Open Economy IS/LM Model: Floating Exchange Rates

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Equilibrium: Outline

We need to clear

1. the goods market: IS
2. the money market: LM
3. the foreign exchange market: UIP

Endogenous variables: Y, i, E

We take as given:

1. P and P^* (short run assumption)
2. M: controlled by the Fed
3. E^e: the expected future exchange rate

Equilibrium: Equations

$$IS: Y = C(Y-T) + I(Y,i) + G + NX(\underset{-,+,-}{Y, Y^*, \varepsilon}) \tag{1}$$

$$LM: M/P = YL(i) \tag{2}$$

$$UIP: E = \frac{1+i}{1+i^*} E^e \tag{3}$$

Digression

What would happen if capital were completely immobile?

Modified IS Curve

We combine IS and UIP into a new IS curve

- It clears goods and FX markets

Then we have 2 equilibrium conditions again

The equilibrium graph looks a lot like a closed economy

The main difference:

- additional variables shift IS (Y^* and what's in the real exchange rate: E, E^e, i^*).

Modified IS Curve

Start from IS

$$Y = C(Y-T) + I(Y,i) + G + NX(\underset{-,+,-}{Y, Y^*, \varepsilon}) \tag{4}$$

Use UIP to substitute out the real exchange rate

$$\varepsilon = EP/P^* \tag{5}$$

$$= \frac{1+i}{1+i^*}\frac{P}{P^*}E^e \tag{6}$$

We can write $NX\left(Y, Y^*, \frac{1+i}{1+i^*}E^e\right)$

- $i \uparrow$ and $E^e \uparrow$ lead to dollar appreciation $(\varepsilon \uparrow)$ and $NX \downarrow$

