International Linkages

Chapter 6

In this chapter we present the key linkages among open economies—economies that trade with others—and introduce some first pieces of analysis.

Any economy is linked to the rest of the world through two broad channels: trade (in goods and services) and finance. The trade linkage means that some of a country's production is exported to foreign countries, while some goods that are consumed or invested at home are produced abroad and imported.

We show in this chapter how the IS-LM analysis has to be modified to take international trade and finance linkages into account.

THE BALANCE OF PAYMENTS AND

EXCHANGE RATES

The balance of payments is the record of the transactions of the residents of a country with the rest of the world. There are two main accounts in the balance of payments: **the current account and the capital account**.

The simple rule for balance-of-payments accounting is that any transaction that gives rise to a payment by a country's residents is a deficit item in that country's balance of payments. Thus, for Turkey, imports of cars, gifts to foreigners, a purchase of land in Spain, or a deposit in a bank in Switzerland— all are deficit items. Examples of surplus items, by contrast, would be Turkish sales of wheats abroad and foreign purchases of Turkish assets.

- <u>Balance of payments</u>: the record of the transactions of the residents of a country with the rest of the world
- Two main accounts:
  - ➢ <u>Current account</u>: records trade in goods and services, as well as transfer payments
  - ➢ <u>Capital account</u>: records purchases and sales of assets, such as stocks, bonds, and land

The **current account** records trade in goods and services, as well as transfer payments.

Services include freight, royalty payments, and interest payments. Services also include net investment income, the interest and profits on our assets abroad less the income foreigners earn on assets they own in the home country.

Transfer payments consist of fees, gifts, and grants.

The trade balance simply records trade in goods. Adding trade in services and net transfers to the trade balance, we arrive at the current account balance.

The current account is an important indicator of an economy's health. It is defined as the sum of the balance of trade (goods and services exports minus imports), net income from abroad, and net current transfers.

A positive current account balance indicates the nation is a net lender to the rest of the world, while a negative current account balance indicates that it is a net borrower from the rest of the world. A current account surplus increases a nation's net foreign assets by the amount of the surplus, and a current account deficit decreases it by that amount.

A country's current account can be calculated by the following formula:

CA=(X-M)+NY+NCT

Where CA is the current account, X and M are respectively the export and import of goods and services, NY the net income from abroad, and NCT the net current transfers.

U.S. Current Account Balance 2017 ($ Millions)

	Account	2017	Definition
a	U.S. Exports	2,351,072	Goods and services made in U.S. and sold to foreign countries
b	U.S. Imports	(2,903,349)	Goods and services made in foreign countries and sold to U.S.
c = a + b	Trade Balance (Deficit)	(552,277)	
	Received From Foreigners:		
d	Income Receipts: Primary	928,118	Investment income (Dividends, Interest) *received* by U.S.
e	Income Receipts: Secondary	154,049	Witholding taxes, fines, insurance, pension *received by U.S.*
f = d + e	Subtotal Receipts	1,082,167	
	Paid To Foreigners:		
g	Income Payments: Primary	(706,386)	Investment income (Dividends, Interest) *payments* by U.S.
h	Income Payments: Secondary	(272,645)	Witholding taxes, fines, insurance, pension *payments* by U.S.
i = g + h	Subtotal Payments	(979,031)	
j = c + f + i	Current Account (Deficit)	(449,141)	

