The Open Economy Revisited: The Mundell–Fleming Model and the Exchange-Rate Regime

Chapter 15

Econ 313 – Intermediate Macroeconomics

University of Tennessee, Knoxville

July 2, 2026

In This Chapter, You Will Learn:

- About the Mundell–Fleming model (*IS–LM* for the small open economy)
- About causes and effects of interest rate differentials
- Arguments for fixed versus floating exchange rates
- How to derive the aggregate demand curve for a small open economy

The Mundell–Fleming 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



Robert Mundell
(1932–2021)
Nobel laureate, 1999.
Wikimedia, CC BY-SA 3.0

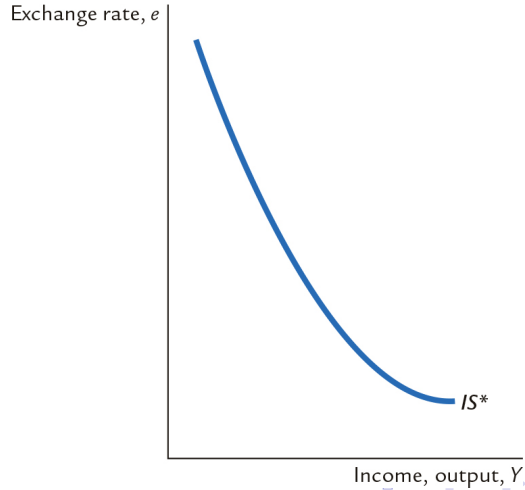
The IS^* curve: Goods market equilibrium

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

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

Intuition for the slope:

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

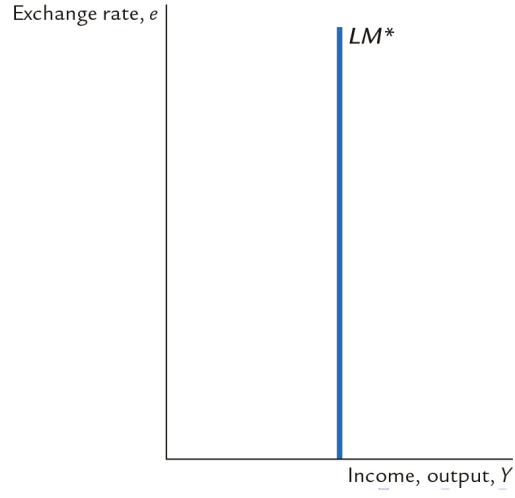


The LM^* curve: Money market equilibrium

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

The LM^* curve:

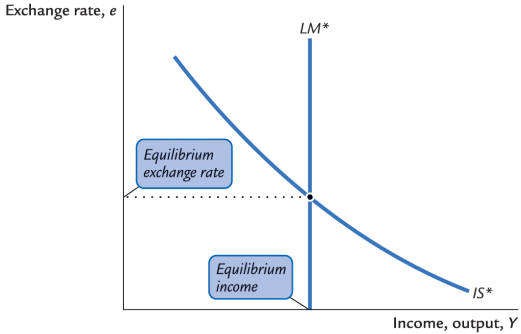
- is drawn for a given value of r^*.
- is vertical because, given r^*, there is only one value of Y that equates money demand with supply, regardless of e.



Equilibrium in the Mundell–Fleming model

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

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



Floating and fixed exchange rates

- 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:
  - in a floating-exchange-rate system
  - in a fixed-exchange-rate system



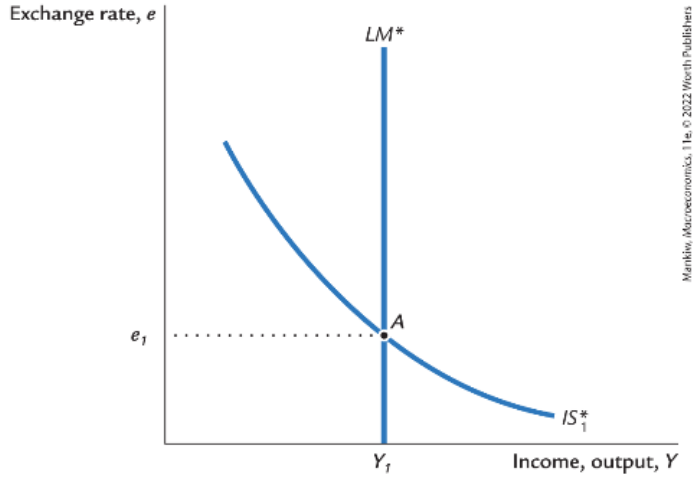
Gold Room, Mount Washington Hotel — where the *Bretton Woods* agreement (July 1944) set up the postwar fixed-exchange-rate system that lasted until 1971.

