



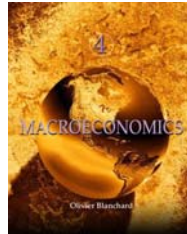
Intermediate Macroeconomics

ECON 302

Professor Yamin Ahmad

Lecture 11: The Small Open Economy

- Mundell-Fleming Model
- Floating vs. Fixed Rates
- Aggregate Demand in the Open Economy
- Interest Rate Parity



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

Note: These lecture notes are incomplete without having attended lectures



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

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The *IS** curve: Goods market eq'm

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

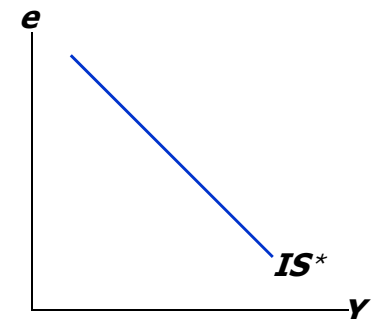
The *IS** curve is drawn for a given value of r^* .

Intuition for the slope:

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

We could derive this using the “Keynesian cross”.

Remember, the *IS* curve incorporates the multiplier effect.



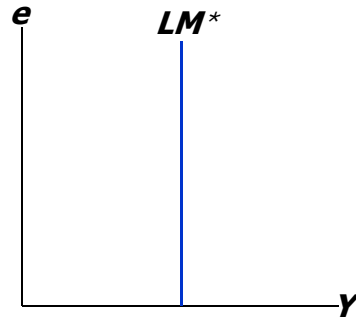
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The LM^* curve: Money market eq'm

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

The LM^* curve

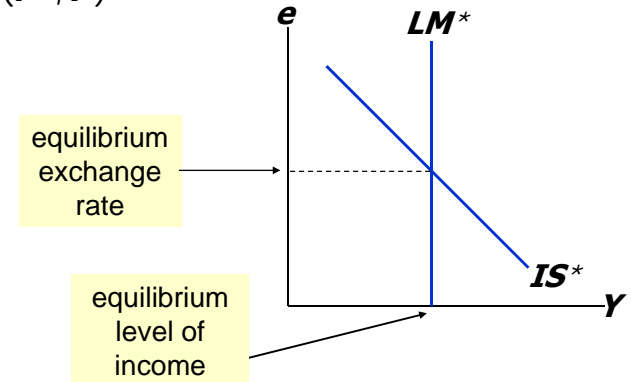
- is drawn for a given value of r^* .
- is vertical because: given r^* , there is only one value of Y that equates money demand with supply, regardless of e .



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

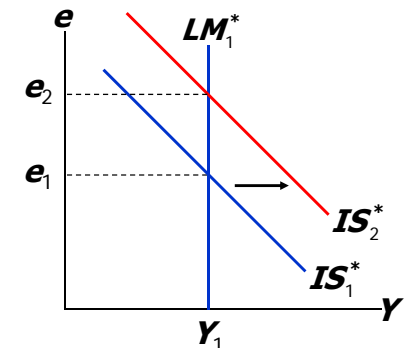
$$Y = C(Y - T) + I(r^*) + G + NX(e)$$

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

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

Results:

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





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.

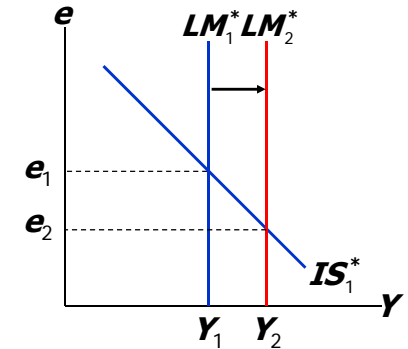


Monetary policy under floating exchange rates

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

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

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



Results:

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



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 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.

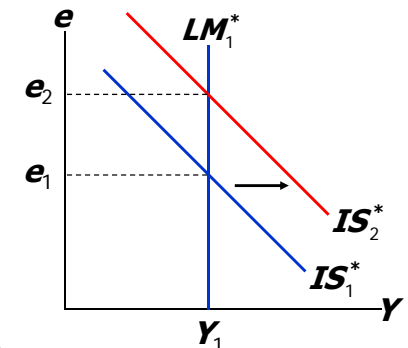


Trade policy under floating exchange rates

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

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

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



Results:

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

NX does not change! Why?



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.”

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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.

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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.

