Chapter 20 - Output, The Interest Rate and The Exchange Rate

Equilibrium in the Goods Market

- Equilibrium in the goods market can be described by the following equation:

$$\underset{}{Y} = \underset{(+)}{C(Y-T)} + \underset{(+,-)}{I(Y,r)} + G - \underset{(+,+)}{IM(Y,\varepsilon)/\varepsilon} + \underset{(+,-)}{X(Y^*,\varepsilon)}$$

  which can also be written as

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

- Consumption, C, depends positively on disposable income, Y - T.
- Investment, I, depends positively on output Y, and negatively on the real interest rate, r.
- Government spending, G, is taken as given.
- The quantity of imports, IM, depends positively on both output, Y, and the real exchange rate ε.
- Exports, X, depend positively on foreign output Y*, and negatively on the real exchange rate ε .
- An increase in the real interest rate leads to a decrease in investment spending; hence, to a decrease in the demand for domestic goods.

- An increase in the real exchange rate leads to a shift in demand toward foreign goods, and to a decrease in net exports.
- For the short-run analysis we can make two simplifications:
  - Both the domestic and the foreign price levels are given; thus, the nominal and the real exchange rate move together:

$$P = P^* = 1, \quad so \quad \varepsilon = E$$

  - There is no inflation, neither actual nor expected.

$$\pi^e = 0, \quad so \quad r = i$$

  - Then, the equilibrium condition becomes:

$$\begin{array}{rcccccc} Y & = & C(Y-T) & + & I(Y,i) & + & G + NX(Y,Y^*,\varepsilon) \\ & & (+) & & (+,-) & & (-,+,-) \end{array}$$

Equilibrium in Financial Markets

The U.S. Saving Rate and the Golden Rule

- We wrote the condition that the supply of money be equal to the demand for money as:

$$\frac{M}{P} = YL(i)$$

- We can use this equation to think about the determination of the nominal interest rate

Domestic Bonds versus Foreign Bonds

- What combination of domestic and foreign bonds should financial investors choose in order to maximize expected returns?

$$(1 + i_t) = (1 + i_t^*)\frac{E_t}{E_{t+1}^e}$$

- The left side gives the return, in terms of domestic currency. The right side gives the expected return, also in terms of domestic currency. In equilibrium, the two expected returns must be equal.

- If the expected future exchange rate is given, then:

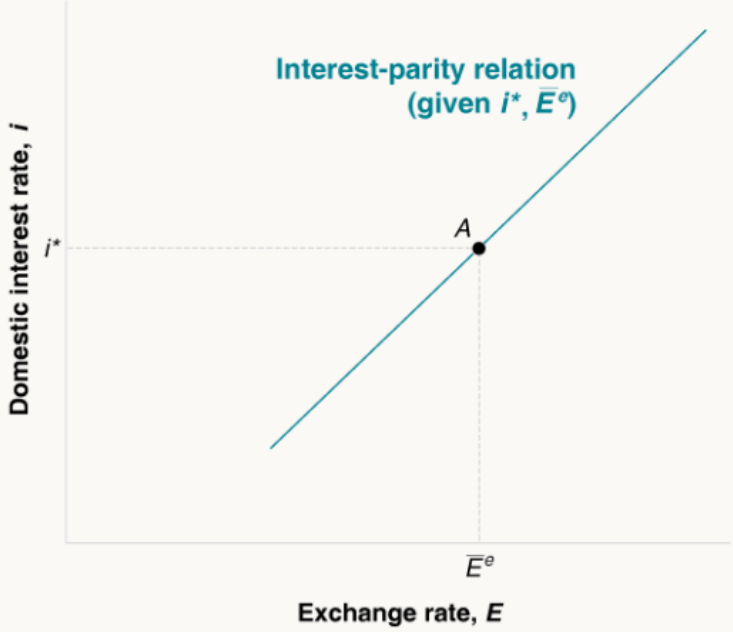
$$E_t = \frac{1 + i_t}{1 + i_t^*}\bar{E}_{t+1}^e$$

- This relation tells us that the current exchange rate depends on the domestic interest rate, on the foreign interest rate, and on the expected future exchange rate:
  - An increase in the domestic interest rate leads to an increase in the exchange rate.
  - An increase in the foreign interest rate leads to a decrease in the exchange rate.
  - An increase in the expected future exchange rate leads to an increase in the current exchange rate.
- An increase in the U.S. interest rate, say, after a monetary contraction, will cause the demand for U.S. bonds to rise. As investors switch from foreign currency to dollars, the dollar appreciates.

