔ Fixed Exchange Rates

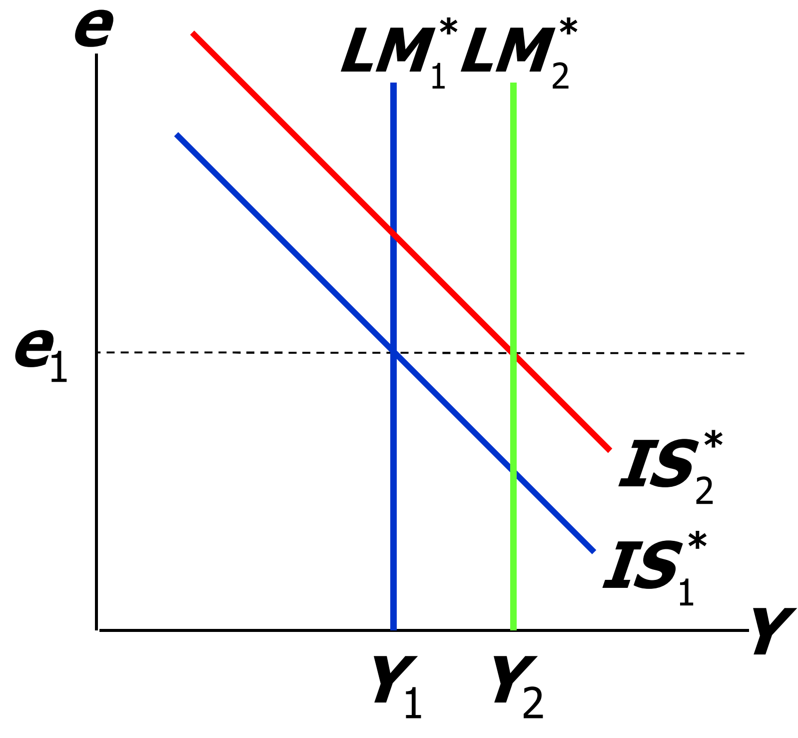
- Under fixed exchange rates, the central bank stands ready to buy or sell the domestic currency for foreign currency at a predetermined rate.
- In the Mundell-Fleming model, the central bank shifts the *LM** curve as required to keep **e** at its preannounced rate.
- This system fixes the nominal exchange rate. In the long run, when prices are flexible, the real exchange rate can move even if the nominal rate is fixed.

12.2) Floating & Fixed Exch. Rates

➔ Fiscal Policy under Fixed Exch. Rs

Under floating rates, fiscal policy is ineffective at changing output.

Under fixed rates, fiscal policy is very effective at changing output.



Results:

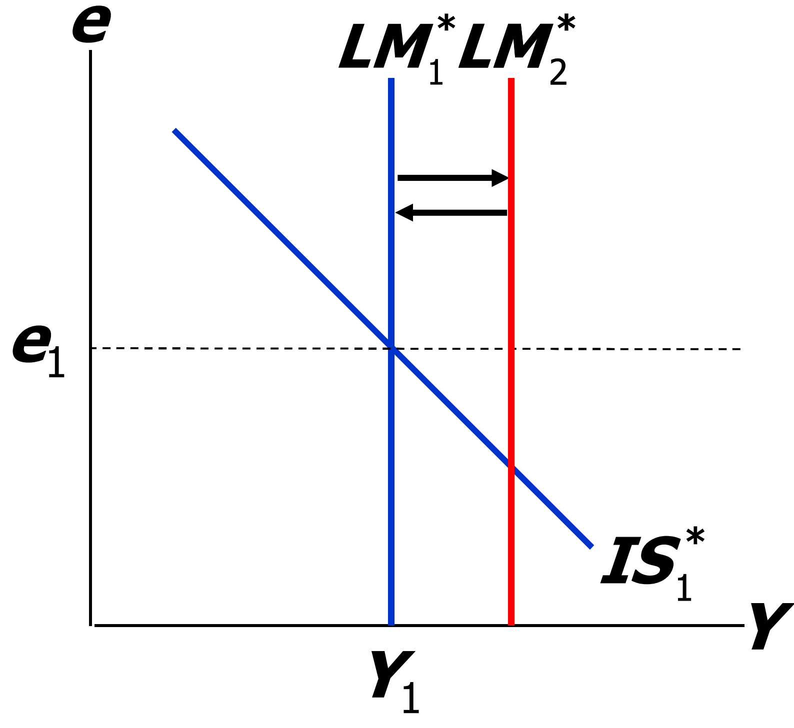
$$\Delta e = 0, \ \ \Delta Y > 0$$

12.2) Floating & Fixed Exch. Rates

➔ Monetary Policy under Fixed Exch. Rs

Under floating rates, monetary policy is <u>very effective</u> at changing output.

