

Ch 12. The Open-Economy Revisited: The Mundell-Fleming Model

Macroeconomics, 7th ed.

N. Gregory Mankiw

Key Concepts

- the Mundell-Fleming model
(*IS-LM* for the small open economy)
- causes and effects of interest rate differentials
- arguments for fixed vs. 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

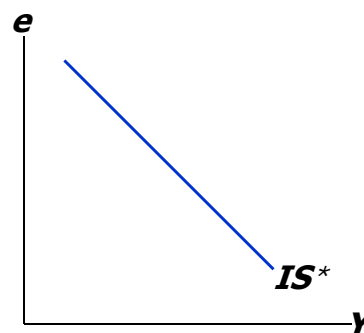
The IS^* curve: Goods market equilibrium

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

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

Intuition for the slope:

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

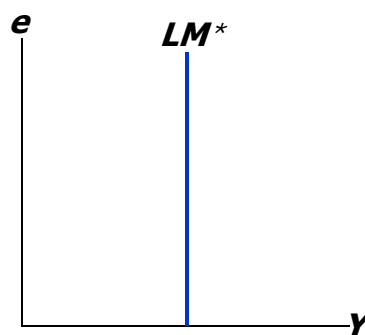


The LM^* curve: Money market eq'm

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

The LM^* curve:

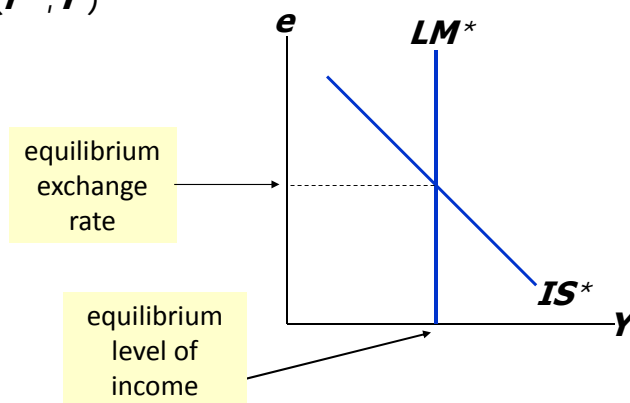
- is drawn for a given value of r^* .
- is vertical because: given r^* , there is only one value of Y that equates money demand with supply, regardless of e .



Equilibrium in the Mundell-Fleming model

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

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



Floating & 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 –
 - first, in a floating exchange rate system
 - then, in a fixed exchange rate system

Fiscal policy under floating exchange rates

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

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

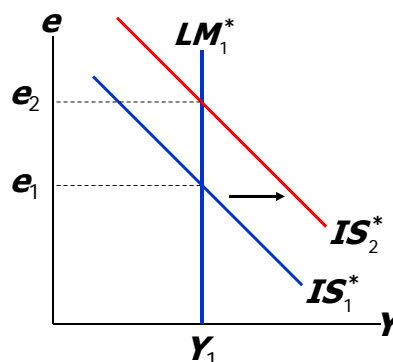
At any given value of e ,
a fiscal expansion
increases Y ,
shifting IS^* to the right.

Results:

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

Explain in words!

What happens to the Composition of Y ?



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.
 - In SOE, there is “complete” crowding out.

Monetary policy under floating exchange rates

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

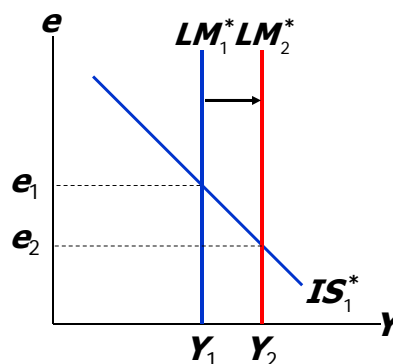
$$M/P = L(r^*, Y)$$

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

Results:

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

What happens to the Composition of Y?