Figure 20 – 1

The Relation between the Interest Rate and the Exchange Rate Implied by Interest Parity

A higher domestic interest rate leads to a higher exchange rate—an appreciation.



Putting Goods and Financial Markets Together

- Goods-market equilibrium implies that output depends, among other factors, on the interest rate and the exchange rate.

$$Y = C(Y - T) + I(Y, i) + G + NX(Y, Y^*, \varepsilon)$$

- The interest rate is determined by the equality of money supply and money demand:

$$\frac{M}{P} = YL(i)$$

- The interest-parity condition implies a positive relation between the domestic interest rate and the exchange rate:

$$E = \frac{1 + i_t}{1 + i_t^*}\bar{E}^e \quad i \uparrow \Rightarrow E \uparrow \qquad i \downarrow \Rightarrow E \downarrow$$

- The open-economy versions of the IS and LM relations are:

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

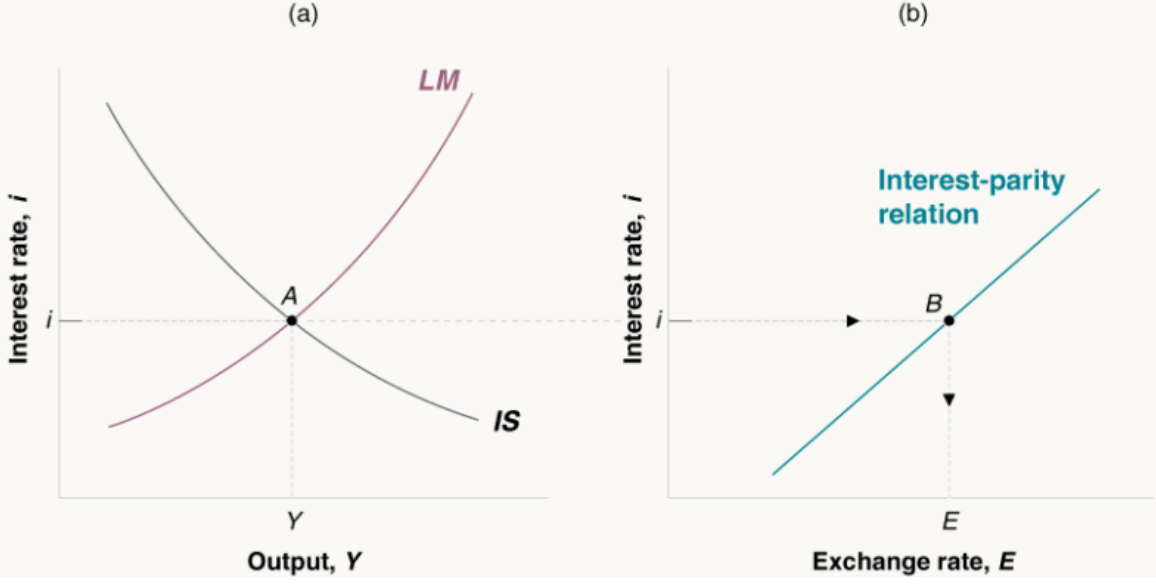
$$LM \ : \quad \frac{M}{P} = YL(i)$$

- An increase in the interest rate now has two effects:
  - The first effect, which was already present in a closed economy, is the direct effect on investment.
  - The second effect, which is present only in the open economy, is the effect through the exchange rate.

Figure 20 – 2

The* IS–LM *Model in an Open Economy

An increase in the interest rate reduces output both directly and indirectly (through the exchange rate): The *IS* curve is downward sloping. Given the real money stock, an increase in output increases the interest rate: The *LM* curve is upward sloping.