Under fixed rates, monetary policy <u>cannot be used to affect output</u>.



Results:

$$\Delta \boldsymbol{e} = 0, \ \Delta \boldsymbol{Y} = 0$$

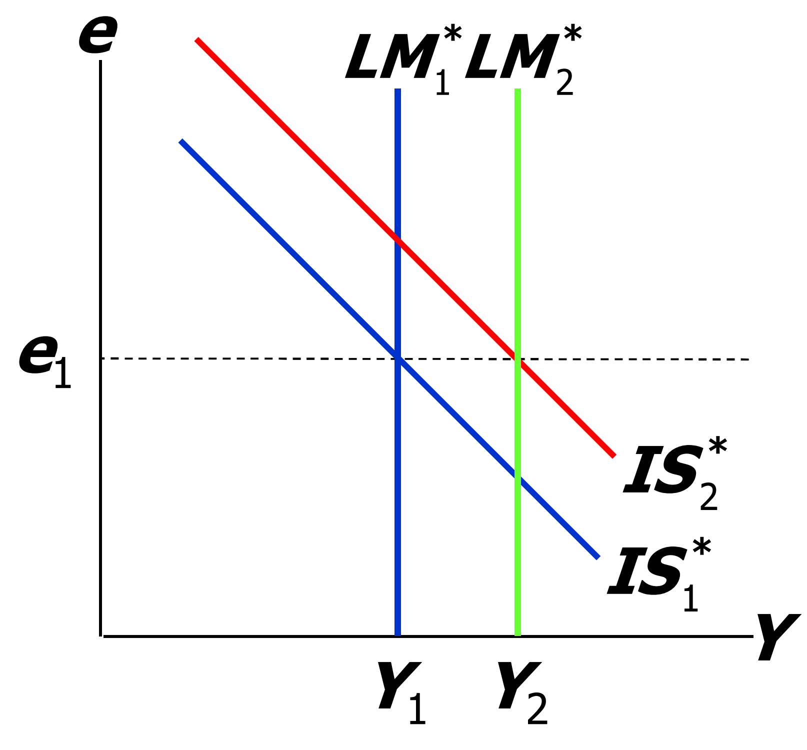
12.2) Floating & Fixed Exch. Rates

➔ Trade Policy under Fixed Exch. Rs

Under floating rates, import restrictions do not affect ***Y*** or ***NX***.

Under fixed rates, import restrictions increase ***Y*** and ***NX***.

But, these gains come at the expense of other countries: the policy merely shifts demand from foreign to domestic goods.



12.2) Floating & Fixed Exch. Rates

➔ Summary of Policy Effects in M-F Model

	type of exchange rate regime:					
	floating			fixed		
	impact on:					
Policy	***Y***	***e***	***NX***	***Y***	***e***	***NX***
fiscal expansion	0	↑	↓	↑	0	0
mon. expansion	↑	↓	↑	0	0	0
import restriction	0	↑	0	↑	0	↑

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- Arguments for fixed vs. floating exchange rates

- Deriving the aggregate demand curve

12.3) Interest-rate Differentials

➔ Reasons for Interest Rate Differentials

Two reasons why ***r*** may differ from ***r****

- ***country risk***: The risk that the country's borrowers will default on their loan repayments because of political or economic turmoil.

  Lenders require a higher interest rate to compensate them for this risk.

- ***expected exchange rate changes***: If a country's exchange rate is expected to fall, then its borrowers must pay a higher interest rate to compensate lenders for the expected currency depreciation.

12.3) Interest-rate Differentials

➔ Differentials in the M-F Model

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

where θ (Greek letter "theta") is a risk premium, assumed exogenous.