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.
- Called a “Beggars thy neighbor” policy

Trade policy under floating exchange rates

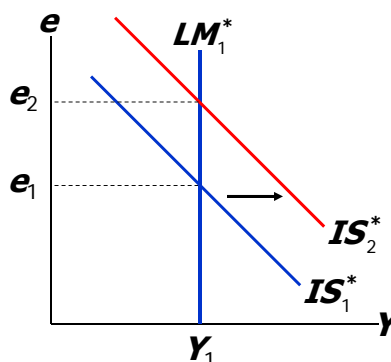
$$Y = C(Y - T) + I(r^*) + G + NX(e)$$

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

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

Results:

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



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.”

Lessons about trade policy, *cont.*

- 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.

Central bank intervention under fixed exchange rates

- When the exchange rate falls below the target level, the central bank intervenes to support the domestic currency.
- The CB sells foreign reserves for domestic currency.*
- The amount of money supply circulating in the economy declines.
- This shifts the LM curve to the left and the exchange rate moves up to the target level.

- Do the opposite case.

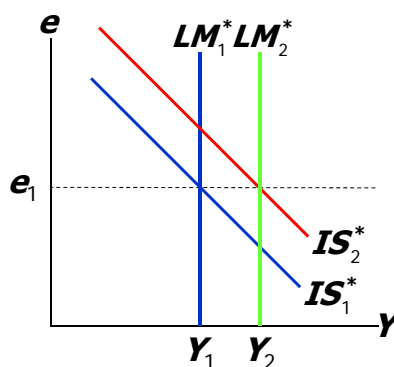
Fiscal policy under fixed exchange rates

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

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

Results:

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



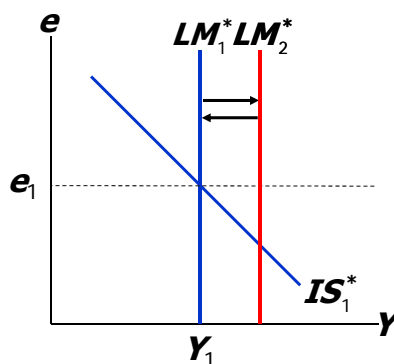
Monetary policy under fixed exchange rates

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

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

Results:

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

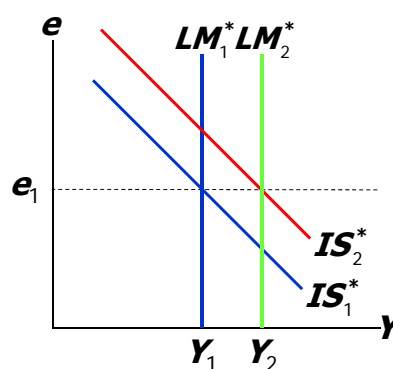


Trade policy under fixed exchange rates

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.



Summary of policy effects in the Mundell-Fleming model

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

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.

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:

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

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

The effects of an increase in θ

IS^* shifts left, because

$$\uparrow \theta \Rightarrow \uparrow r \Rightarrow \downarrow I$$

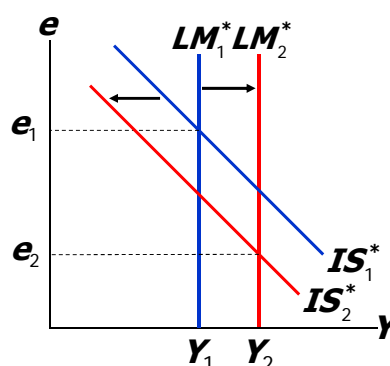
LM^* shifts right, because

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

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

Results:

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



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).

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.

Floating vs. fixed exchange rates

Argument for floating rates:

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

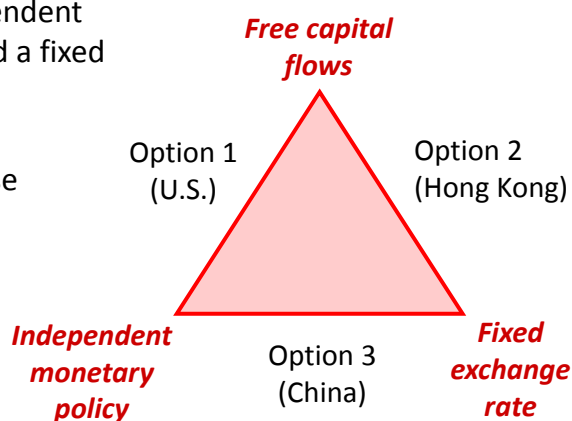
Arguments for fixed rates:

- avoids uncertainty and volatility, making international transactions easier.
- disciplines monetary policy to prevent excessive money growth & hyperinflation.