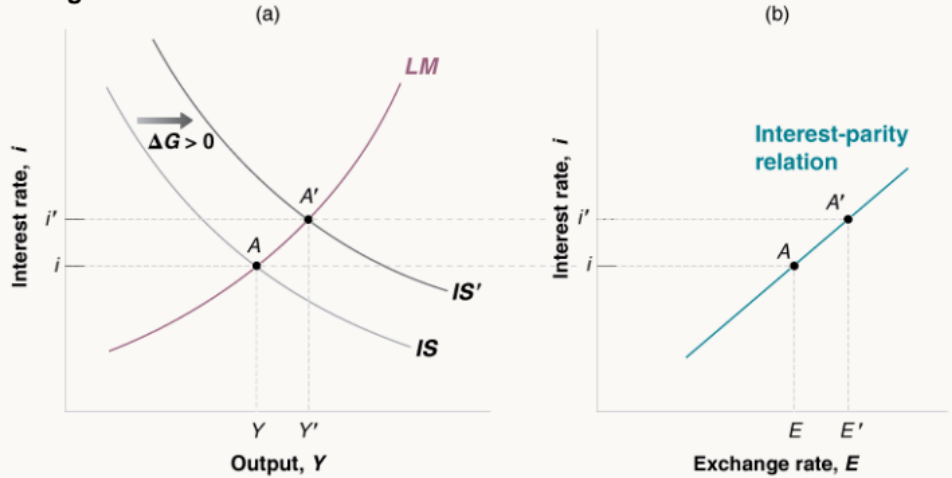


The Effects of Fiscal Policy in an Open Economy

Figure 20 – 3

The Effects of an Increase in Government Spending

An increase in government spending leads to an increase in output, an increase in the interest rate, and an appreciation.



The increase in government spending shifts the *IS* curve to the right. It shifts neither the *LM* curve nor the interest-parity curve.

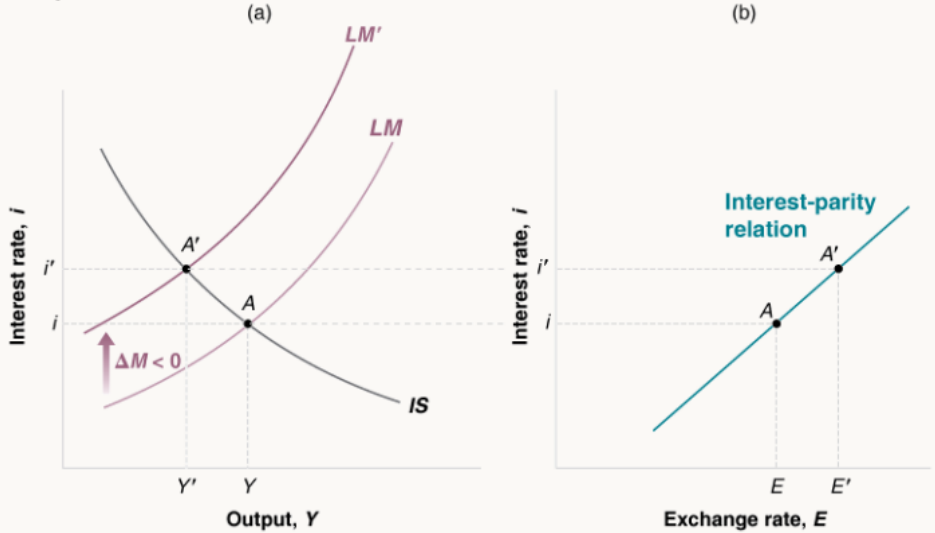
- When government purchases increases, the interest rate rises above the world interest rate, capital flows in from abroad, which increases the demand for the domestic currency and exchange rate appreciates
- Both the increase in output and the appreciation combine to decrease net exports, which and partly offsets the effects of the expansionary fiscal policy on income
  - Note: The effect of an increase in government purchases in an open economy is just like the combined effect of this policy in a closed economy short run and in an open economy in the medium run: output increases, net exports fall
- In the new equilibrium, interest rate is higher, currency appreciates, financial account improves, current account worsens

The Effects of Monetary Policy in an Open Economy

Figure 20 – 4

The Effects of a Monetary Contraction

A monetary contraction leads to a decrease in output, an increase in the interest rate, and an appreciation.