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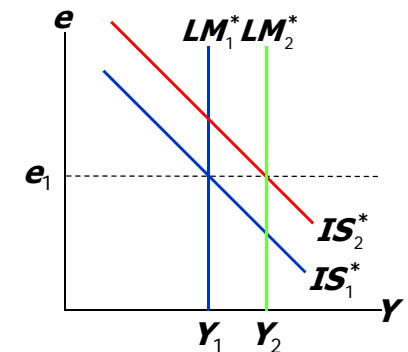
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Fiscal policy under fixed exchange rates

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

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



Results:

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

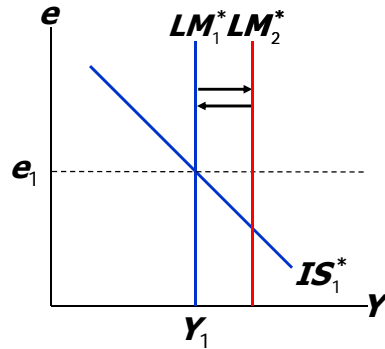
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Monetary policy under fixed exchange rates

Under floating rates, monetary policy is very effective at changing output.
 Under fixed rates, monetary policy cannot be used to affect output.



Results:

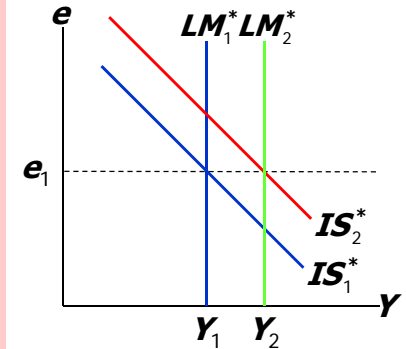
$$\Delta e = 0, \Delta Y = 0$$

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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 .
 Is this policy desirable? Why or why not?



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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 | ↑ |

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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:

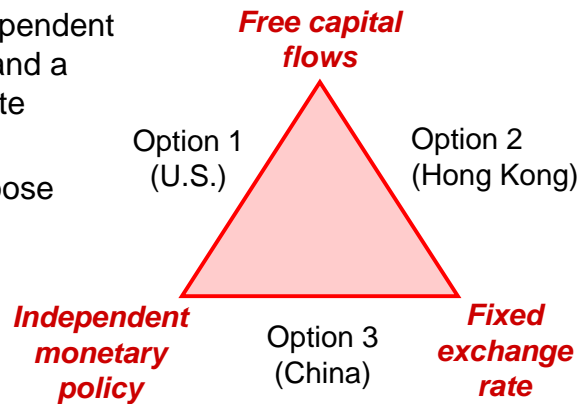
- avoids uncertainty and volatility, making international transactions easier.
- disciplines monetary policy to prevent excessive money growth & hyperinflation.

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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.



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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.

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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.

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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 lecture, P was fixed, so we could write NX as a function of e instead of ϵ .)

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Deriving the AD curve

Why AD curve has negative slope:

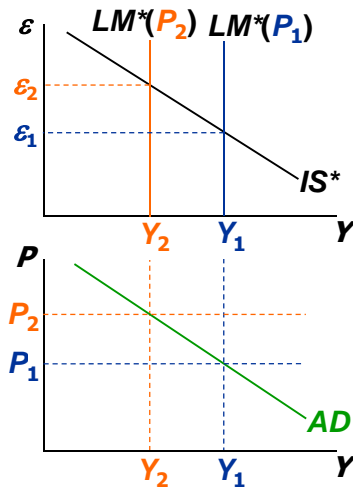
$$\uparrow P \Rightarrow \downarrow (M/P)$$

\Rightarrow LM shifts left

$\Rightarrow \uparrow \epsilon$

$\Rightarrow \downarrow NX$

$\Rightarrow \downarrow Y$



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From the short run to the long run

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

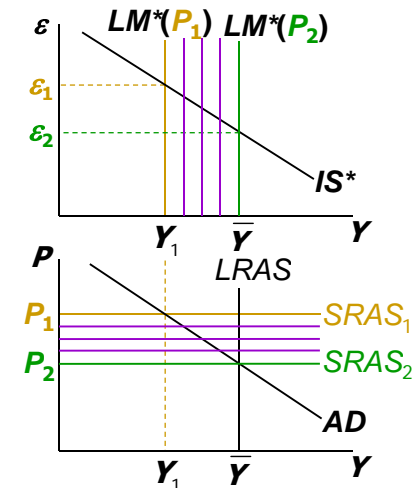
Over time, P will move down, causing

$$(M/P) \uparrow$$

$\epsilon \downarrow$

$NX \uparrow$

$Y \uparrow$



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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.