Substitute the expression for r into the *IS** and *LM** equations:

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

$$M/P = L(r^* + \theta, Y)$$

12.3) Interest-rate Differentials

➔ The Effects of an Increase in θ

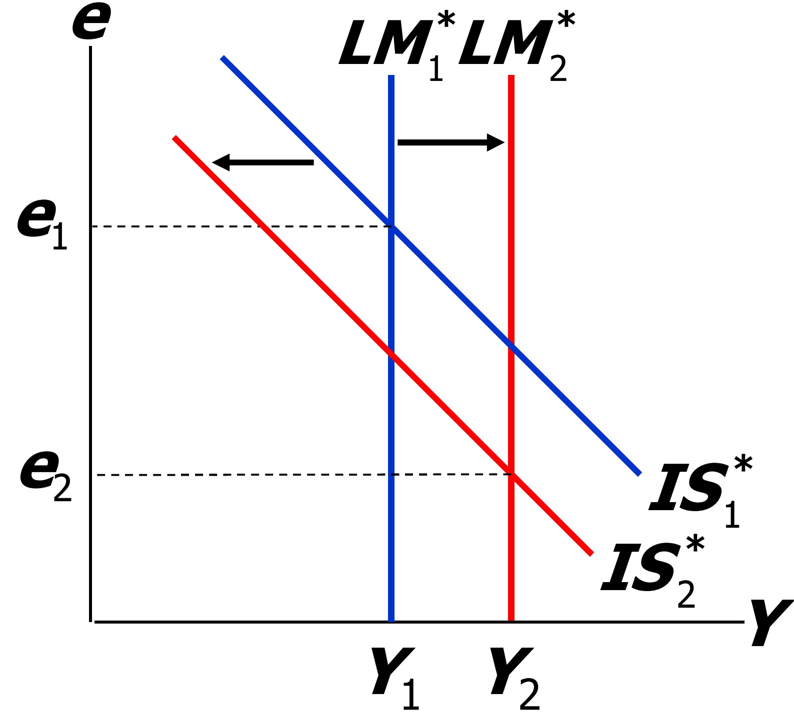
*IS** shifts left, because

$\uparrow\theta \Rightarrow \uparrow \boldsymbol{r} \Rightarrow \downarrow \boldsymbol{I}$

*LM** shifts right, because

$\uparrow\theta \Rightarrow \uparrow \boldsymbol{r} \Rightarrow \downarrow (\boldsymbol{M/P})^d$,

so ***Y*** must rise to restore money market eq'm.



Results:

$\Delta \boldsymbol{e} < 0, \ \Delta \boldsymbol{Y} > 0$

12.3) Interest-rate Differentials

➔ The Effects of an Increase in θ

- The fall in ***e*** is intuitive:
  An increase in country risk or an expected depreciation makes holding the country's currency less attractive.

  Note: an expected depreciation is a self-fulfilling prophecy.

- The increase in Y occurs because the boost in NX (from the depreciation) is greater than the fall in I (from the rise in r).