A monetary contraction shifts the *LM* curve up. It shifts neither the *IS* curve nor the interest-parity curve.

- The decrease in the money supply puts upward pressure on the domestic interest rate, capital flows into the economy
- The capital inflow increases the supply of the foreign currency in the market for foreign-currency exchange, the exchange rate appreciates, which reduces net exports
- Both the increase in interest rate and the increase in the exchange rate decrease the demand and output
- In the new equilibrium, interest rate is higher, currency appreciates, financial account improves, current account worsens

Fixed Exchange Rates

- Central banks act under implicit and explicit exchange-rate targets and use monetary policy to achieve those targets.

Pegs, Crawling Pegs, Bands, the EMS, and the Euro

- Some countries operate under fixed exchange rates. These countries maintain a fixed exchange rate in terms of some foreign currency. Some peg their currency to the dollar.
- Some countries moved further, agreeing to adopt a common currency, the euro, in effect, adopting a "fixed exchange rate."

Pegging the Exchange Rate and Monetary Control

- The interest parity condition is:

$$(1 + i_t) = (1 + i_t^*)\frac{E_t}{E_{t+1}^e}$$

- Pegging the exchange rate ($E_t = E_{t+1}^e$) turns the interest parity relation into:

$$(1 + i_t) = (1 + i_t^*) \quad \Rightarrow \quad i_t = i_t^*$$

- Under a fixed exchange rate and perfect capital mobility, the domestic interest rate must be equal to the foreign interest rate.

- In words: If financial investors expect the exchange rate to remain unchanged, they will require the same nominal interest rate in both

countries. Under a fixed exchange rate and perfect capital mobility, the domestic interest rate must be equal to the foreign interest rate.

- Increases in the domestic demand for money must be matched by increases in the supply of money in order to maintain the exchange rate constant, so that the following condition holds:

$$\frac{M}{P} = Y L(i^*)$$

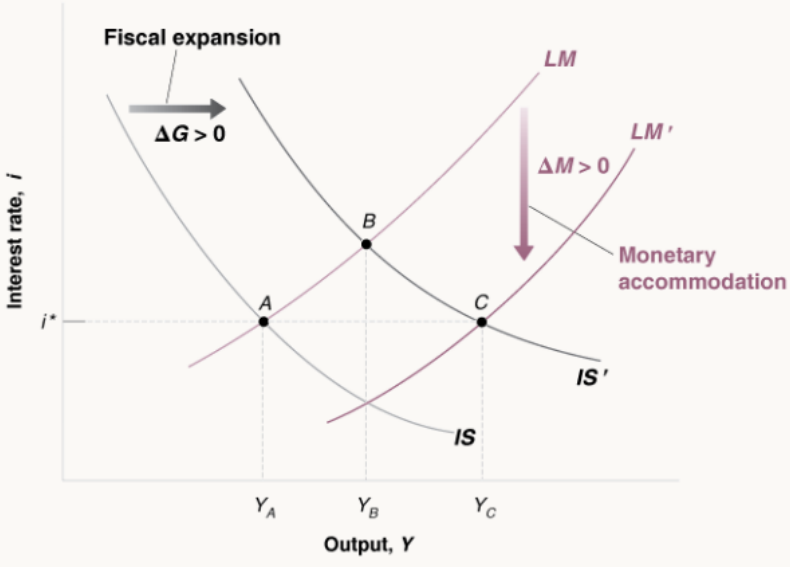
- Under fixed exchange rates, the central bank gives up monetary policy as a policy instrument.

Fiscal Policy under Fixed Exchange Rates

Figure 20 – 5

The Effects of a Fiscal Expansion under Fixed Exchange Rates

Under flexible exchange rates, a fiscal expansion increases output from Y_A to Y_B. Under fixed exchange rates, output increases from Y_A to Y_C .



The central bank must accommodate the resulting increase in the demand for money.