Source: BEA "U.S. International Transactions, Q3 2018" See Table 1

Turkey Current Account recorded a deficit of 3.2 USD bn in Dec 2020, compared with a deficit of 3.6 USD bn in the previous month.
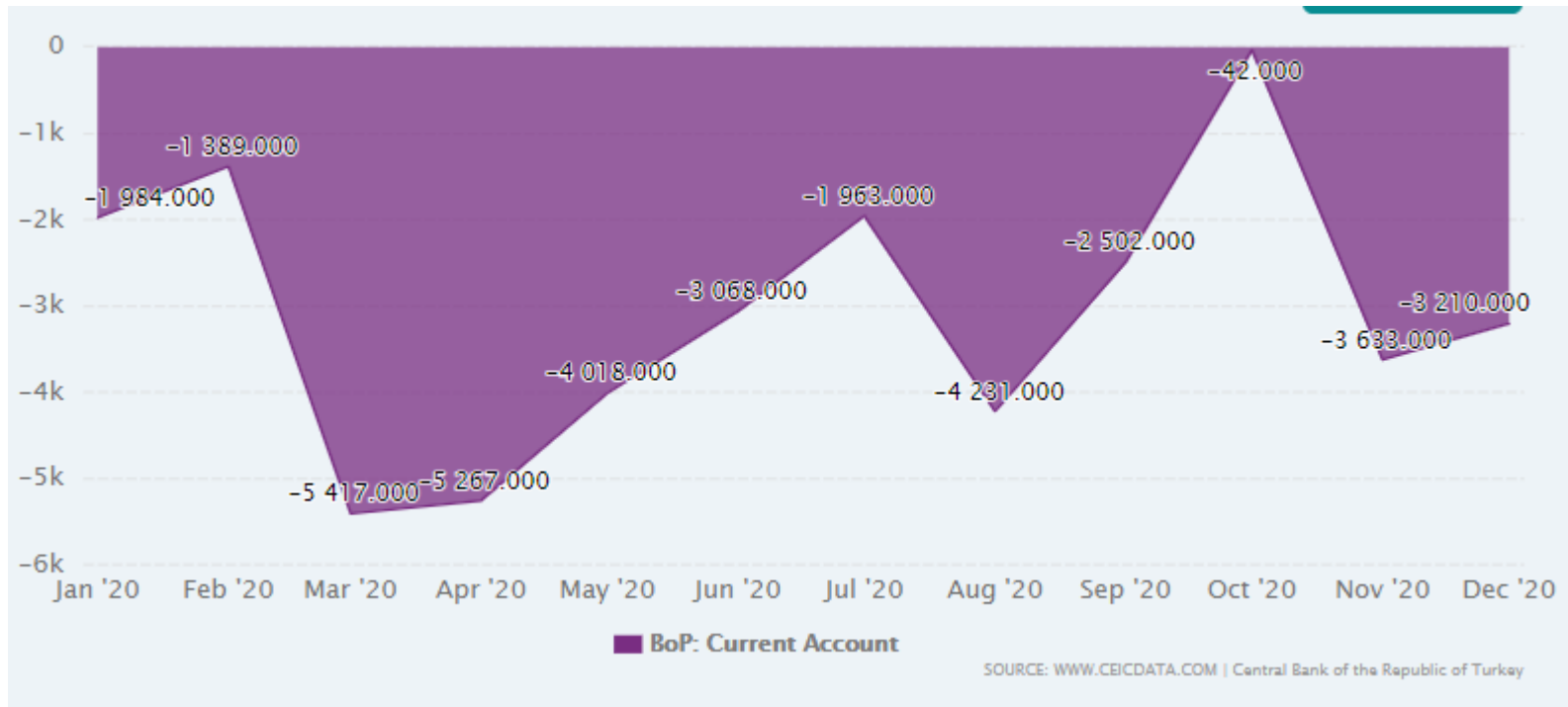
The **capital account** records purchases and sales of assets, such as stocks, bonds, and land.

There is a capital account surplus—also called a net capital inflow—when our receipts from the sale of stocks, bonds, land, bank deposits, and other assets exceed our payments for our own purchases of foreign assets.

$$\text{Capital account} = \text{Change in foreign ownership of domestic assets}$$
$$- \text{Change in domestic ownership of foreign assets}$$

Breaking this down:

$$\text{Capital account} = \text{Foreign direct investment}$$
$$+ \text{Portfolio investment}$$
$$+ \text{Other investment}$$
$$+ \text{Reserve account}$$

CURRENT ACCOUNT					
		Merchandise Exported	290.1		
		Merchandise Imported	-162.3		
	Balance on Merchandise Trade			127.8	
		Services Exported	25.3		
		Services Imported	-82.6		
	Balance on Services			-57.3	
	Balance on Goods and Services				70.5
	Unilateral Transfers			5.3	
Balance on CURRENT ACCOUNT					75.8
CAPITAL ACCOUNT					
		Domestic Government Investment	-24.7		
		Domestic Private Investment	-91.3		
	Domestic Investment in Foreign Assets			-116.0	
		Foreign Government Investment	8.1		
		Foreign Private Investment	33.8		
	Foreign Investment in Domestic Assets			41.9	
Balance on CAPITAL ACCOUNT					-74.1
Balance on CURRENT AND CAPITAL ACCOUNT					1.7
	Statiscal Discrepancy			-1.7	
OVERALL BALANCE					0.0