12.3) Interest-rate Differentials

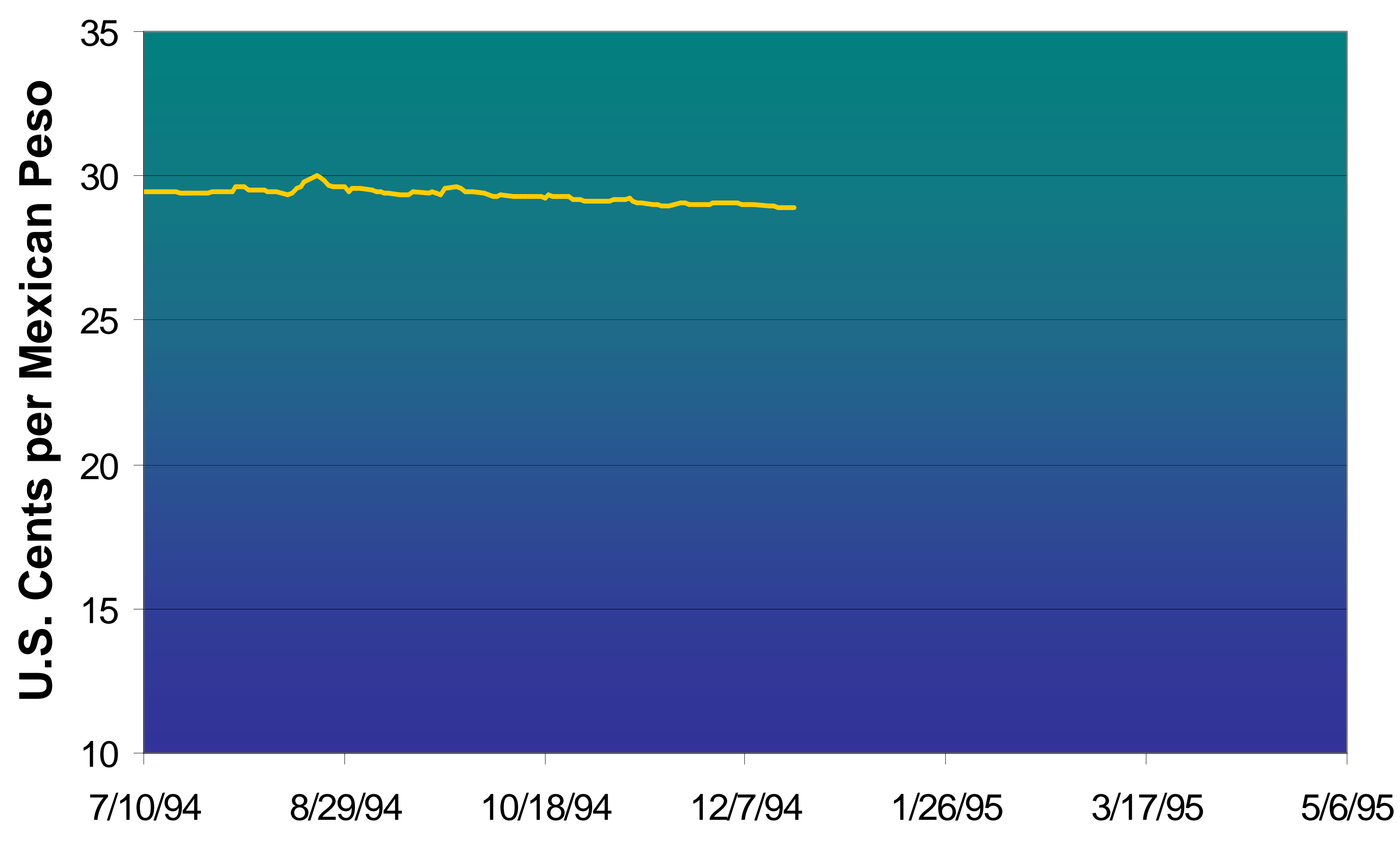
→ Why Income might not Rise

- The central bank may try to prevent the depreciation by reducing the money supply.
- The depreciation might boost the price of imports enough to increase the price level (which would reduce the real money supply).
- Consumers might respond to the increased risk by holding more money.

Each of the above would shift LM^* leftward.