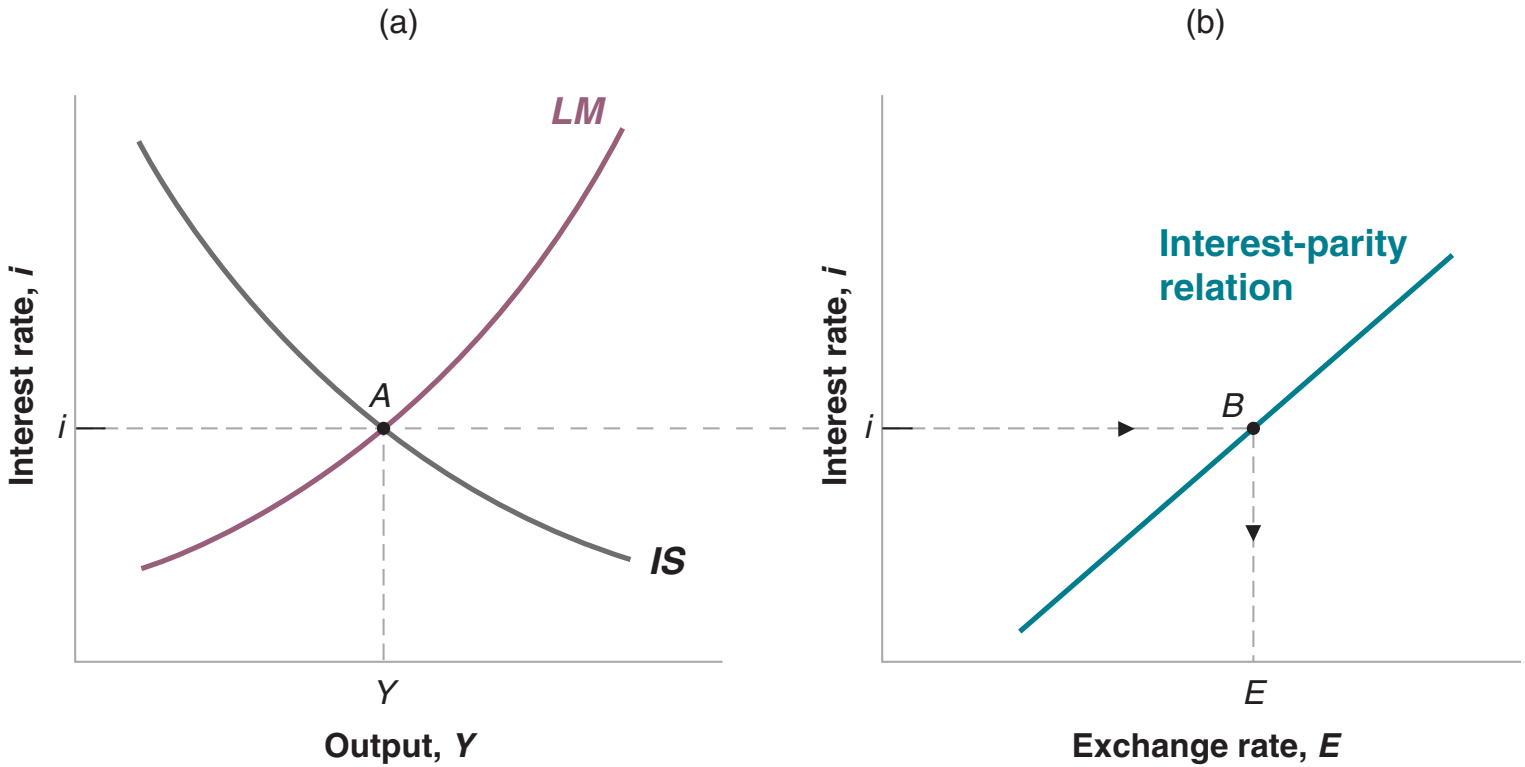
Modified IS Curve

$$IS: Y + C(Y-T) + I(Y,i) + G + NX\left(Y, Y^*, \frac{1+i}{1+i^*}E^e\right) \qquad (7)$$

Properties:

- downward sloping: $r \uparrow \Longrightarrow Y \downarrow$
- shifters: as closed economy *plus* anything that increases NX

IS-LM Graph


(a)
(b)
LM
IS
A
B
i
i
Interest rate, i
Interest rate, i
Interest-parity relation
Y
E
Output, Y
Exchange rate, E

What Has Changed

Relative to a closed economy:

1. the interest rate has an additional effect on IS:
   $i \uparrow \Longrightarrow E \uparrow \Longrightarrow NX \downarrow$
   this is driven by capital mobility (UIP)
   more mobile capital $\Longrightarrow$ flatter IS curve
2. additional shifters of IS: i^*, Y^*, E^e

Model Summary

$$IS: Y = C(Y-T) + I(Y,i) + G + NX\left(Y, Y^*, \frac{1+i}{1+i^*}E^e\right) \quad (8)$$