Trilemma or 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.



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:

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

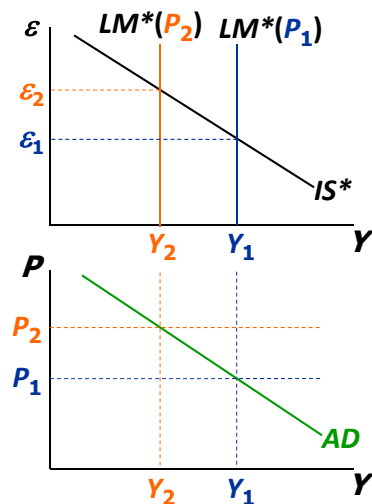
$$(LM^*) \quad M/P = L(r^*, Y)$$

(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 AD curve has negative slope:

$\uparrow P \Rightarrow \downarrow (M/P)$
 $\Rightarrow LM$ shifts left
 $\Rightarrow \uparrow \varepsilon$
 $\Rightarrow \downarrow NX$
 $\Rightarrow \downarrow Y$

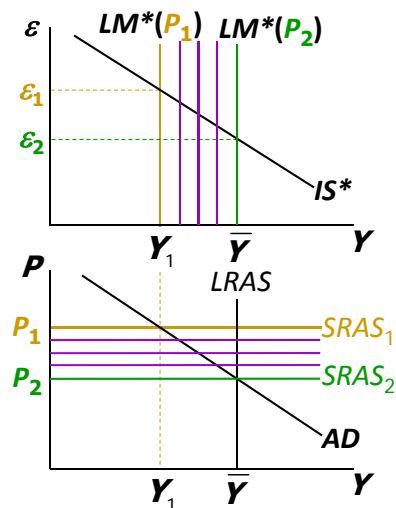


From the short run to the long run

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

Over time, P will
move down, causing

$(M/P) \uparrow$
 $\varepsilon \downarrow$
 $NX \uparrow$
 $Y \uparrow$

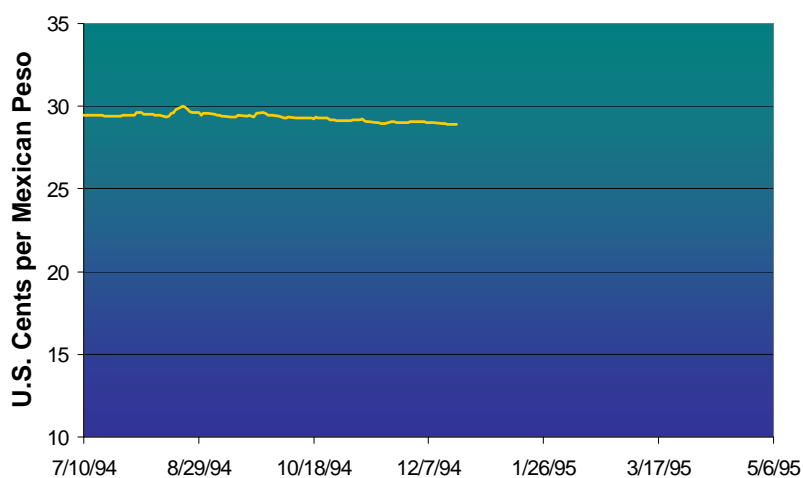


Large: Between small and closed

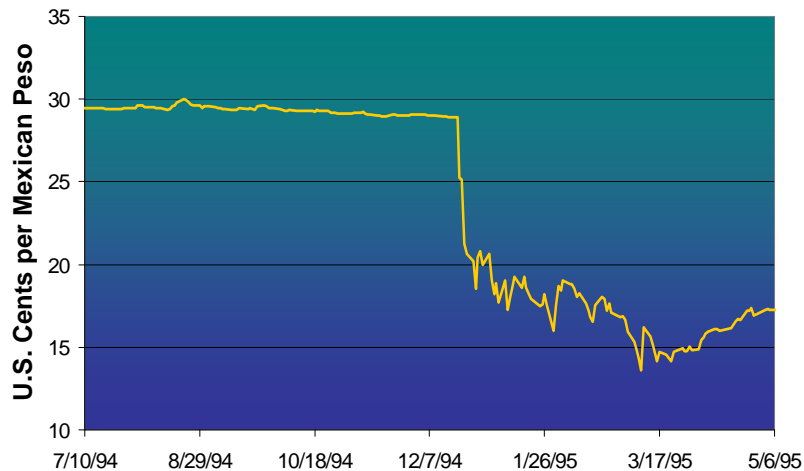
- Many countries – including the U.S. – are neither closed nor small open economies.
- A large open economy is between the polar cases of closed & small open.
- Consider a monetary expansion:
 - Like in a closed economy,
 $\Delta M > 0 \Rightarrow \downarrow r \Rightarrow \uparrow I$ (though not as much)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

CASE STUDY:

The Mexican peso crisis



CASE STUDY:
The Mexican peso crisis



The Peso crisis didn't just hurt Mexico

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

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

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 have adequate reserves of dollars.
Did it?

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.

💣 *the disaster* 💣

- Dec. 20: Mexico devalues the peso by 13%
(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.
- Dec. 22: central bank's reserves nearly gone. It abandons the fixed rate and lets e float.
- In a week, e falls another 30%.

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.

CASE STUDY:

The Southeast Asian crisis 1997-98

- 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 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.

Data on the SE Asian crisis

	<i>exchange rate % change from 7/97 to 1/98</i>	<i>stock market % change from 7/97 to 1/98</i>	<i>nominal GDP % change 1997-98</i>
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%