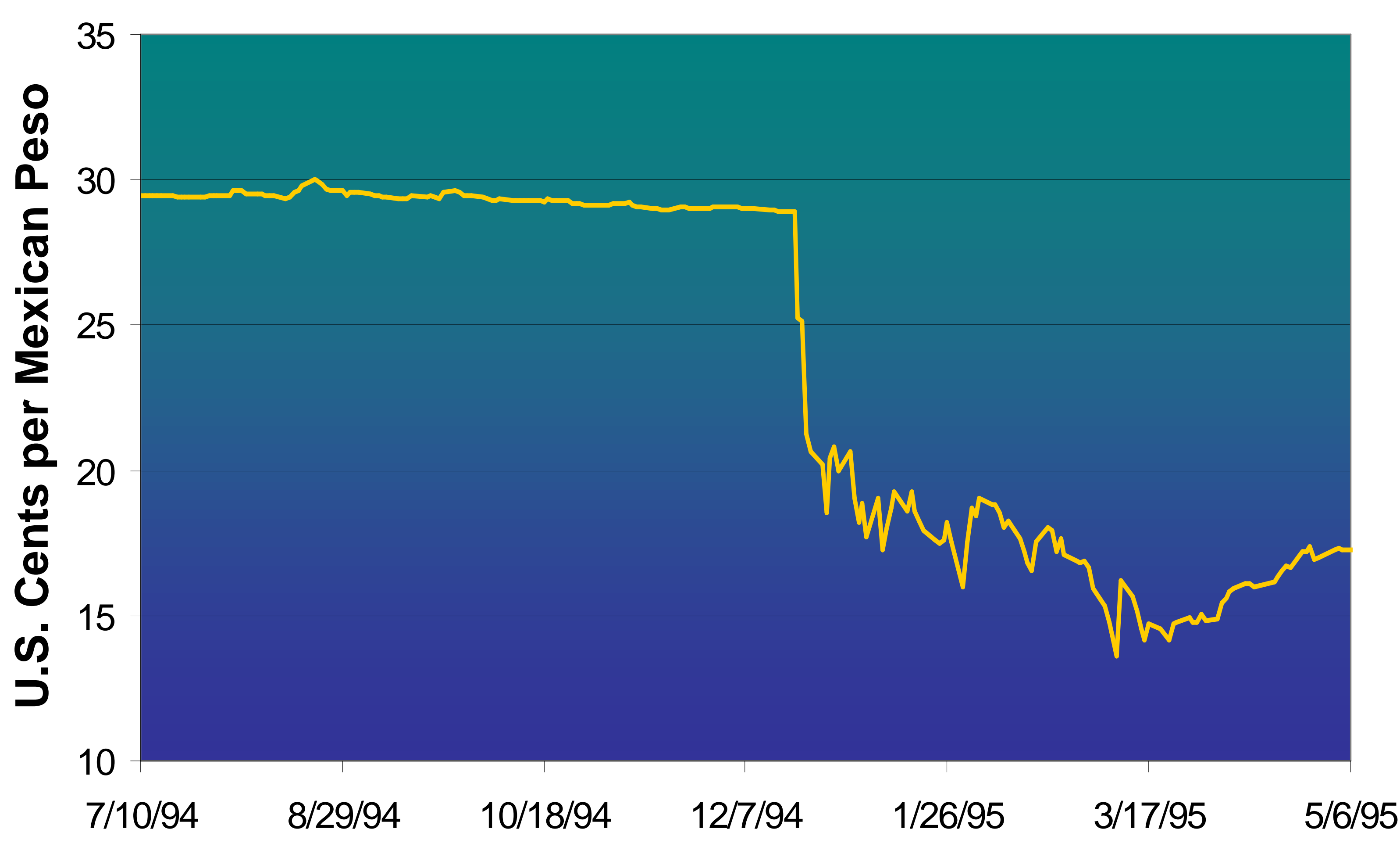
12.3) Interest-rate Differentials

➔ CASE STUDY: The Mexican Peso Crisis



12.3) Interest-rate Differentials

➔ CASE STUDY: The Mexican Peso Crisis



12.3) Interest-rate Differentials

➔ The Peso Crisis didn't just Hurt Mexico

- U.S. goods more expensive to Mexicans
  - U.S. firms lost revenue
  - Hundreds of bankruptcies along U.S.-Mexican border
- Mexican assets worth less in dollars
  - Reduced wealth of millions of U.S. citizens

12.3) Interest-rate Differentials

→ Understanding the Crisis

- In the early 1990s, Mexico was an attractive place for foreign investment.
- During 1994, political developments caused an increase in Mexico's risk premium (θ):
  - peasant uprising in Chiapas
  - assassination of leading presidential candidate
- Another factor:
  The Federal Reserve raised U.S. interest rates several times during 1994 to prevent U.S. inflation.
  ($\Delta r^* > 0$)

12.3) Interest-rate Differentials

➔ Understanding the Crisis

- These events put downward pressure on the peso.
- Mexico's central bank had repeatedly promised foreign investors that it would not allow the peso's value to fall,

  so it bought pesos and sold dollars to "prop up" the peso exchange rate.
- Doing this requires that Mexico's central bank has adequate reserves of dollars.
  Did it?

12.3) Interest-rate Differentials

➔ Dollar Reserves of Mexico's Central Bank

December 1993 ………………. $28 billion

August 17, 1994 ………………. $17 billion

December 1, 1994 …………….$ 9 billion

December 15, 1994 ………… $ 7 billion

During 1994, Mexico's central bank hid the fact that its reserves were being depleted.

12.3) Interest-rate Differentials

➔ The Disaster

- Dec. 20: Mexico devalues the peso by 13%

  (fixes ***e*** at 25 cents instead of 29 cents)

- Investors are taken by surprise– they had no idea Mexico was running out of reserves.
- $\uparrow\theta$, investors dump their Mexican assets and pull their capital out of Mexico.
- Dec. 22: central bank's reserves nearly gone. It abandons the fixed rate and lets ***e*** float.
- In a week, ***e*** falls another 30%.

12.3) Interest-rate Differentials

➔ The Rescue Package

- 1995: U.S. & IMF set up $50b line of credit to provide loan guarantees to Mexico's govt.
- This helped restore confidence in Mexico, reduced the risk premium.
- After a hard recession in 1995, Mexico began a strong recovery from the crisis.