$$LM: M/P = YL(i) \quad (9)$$

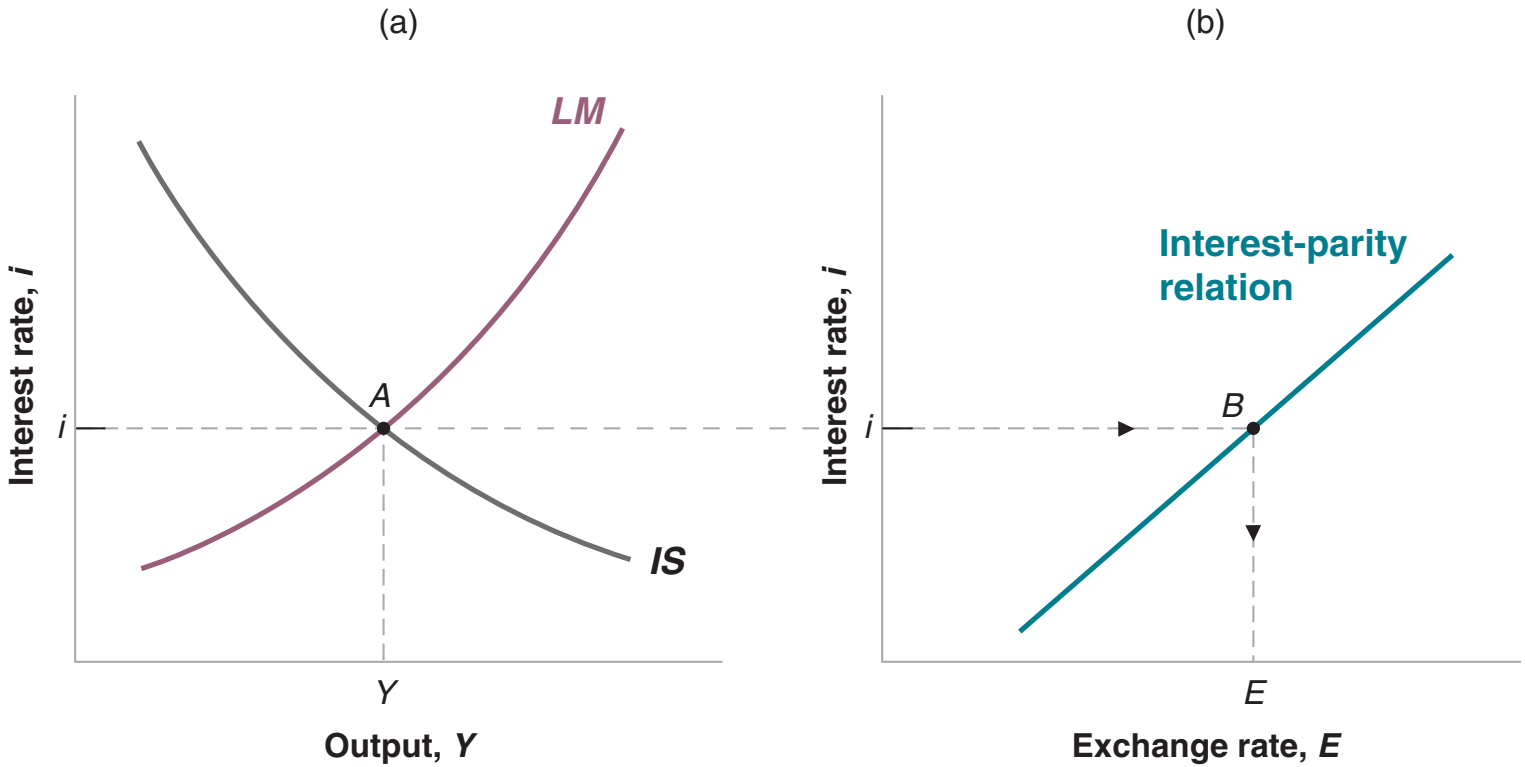
$$UIP: E = \frac{1+i}{1+i^*}E^e \quad (10)$$