Wikimedia, CC BY-SA

Fiscal policy under floating exchange rates

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

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



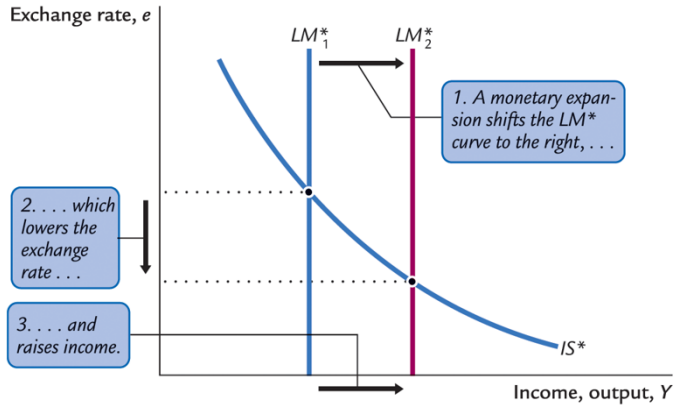
Lessons about fiscal policy

- 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.

Monetary policy under floating exchange rates

An increase in M shifts LM^* right because Y must rise to restore equilibrium in the money market.

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



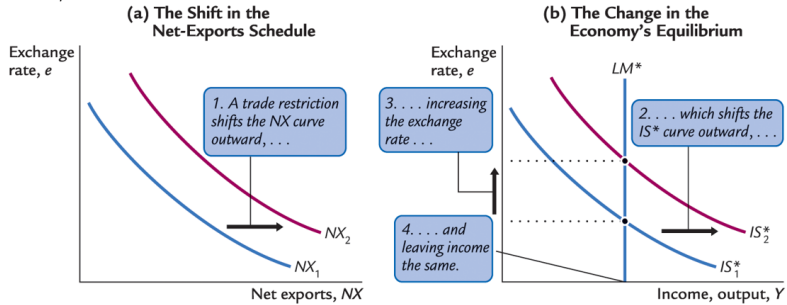
Lessons about monetary policy

- Monetary policy affects output by affecting the components of aggregate demand:
  - closed economy: $\uparrow M \rightarrow \downarrow r \rightarrow \uparrow I \rightarrow \uparrow Y$
  - small open economy: $\uparrow M \rightarrow \downarrow e \rightarrow \uparrow NX \rightarrow \uparrow Y$
- Expansionary monetary policy does not raise world aggregate 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.

Trade policy under floating exchange rates

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

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



Lessons about trade policy under floating exchange rates, part 1

- 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."

Lessons about trade policy under floating exchange rates, part 2

- 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.

Fixed exchange rates

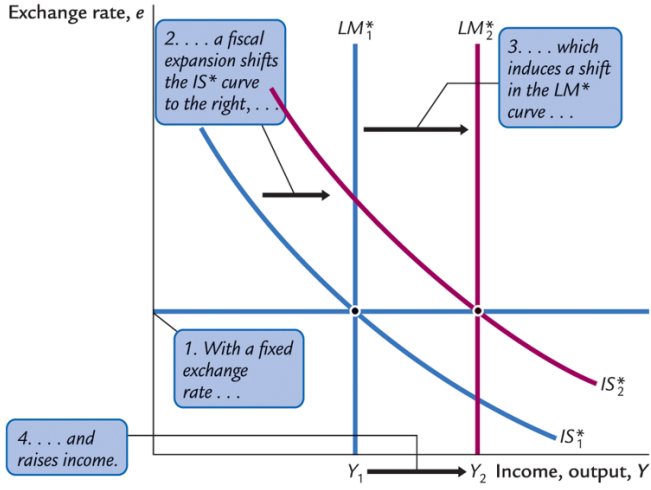
- Under fixed exchange rates, the central bank stands ready to buy or sell the domestic currency for foreign currency at a predetermined rate.
- In the Mundell–Fleming model, the central bank shifts the LM^* curve as required to keep e at its preannounced rate.
- This system fixes the nominal exchange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

Fiscal policy under fixed exchange rates, part 1

Under floating rates, a fiscal expansion would raise e.