12.3) Interest-rate Differentials

➔ CASE STUDY: The Southeast Asian Crisis

- Problems in the banking system eroded international confidence in SE Asian economies.
- Risk premia and interest rates rose.
- Stock prices fell as foreign investors sold assets and pulled their capital out.
- Falling stock prices reduced the value of collateral used for bank loans, increasing default rates, which exacerbated the crisis.
- Capital outflows depressed exchange rates.

12.3) Interest-rate Differentials

→ Data on the SE Asian Crisis

	exchange rate % change from 7/97 to 1/98	***stock market % change from 7/97 to 1/98***	***nominal GDP % change 1997-98***
Indonesia	-59.4%	-32.6%	-16.2%
Japan	-12.0%	-18.2%	-4.3%
Malaysia	-36.4%	-43.8%	-6.8%
Singapore	-15.6%	-36.0%	-0.1%
S. Korea	-47.5%	-21.9%	-7.3%
Taiwan	-14.6%	-19.7%	n.a.
Thailand	-48.3%	-25.6%	-1.2%
U.S.	n.a.	2.7%	2.3%

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12.4) Arguments for Two Exch. Rs

➔ Floating vs. Fixed Exchange Rates

Argument for floating rates:

– allows monetary policy to be used to pursue other goals (stable growth, low inflation).

Arguments for fixed rates:

– avoids uncertainty and volatility, making international transactions easier.

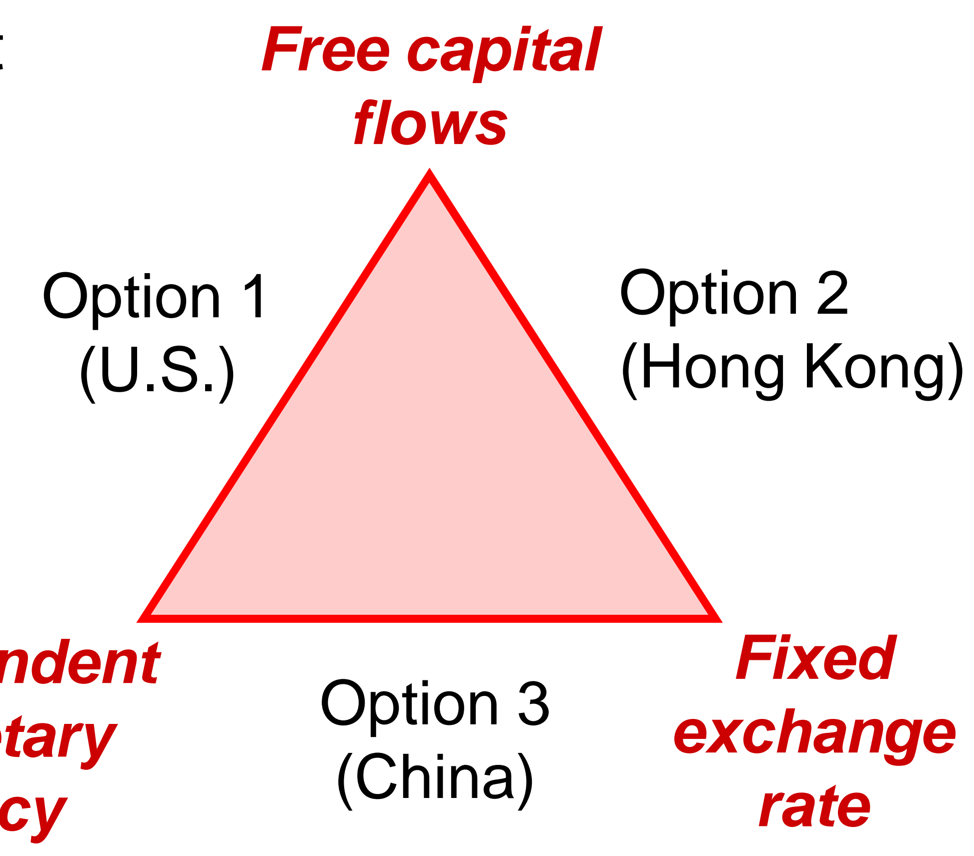
– disciplines monetary policy to prevent excessive money growth & hyperinflation.

12.4) Arguments for Two Exch. Rs

➔ The Impossible Trinity

A nation cannot have free capital flows, independent monetary policy, and a fixed exchange rate simultaneously.

A nation must choose one side of this triangle and give up the opposite corner.