Exogenous: P, P^*, Y^*, E^e, G, T

Endogenous: Y, i, E

Analyzing Shocks

Government Spending Rises

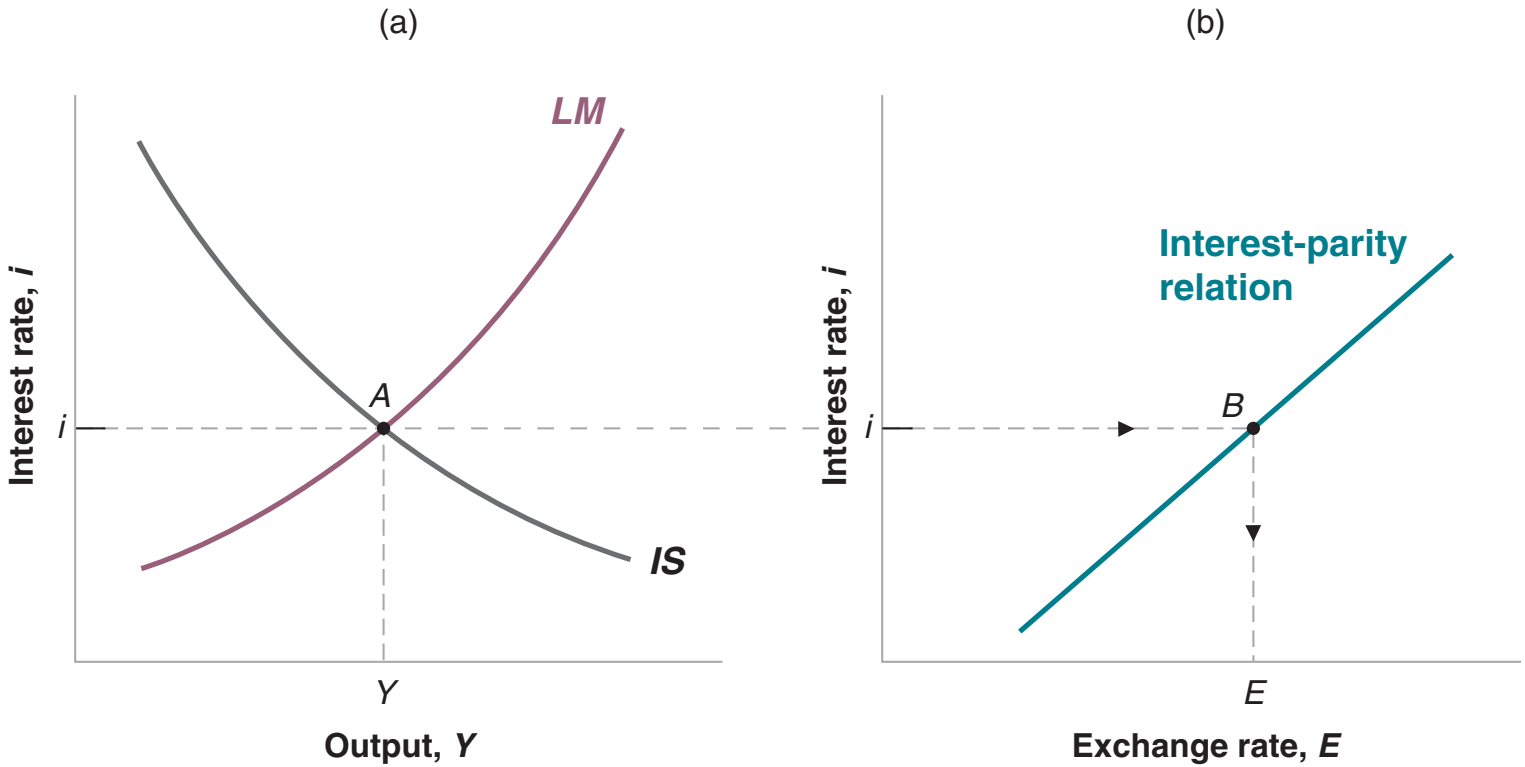


Government Spending Rises

Higher G leads to:

1. higher Y and i
2. capital inflows (attracted by higher i)
3. dollar appreciation $(E \uparrow)$ (due to capital inflows)
4. lower NX (due to higher Y and E)

Monetary Contraction



Monetary Contraction

Lower M leads to:

1. lower Y, but higher i
2. capital inflows
3. dollar appreciation $(E \uparrow)$
4. lower NX (b/c we have capital inflows)

Combining Monetary and Fiscal Policy

	Y	i	NX	E
$G\uparrow$	$\uparrow$	$\uparrow$	$\downarrow$	$\uparrow$
$M\uparrow$	$\uparrow$	$\downarrow$	$\uparrow$	$\downarrow$
Both	$\uparrow$	–	–	–

In principle, monetary and fiscal policy can be used jointly to increase output without affecting the trade balance.

Intuition:

International Spillovers

What are the effects of a

- monetary expansion
- fiscal expansion

on our trade partners?

Policy Coordination

Suppose that Europe is in recession.

Each country has an incentive to get out of its recession by diverting some demand to its own economy

- monetary expansion leads to depreciation

Without coordination:

- all countries expand M
- the net effect on NX is zero
- "competitive devaluations"

Countries need to coordinate on using other policies (e.g. $G \uparrow$).