- When the domestic interest rate increases above the foreign interest rate, there is an inflow of money into the country and domestic currency appreciates. In the fixed exchange rate regime the central bank intervenes in the market and hands out domestic currency in exchange for foreign currency, which increases the domestic money supply and shifts the LM curve out
- Thus, under a fixed exchange rate, a fiscal expansion raises aggregate income but leaves interest rates and exchange rates unaffected
- Net exports (and the current account) are unaffected. But the rise in the interest rate brings capital inflow to the country (financial account improves), which increases the foreign reserves of the central bank. *The Fundamental Balance of Payments Identity is still at work*

Monetary Policy under Fixed Exchange Rates

- If CBs tries to decrease the money supply (shifts the LM curve), it puts upward pressure on the exchange rate and on the domestic interest rate
- When the domestic interest rate increases above the foreign interest rate , there is an inflow of money from the country (increase in supply for foreign currency) and domestic currency appreciates (or foreign currency depreciates) in the market; in response, the central bank hands out domestic currency in exchange for foreign currency to keep the exchange rate fixed (In fact, arbitrageurs quickly respond to the increasing exchange rate by selling the foreign currency to the central bank). This increases the domestic money supply and shifts the LM curve back.
- Hence, the monetary polict is ineffective in the fixed exchange rate

regime

- Yet, the increase in the interest rates brings capital inflow to the country and increases the foreign reserves of the central bank. *The Fundamental Balance of Payments Identity is still at work*

- There are a number of reasons why countries choosing to fix its interest rate appears to be a bad idea:
  - By fixing the exchange rate, a country gives up a powerful tool for correcting trade imbalances or changing the level of economic activity.
  - By committing to a particular exchange rate, a country also gives up control of its interest rate

Chapter 21 - Exchange Rate Regimes

Exchange Rate Crises under Fixed Exchange Rates

- Suppose a country is operating under a fixed exchange rate, and that financial investors start believing there may soon be an exchange rate adjustment:
  - The real exchange rate may be too high, the domestic currency may be overvalued.
  - Internal risky conditions may create such a situation as well
- Expectations that a devaluation may be coming can trigger an exchange rate crisis that is a speculative attack

$$(1 + i_t) = (1 + i_t^*)\frac{E_t}{E_{t+1}^e}$$

- Suppose that a rumor spreads that the central bank is going to abandon the exchange-rate peg. People would respond by rushing to the central bank to convert domestic currency into dollars before the domestic currency loses value. This rush would drain the central bank's reserves and could force the central bank to abandon the peg. In this case, the rumor would prove self-fulfilling.

- The government and central bank have a few options:
  - They can try to convince markets they have no intention of devaluing.
  - The central bank can increase the interest rate.
  - The central bank can validate the market's expectations and devalue.
- To summarize, expectations that a devaluation may be coming can trigger an exchange rate crisis. Faced with such expectations, the government has two options:
  - Give in and devalue.
  - Fight and maintain the parity.

Pros and Cons of Different Exchange-Rate Systems

- Fixed rates provide greater certainty for exporters and importers. It also convinces financial markets that a country is serious about reducing money growth is a pledge to fix its exchange rate, now and in the future, which in the long run should keep interest rates down and stimulate increased trade and investment.
- Yet, in the short run, under fixed exchange rates, a country gives up its control of the interest rate and the exchange rate. A system of floating exchange rates leaves monetary policy-makers free to pursue other goals, such as stabilizing employment or prices
- Also if you decide to fix your currency, you now have to stand ready to buy and sell foreign currency for a domestic currency

  - Problem: You might run out of foreign currency. In this case, the central bank has no choice but to abandon the fixed exchange rate and let the domestic currency depreciate
  - This fact raises the possibility of a speculative attack

- Moreover, after the world (many of the industrialized nations) abandoned the Bretton Woods system of fixed exchange rate, the amount of world trade has continued to rise.

- In fact, there are many other policy rules than committing to a fixed exchange rate to discipline a nation's monetary authority. During periods of floating exchange rates, countries often use formal or informal targets for the exchange rate when deciding whether to expand or contract the money supply. Hence, we rarely observe exchange rates that are completely fixed or completely floating. Instead, under both

systems, stability of the exchange rate is usually one among many of the central bank's objective