12.4) Arguments for Two Exch. Rs

➔ CASE: The Chinese Currency Controversy

- 1995-2005: China fixed its exchange rate at 8.28 yuan per dollar, and restricted capital flows.
- Many observers believed that the yuan was significantly undervalued, as China was accumulating large dollar reserves.
- U.S. producers complained that China's cheap yuan gave Chinese producers an unfair advantage.
- President Bush asked China to let its currency float; Others in the U.S. wanted tariffs on Chinese goods.

12.4) Arguments for Two Exch. Rs

➔ CASE: The Chinese Currency Controversy

- If China lets the yuan float, it may indeed appreciate.
- However, if China also allows greater capital mobility, then Chinese citizens may start moving their savings abroad.
- Such capital outflows could cause the yuan to depreciate rather than appreciate.

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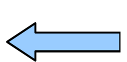
- Deriving the aggregate demand curve 

12.5) Deriving the AD Curve

➔ Mundell-Fleming and the *AD* Curve

- So far in M-F model, ***P*** has been fixed.
- Next: to derive the *AD* curve, consider the impact of a change in ***P*** in the M-F model.
- We now write the M-F equations as:

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

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

*(Earlier in this chapter, **P** was fixed, so we could write **NX** as a function of **e** instead of ε.)*

12.5) Deriving the AD Curve

➔ Deriving the *AD* Curve

Why *AD* curve has negative slope:

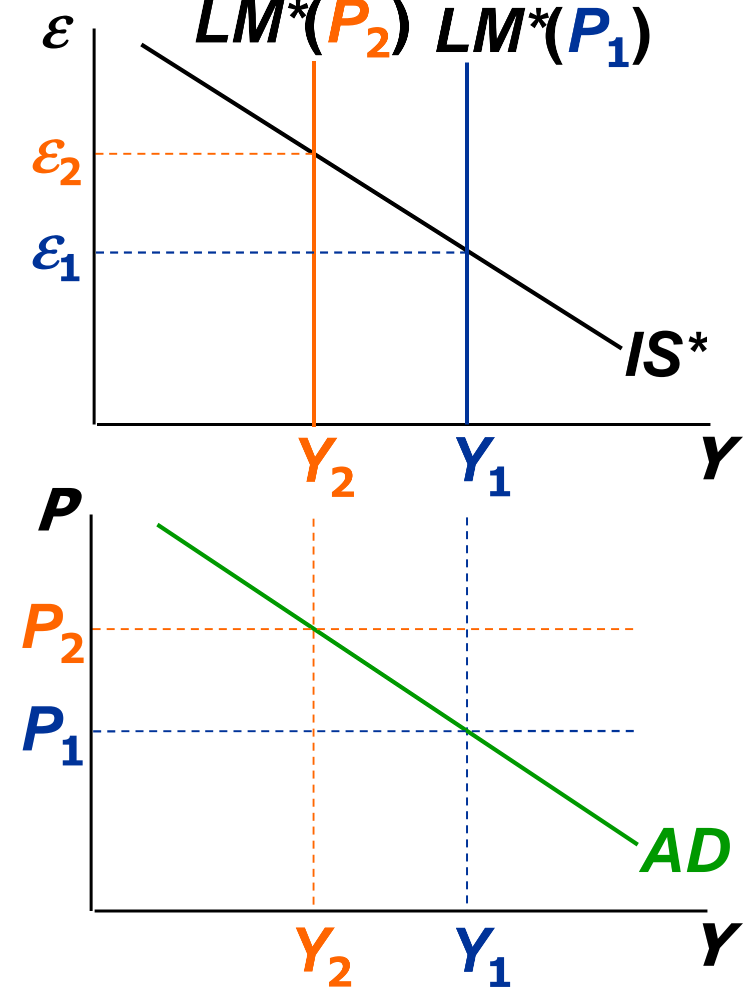
$\uparrow P \Rightarrow \downarrow (M/P)$

$\Rightarrow$ *LM* shifts left

$\Rightarrow \uparrow \varepsilon$

$\Rightarrow \downarrow NX$

$\Rightarrow \downarrow Y$



12.5) Deriving the AD Curve

➔ From the Short Run to the Long Run

If $Y_1 < \overline{Y}$,
then there is downward pressure on prices.