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Expected change in exchange rates

- When a foreigner buys a domestic bond, they really earn more than just r , the interest rate.
- They are holding a dollar asset. Foreigners gain if the dollar itself gains value relative to the foreign currency.
- The expected appreciation of the dollar:

$$\frac{e_{+1} - e}{e}$$

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Interest parity

- The total expected return for a foreigner is

$$r + \frac{e_{+1}^e - e}{e}$$

- “Interest parity” says that the return on the home country’s bonds equal the foreign interest rate:

$$r + \frac{e_{+1}^e - e}{e} = r^*$$



Interest rates and exchange rates

- We can rewrite the interest parity equation to get a relationship that says the exchange rate is determined by home and foreign interest rates, and the expected future exchange rate:

$$e = \frac{e_{+1}^e}{1 + r^* - r}$$

- Home currency is stronger if:
 - Home interest rate, r , rises
 - Foreign interest rate, r^* , falls
 - Expected exchange rate increases



IS-LM again

- Let’s write the equation for exchange rates as

$$\text{➤ } e = e(r, r^*, e^e)$$

- Now let’s go back to our IS equation:

$$\begin{aligned} \text{➤ } Y &= C(Y - T) + I(r) + G + NX(e) \\ &= C(Y - T) + I(r) + G + NX(e(r, r^*, e^e)) \end{aligned}$$

- We have solved out for the exchange rate.
 - IS depends on the interest rate, r .
 - IS is shifted by changes in r^* and e^e



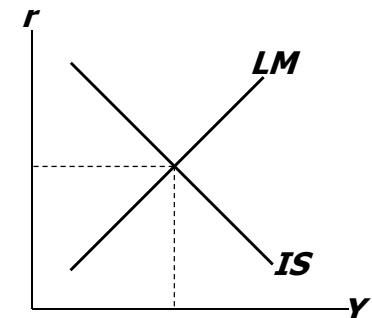
The short-run equilibrium

The **LM** curve is unchanged.

For the open-economy, we can write an **IS-LM** model that is similar to the closed economy:

$$\begin{aligned} Y &= C(Y - \bar{T}) + I(r) + \bar{G} \\ &\quad + NX(e(r, r^*, e^e)) \end{aligned}$$

$$\bar{M}/\bar{P} = L(r, Y)$$

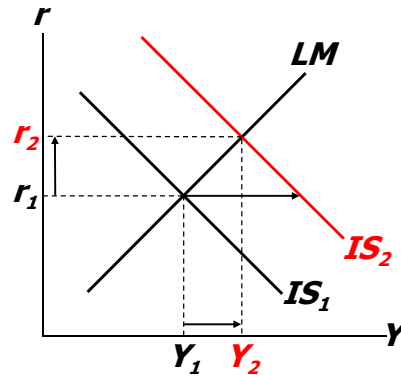


IS is flatter than in the closed economy. Why?



An increase in government purchases

1. IS curve shifts right
2. r rises and Y rises
3. e rises, from interest parity
4. NX must fall.



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Compare to model without expectations

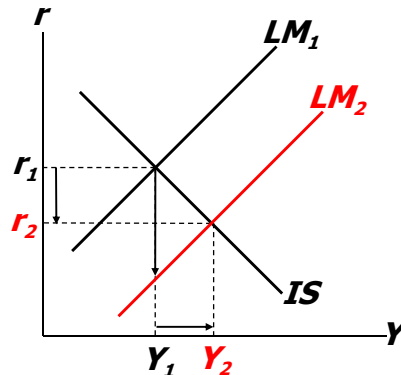
- The home country interest rate can rise. We do not have to have $r = r^*$
- There is crowding out – as G rises, NX falls.
 - But it is not complete crowding out. NX does not fall as much as G rises.
- So, Y rises when G rises.
 - Exogenous changes in demand can affect output.

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Monetary policy: An increase in M

1. $\Delta M > 0$ shifts the LM curve down
2. r goes down, Y goes up
3. e goes down
4. NX goes up



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Compare to the model with no expectations

- A monetary expansion reduces the home interest rate, r , as in an open economy
- Investment demand and net exports are stimulated.
 - In the open economy, a monetary expansion has an extra kick.

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A change in expectations

- What if there is an increase in the expected future value of the currency? e^e rises.
 - From interest parity, this leads to an immediate appreciation: e rises.
 - This reduces net exports.
 - IS shifts to the left.
 - The interest rate, r , falls, and output, Y , falls.

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Summary

- When we allow for expected changes in the value of the currency and use interest parity, the model is like the closed economy IS-LM.
- The IS curve is flatter because a drop in the interest rate also causes e to fall, which stimulates net exports.
- The expected exchange rate, e^e , and the foreign interest rate, r^* , can affect the IS curve.

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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.

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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.

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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.