To keep e from rising, the central bank must sell domestic currency, which increases M and shifts LM^* to the right.

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



Fiscal policy under fixed exchange rates, part 2

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

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

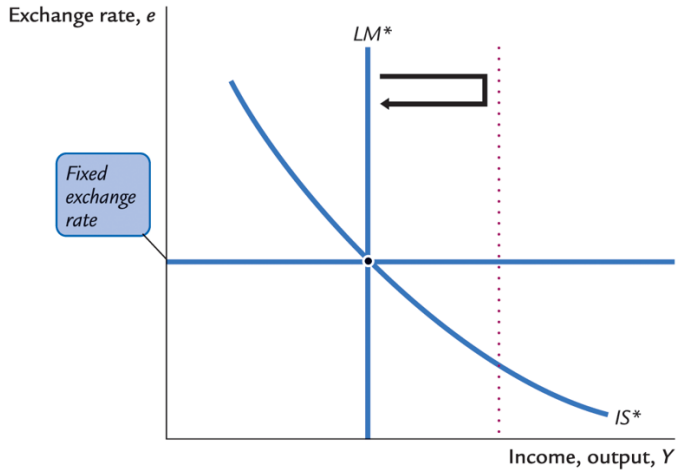
Recall: In a closed economy, fiscal policy can be effective at changing output.

Monetary policy under fixed exchange rates, part 1

An increase in M would shift LM^* right and reduce e.

To prevent the fall in e, the central bank must buy domestic currency, which reduces M and shifts LM^* back left.

Results:
$\Delta e = 0$, $\Delta Y = 0$



Monetary policy under fixed exchange rates, part 2

Under floating rates, monetary policy is very effective at changing output.

Under fixed rates, monetary policy cannot be used to affect output.

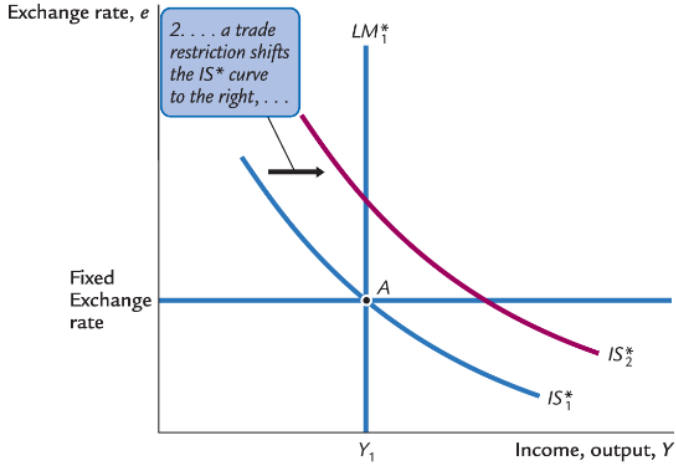
Recall: In a closed economy, monetary policy is effective at changing output.

Trade policy under fixed exchange rates, part 1

A restriction on imports puts upward pressure on e.

To keep e from rising, the central bank must sell domestic currency, which increases M and shifts LM^* to the right.

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



Trade policy under fixed exchange rates, part 2

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 goods to domestic goods.

Summary of policy effects in the Mundell–Fleming model

Type of exchange-rate regime:

	Floating			Fixed		
Policy	Y	e	NX	Y	e	NX
Fiscal expansion	0	↑	↓	↑	0	0
Mon. expansion	↑	↓	↑	0	0	0
Import restriction	0	↑	0	↑	0	↑

▸ Worked example

Interest rate differentials

Two reasons why r may differ from r^*:

- **Country risk**:
  There is a 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.

Differentials in the Mundell–Fleming model

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

where θ (Greek letter *theta*) is a risk premium, assumed to be exogenous.