External Accounts Must Balance

- The central point of international payments is very simple: *Individuals and firms have to pay for what they buy abroad*
  - If a person spends more than her income, her deficit needs to be financed by selling assets or by borrowing
  - Similarly, if a country runs a deficit in its current account the deficit needs to be financed by selling assets or by borrowing abroad
    - Selling/borrowing implies the country is running a capital account surplus $\rightarrow$ any current account deficit is of necessity *financed* by an offsetting capital inflow

$$\text{Current account} + \text{Capital account} = 0 \quad (1)$$

$$CurrentAccount + CapitalAccount = 0$$

Equation makes a drastic point: If a country has no assets to sell, if it has no foreign currency reserves to use up, and if nobody will lend to it, the country has to achieve balance in its current account, however painful and difficult that may be.

It is often useful to split the **capital account into two separate parts**:
(1) the transactions of the country's private sector and
(2) official reserve transactions, which correspond to the central bank's activities.

A current account deficit can be financed by private residents selling off assets abroad or borrowing abroad. Alternatively, or as well, a current account deficit can be financed by the government, which runs down its reserves of foreign exchange, selling foreign currency in the foreign exchange market.

Conversely, when there is a surplus, the private sector may use the foreign exchange revenues it receives to pay off debt or buy assets abroad; alternatively, the central bank can buy the (net) foreign currency earned by the private sector and add that currency to its reserves.

The increase in official reserves is also called the **overall balance-of-payments surplus**. We can summarize our discussion in the following statement:

Balance-of-payments surplus = increase in official exchange reserves
= current account surplus + net private capital inflow

If both the current account and the private capital account are in deficit, then the overall balance of payments is in deficit; that is, the central bank is losing reserves.

When one account is in surplus and the other is in deficit to precisely the same extent, the overall balance of payments is zero—neither in surplus nor in deficit

Exchange Rates

Exchange rate is the price of one currency in terms of another

- For example, an interbank exchange rate of 120 Japanese yen to the United States dollar means that ¥120 will be exchanged for each US$1 or that US$1 will be exchanged for each ¥120. In this case it is said that the price of a dollar in relation to yen is ¥120, or equivalently that the price of a yen in relation to dollars is $1/120.

We will discuss two different exchange rate systems:

1. Fixed exchange rate system
2. Floating exchange rate system

Fixed Exchange Rates

- A fixed exchange rate, sometimes called a pegged exchange rate, is a type of exchange rate regime in which a currency's value is fixed or pegged by a monetary authority against the value of another currency, a basket of other currencies, or another measure of value, such as gold.

- In a fixed exchange rate system foreign central banks stand ready to buy and sell their currencies at a fixed price in terms of dollars. The major countries had fixed exchange rates against one another from the end of World War II until 1973. Today, some countries fix their exchange rates, but others don't.

Ensures that market prices equal to the fixed rates. No one will buy dollars for more than fixed rate since know that they can get them for the fixed rate. No one will sell dollars for less than fixed rate since know can sell them for the fixed rate.

Foreign central banks hold reserves to sell when they have to intervene in the foreign exchange market.

Intervention: the buying or selling of foreign exchange by the central bank.

- *What determines the level of intervention of a central bank in a fixed exchange rate system?*
  - The balance of payments measures the amount of foreign exchange intervention needed from the central banks
    - Ex. If the U.S. were running a current account deficit vis-à-vis Japan, the <u>demand</u> for yen in exchange for dollars exceeded the <u>supply</u> of yen in exchange for dollars, the Bank of Japan would buy the excess dollars, paying for them with yen
    - →Under a fixed exchange rate, price fixers must make up the excess demand or take up the excess supply
    - →Makes it necessary to hold an inventory for foreign currencies that can be provided in exchange for the domestic currency