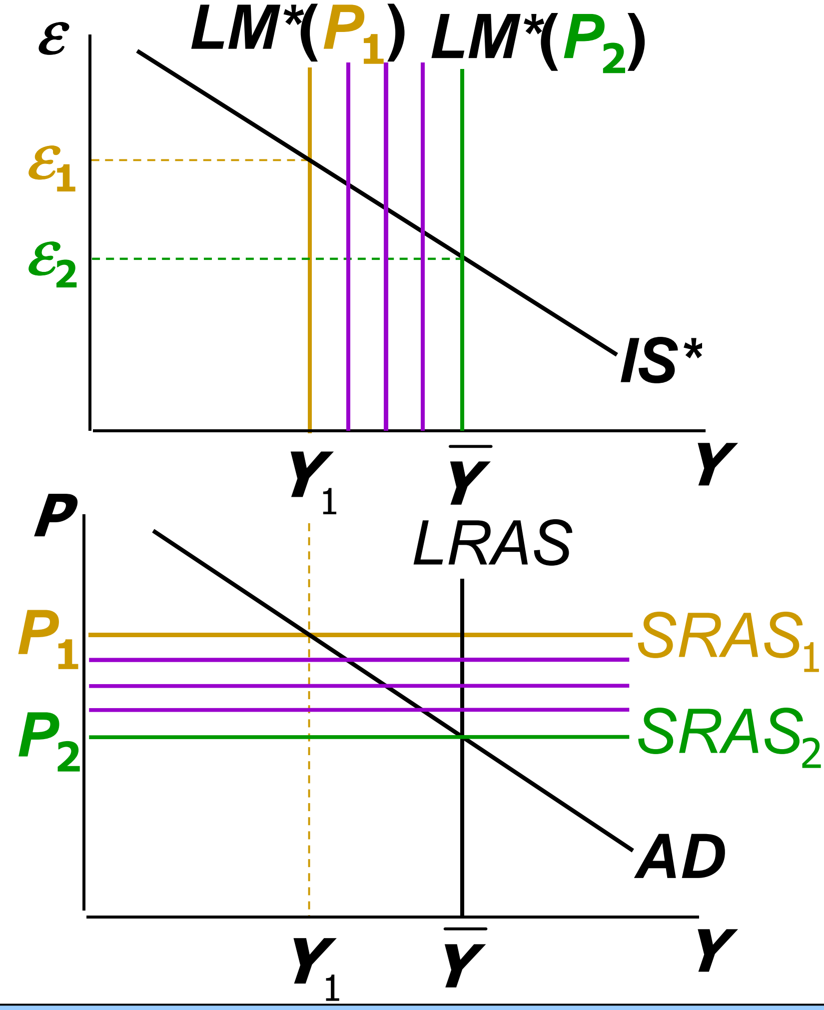
Over time, P will move down, causing

$(M/P)\uparrow$

$\varepsilon\downarrow$

$NX\uparrow$

$Y\uparrow$



12.5) Deriving the AD Curve

➔ Large: Between Small and Closed

- Many countries – including the U.S. – are neither closed nor small open economies.
- A large open economy is between the polar cases of closed & small open.
- Consider a monetary expansion:
  - Like in a closed economy, $\Delta \boldsymbol{M} > 0 \Rightarrow \downarrow \boldsymbol{r} \Rightarrow \uparrow \boldsymbol{I}$ (though not as much)
  - Like in a small open economy, $\Delta \boldsymbol{M} > 0 \Rightarrow \downarrow \varepsilon \Rightarrow \uparrow \boldsymbol{NX}$ (though not as much)

Economic Text:

→The time bomb at the heart o Europe

1.Summarize the text in a few sentences.

2.What are the weaknesses of the French economy?

3. What makes it difficult for the French government to implement necessary reforms though it would have enough political sway?

4. Why is a healthy economy in France so important for the Euro(pean project)?

5. What is meant with the phrase ‚You cannot defy economics for long‘?

Chapter Summary

1. Mundell-Fleming model
   - the IS-LM model for a small open economy.
   - takes ***P*** as given.
   - can show how policies and shocks affect income and the exchange rate.
2. Fiscal policy
   - affects income under fixed exchange rates, but not under floating exchange rates.

Chapter Summary

3. Monetary policy
   - affects income under floating exchange rates.
   - under fixed exchange rates, monetary policy is not available to affect output.
4. Interest rate differentials
   - exist if investors require a risk premium to hold a country's assets.
   - An increase in this risk premium raises domestic interest rates and causes the country's exchange rate to depreciate.

Chapter Summary

5. Fixed vs. floating exchange rates
   - Under floating rates, monetary policy is available for can purposes other than maintaining exchange rate stability.
   - Fixed exchange rates reduce some of the uncertainty in international transactions.