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

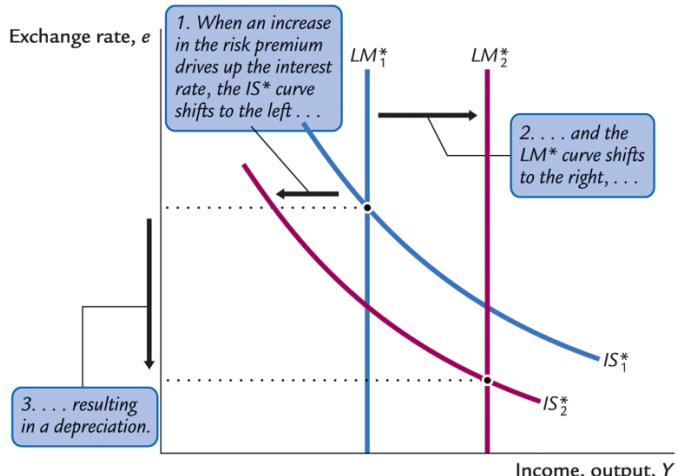
$$Y = C(Y - T) + I(r^* + \theta) + G + NX(e)$$
$$M/P = L(r^* + \theta, Y)$$

The effects of an increase in θ, part 1

IS^* shifts left because
$\uparrow \theta \rightarrow \uparrow r \rightarrow \downarrow I$

LM^* shifts right because
$\uparrow \theta \rightarrow \uparrow r \rightarrow \downarrow (M/P)^d$,
so Y must rise to restore money market equilibrium.

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



The effects of an increase in θ, part 2

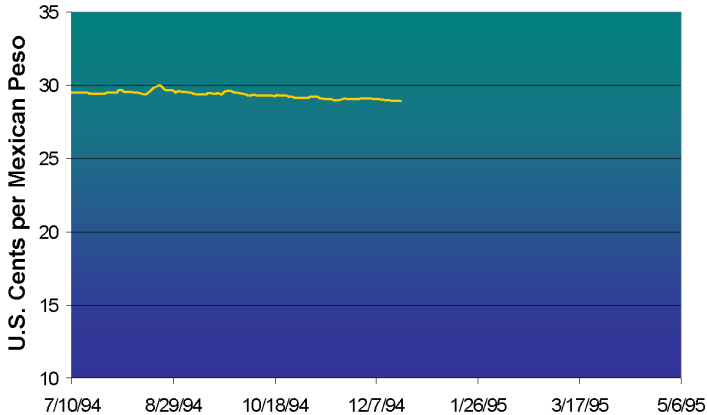
- The fall in e is intuitive:
  An increase in country risk or an expected depreciation makes holding the country's currency less attractive.
  Note: An expected depreciation is a self-fulfilling prophecy.
- The increase in Y occurs because
  - our vertical LM curve shifted out.
  - income might not go up in reality!

Why income may not rise

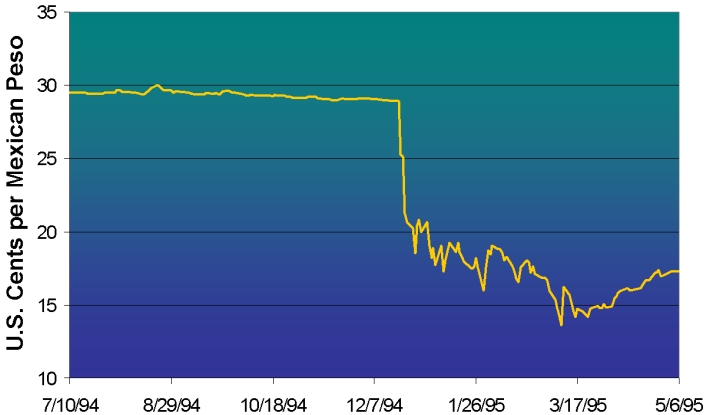
- The central bank may try to prevent the depreciation by reducing the money supply.
- The depreciation might boost the price of imports enough to increase the price level (which would reduce the real money supply).
- Consumers might respond to the increased risk by holding more money.

Each of the above would shift LM^* leftward.