- With necessary reserves, Central Bank can continue to intervene in foreign exchange markets to keep the exchange rate constant
- If a country persistently runs deficits in the balance of payments:
  - The central bank eventually will run out of reserves on of foreign exchange
  - Will be unable to continue its intervention
  - Before this occurs, the central bank will likely devalue the currency
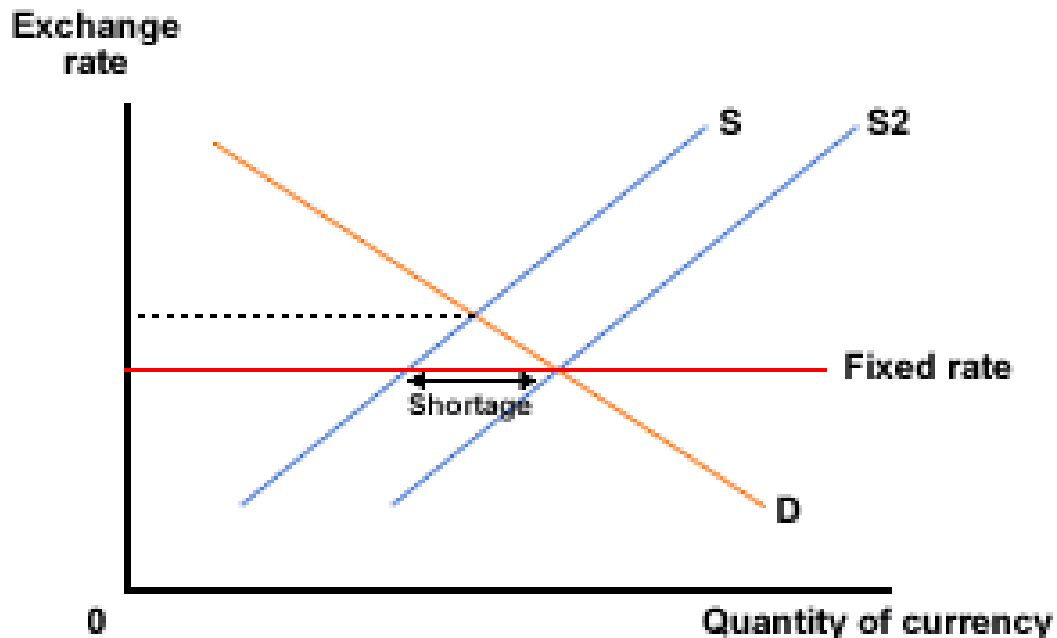
Figure 1: Fixed exchange rate - equilibrium above the fixed rate

In Figure 1, the equilibrium is above the fixed rate. There is a shortage of the national currency at the fixed rate. This would normally force the equilibrium exchange rate upwards, but the rate is fixed and so cannot be allowed to move. To keep the exchange rate at the fixed rate the government will need to intervene. They will need to sell their own currency from their foreign exchange reserves and buy overseas currencies instead. This has the effect of shifting the supply curve to S2 and as a result, their foreign currency holdings will rise.
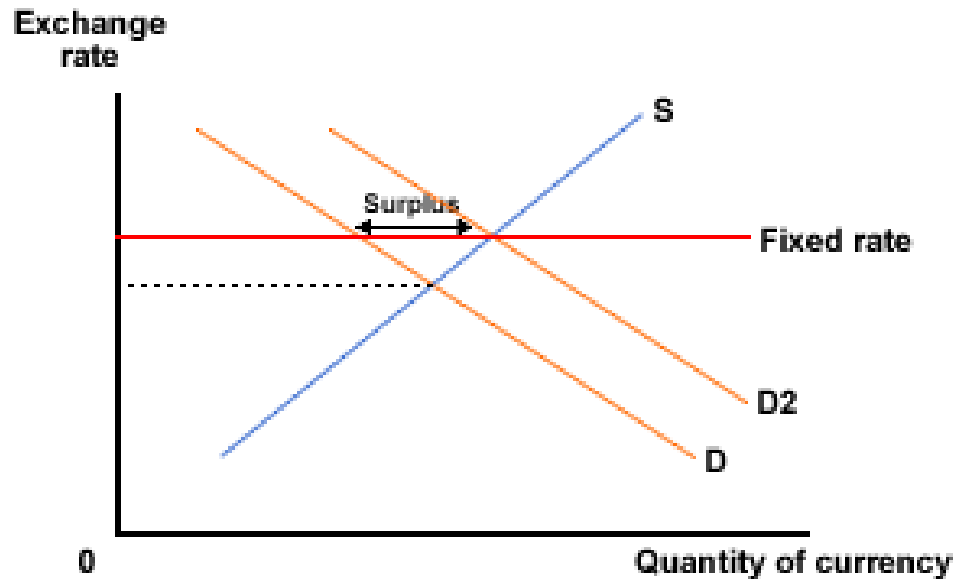
Figure 2 Fixed exchange rate - equilibrium below the fixed rate

In Figure 2, the opposite is true - the equilibrium rate is below the fixed rate. This means that there is a surplus of the national currency. The government will need to buy this surplus if they are to prevent the currency from falling - in other words keep it at the fixed rate. When they buy the currency they will be selling from their foreign currency reserves and so these will fall, but the demand for domestic currency will rise.