Trade Restrictions

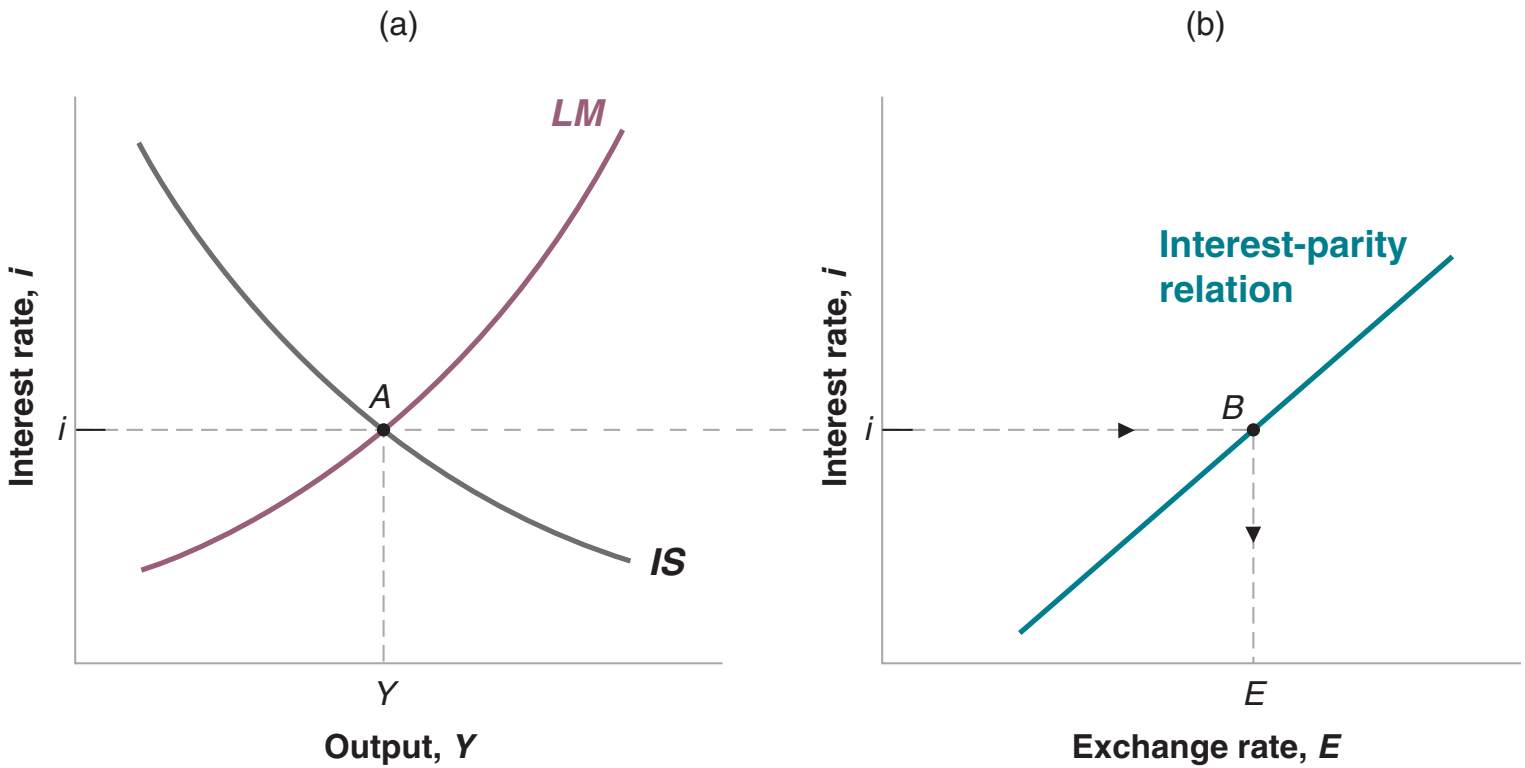
What is the effect of a tariff on imports?

Think of a tariff as improving NX for given (Y, Y^*, ε)

$$Y = C(Y - T) + I(Y, i) + G + NX\left(Y, Y^*, \frac{1+i}{1+i^*}E^e, \tau\right) \qquad (11)$$

It has exactly the same effects as a foreign expansion $(Y^* \uparrow)$.

Trade Restrictions



Result: tariffs work (but only in the short run...)

Reading

Blanchard / Johnson, Macroeconomics, 6th ed., ch. 19, 20