CASE STUDY: The Mexican peso crisis, part 1



CASE STUDY: The Mexican peso crisis, part 2



The Peso crisis didn't hurt just Mexico

- U.S. goods became expensive to Mexicans, so:
  - U.S. firms lost revenue.
  - Hundreds of bankruptcies occurred along the U.S.–Mexico border.
- Mexican assets lost value (measured in dollars):
  - Reduced wealth of millions of U.S. citizens

Understanding the crisis, part 1

- 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. ($\Delta r^* > 0$)

Understanding the crisis, part 2

- These events put downward pressure on the peso.
- Mexico's central bank had repeatedly promised foreign investors it would not allow the peso's value to fall, so it bought pesos and sold dollars to prop up the peso exchange rate.
- Such a move requires that the central bank has adequate reserves of the foreign currency.
  Did Mexico's central bank have these adequate reserves of dollars?

Dollar reserves of Mexico's central bank

Date	Reserves
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.

The disaster

- December 20: Mexico devalues the peso by 13 percent (fixes e at 25 cents instead of 29 cents).
- Investors are *SHOCKED!* They had no idea Mexico was running out of reserves.
- $\uparrow \theta$, investors dump their Mexican assets and pull their capital out of Mexico.
- December 22: The central bank's reserves are nearly gone. It abandons the fixed rate and lets e float.
- In a week, e falls another 30 percent.

The rescue package

- 1995: The United States and the IMF set up a $50 billion line of credit to provide loan guarantees to Mexico's government.
- This helped restore confidence in Mexico and reduced the risk premium.
- After a hard recession in 1995, Mexico began a strong recovery from the crisis.

CASE STUDY: The Southeast Asian crisis, 1997–1998

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

Data on the SE Asian crisis

	Exchange rate % change	Stock market % change	Nominal GDP % change
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
United States	n.a.	2.7	2.3

Floating versus fixed exchange rates

Argument for floating rates:

- allow monetary policy to be used to pursue other goals (stable growth, low inflation)

Arguments for fixed rates:

- avoid uncertainty and volatility, making international transactions easier
- discipline monetary policy to prevent excessive money growth and hyperinflation

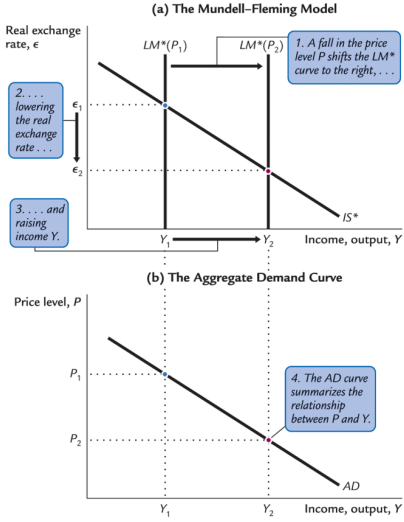
Currency boards and dollarization

Some countries, such as Argentina in the 1990s, established a **currency board** to avoid speculative attacks on their currency.

Once a currency board is adopted, the next step a country might consider is outright **dollarization**:

- Typically happens in high-inflation countries
- Domestic government does not control how much money it can print anymore.

The impossible trinity



CASE STUDY: The Chinese currency controversy

- 1995–2005: China fixed its exchange rate at 8.28 yuan per dollar and restricted capital flows.
- Many observers believed the yuan was significantly undervalued. U.S. producers complained the cheap yuan gave Chinese producers an unfair advantage.
- President Bush called on China to let its currency float; others wanted tariffs on Chinese goods.
- July 2005: China began to allow gradual changes in the yuan/dollar rate. By June 2013, the yuan had appreciated 35 percent.