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 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.

CASE STUDY:
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.

Problem 12-1

- Use the Mundell-Fleming to predict what would happen to aggregate income, the exchange rate, and the trade balance under floating exchange rates in response to each of the following shocks
 - a. A fall in consumer confidence about future induces consumers to spend less and save more
 - b. The introduction of a stylish line of Toyotas makes some consumers prefer foreign cars over domestic cars
 - c. The introduction of automatic teller machine reduces the demand for money.

Problem 12-1a

- Repeat the question in the previous slide assuming the country maintains a fixed exchange rate.

Problem 12-2

- A small open economy with a floating exchange rate is in recession with balanced trade. If policy makers want to reach full employment while maintaining balanced trade, what combination of monetary and fiscal policy should they choose?

Problem 12-3

- The world interest rate r^* may change.
 - a. What might cause the world interest rate to rise?
 - b. In the Mundell-Fleming model with a floating exchange rate, what happens to aggregate income, the exchange rate, and the trade balance when the world interest rate rises?
 - c. Repeat (b) for a fixed exchange rate.

Problem 12-4

- Business executives and policymakers are often concerned about the competitiveness of American industry. (the ability of US industries to sell their goods profitably in world markets).
 - a. How would a change in the nominal interest rate affect competitiveness in the short run when prices are sticky?
 - b. Suppose that you wanted to make domestic industries more competitive but did not want to alter aggregate income. According to the MF model, what combination of monetary and fiscal policies should you pursue?

The Euro Area Crisis

- The crisis consists of four distinct and mutually reinforcing crises
 - A. A Design crisis
 - B. A Fiscal crisis
 - C. A Competitiveness crisis
 - D. A Banking crisis

Read the article and summarize each of the 4 aspects using 100-200 words.

Reading: J.F. Kirkegaard (PIIE) "The Euro Area Crisis: Origin, Current Status, and European and US Responses" (Congressional Testimony)

<http://www.iie.com/publications/print.cfm?researchid=1969&doc=int>