Mundell–Fleming and the *AD* curve

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

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

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

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

Deriving the *AD* curve

Why the *AD* curve has a negative slope:

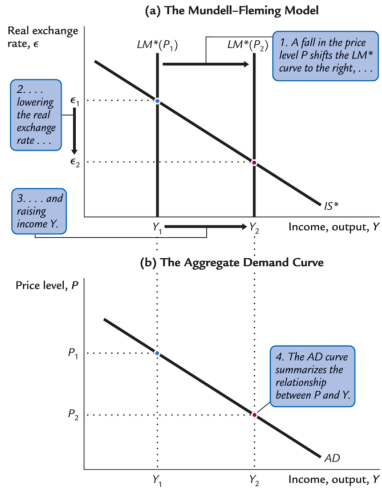
$\uparrow P \rightarrow \downarrow (M/P)$

$\rightarrow LM$ shifts left

$\rightarrow \uparrow \varepsilon$

$\rightarrow \downarrow NX$

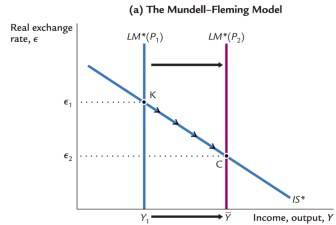
$\rightarrow \downarrow Y$

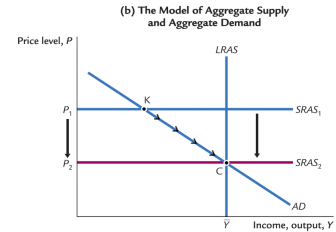


From the short run to the long run

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

Over time, P will move down, causing
$(M/P) \uparrow$
$\varepsilon \downarrow$
$NX \uparrow$
$Y \uparrow$





Large: Between small and closed

- Many countries—including the United States—are neither closed nor small open economies.
- A large open economy is between the polar cases of closed and small open.
- Consider a monetary expansion:
  - As in a closed economy,
    $\uparrow M \rightarrow \downarrow r \rightarrow \uparrow I$ (though not as much)
  - As in a small open economy,
    $\uparrow M \rightarrow \downarrow \varepsilon \rightarrow \uparrow NX$ (though not as much)

Chapter Summary, Part 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.
- Fiscal policy:
  - affects income under fixed exchange rates but not under floating exchange rates.

Chapter Summary, Part 2

- Monetary policy:
  - affects income under floating exchange rates.
  - Under fixed exchange rates, monetary policy is not available to affect output.
- 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, Part 3

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

Appendix: Mundell–Fleming — fiscal shock walkthrough

Small open economy, perfect capital mobility, world rate $r^* = 5\%$.

- IS^*: $Y = C(Y - T) + I(r^*) + G + NX(e)$
- LM^*: $M/P = L(r^*, Y)$

Initial equilibrium: $Y^* = 1000$, exchange rate $e^* = 1$.
Shock: Congress raises G by 100 (an "IS star" shift to the right).
Two very different outcomes depending on exchange-rate regime...

back

Appendix — fiscal expansion, **floating** rates

Step 1. IS^* shifts right. Would raise Y if e stayed constant.
Step 2. Higher Y raises money demand, which would raise r. But r can't exceed $r^* = 5\%$ (capital rushes in). Instead: capital inflow $\Rightarrow$ exchange rate e appreciates ($e \uparrow$).
Step 3. Higher e makes exports expensive, imports cheap: $NX \downarrow$. This shifts IS^* back to the left. Appreciation continues until Y is back where it started.

Bottom line: $\Delta Y = 0$, $\Delta e = +$, $\Delta NX = -\Delta G$.
Fiscal expansion *fully crowded out* through the exchange rate.

The fiscal stimulus becomes a trade deficit, not extra output. This is the "twin deficits" story — big U.S. budget deficits in the 1980s and 2000s coincided with the biggest trade deficits.

back

Appendix — fiscal expansion, **fixed** rates

e is pegged. The central bank must *do whatever it takes* to keep e constant.
Step 1. IS^* shifts right, would raise Y. Would also cause e to appreciate (as before).
Step 2. To prevent appreciation, central bank *buys foreign currency* $\Rightarrow$ M expands $\Rightarrow$ LM^* shifts right.
Step 3. Both curves shift right by the same amount. New equilibrium at higher Y, same e.

Bottom line: $\Delta Y = +$ (full multiplier), $\Delta e = 0$, $\Delta NX = 0$.
Fiscal expansion is *fully effective* under fixed rates.

Under a peg, monetary policy is not free — it has to defend the peg. So the trade-off is reversed:

- Floating: monetary policy potent, fiscal policy weak.
- Fixed: fiscal policy potent, monetary policy weak.

This is the "Mundell trilemma" in action.

back