Flexible Exchange Rates

In a flexible (floating) exchange rate system, central banks allow the exchange rate to adjust to equate the supply and demand for foreign currency. Where the exchange rate is floating, it will be determined by market forces - that is supply and demand.
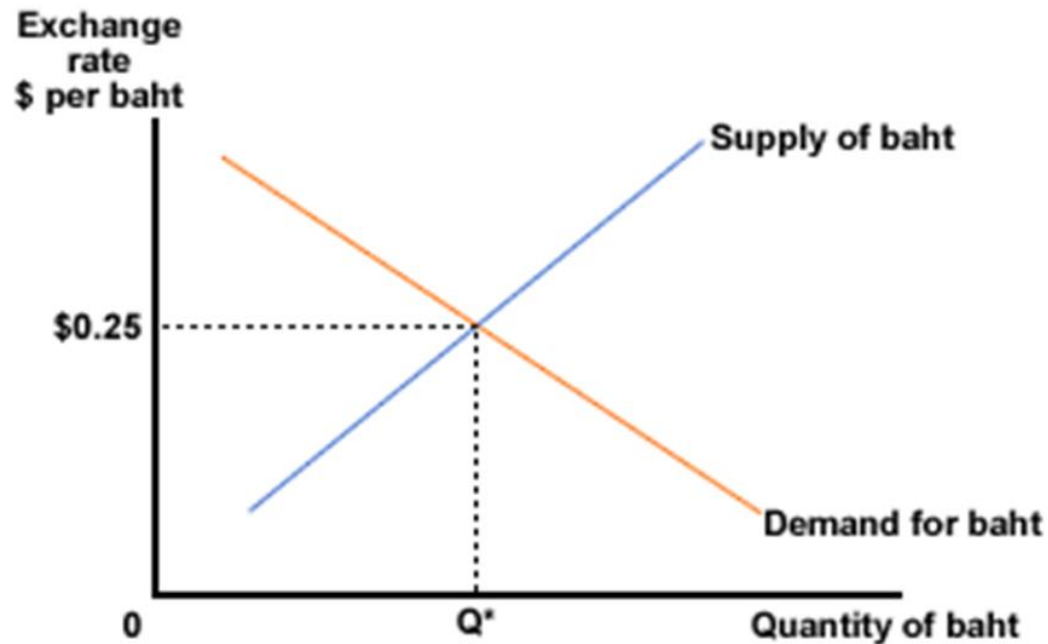
FLOATING, CLEAN AND DIRTY

In a system of **clean floating**, central banks stand aside completely and allow exchange rates to be freely determined in the foreign exchange markets.

Since the central banks do not intervene in the foreign exchange markets in such a system, official reserve transactions are, accordingly, zero. That means the balance of payments is zero in a system of clean floating: The exchange rate adjusts to make the current and capital accounts sum to zero.

In practice, the flexible rate system, in effect since 1973, has not been one of clean floating. Instead, the system has been one of **managed, or dirty, floating**.

Under managed floating, central banks intervene to buy and sell foreign currencies in attempts to influence exchange rates. Official reserve transactions are, accordingly, not equal to zero under managed floating.

TERMINOLOGY

Exchange rate language can be very confusing. In particular, the terms **"depreciation,"** **"appreciation,"** **"devaluation,"** **and** **"revaluation"** recur in any discussion of international trade and finance.

Because the exchange rate is the price of one currency in terms of another, it can be quoted two ways, for example, either 124 yen per dollar or .81 cents per yen.

The foreign exchange markets generally settle on one way of quoting each rate. For example, the yen is typically quoted in yen per dollar, the British pound in dollars per pound.

In academic economics the convention is that the exchange rate is a price in terms of domestic currency. For example, a quote for the dollar-pound exchange rate is given in dollars per pound, say, $1.56 per pound—just as a quart of milk might cost $1.56. So if the exchange rate falls, the domestic currency is worth more; it costs fewer dollars to buy a unit of the foreign currency

A **devaluation** takes place when the price of foreign currencies under a fixed rate regime is increased by official action. A devaluation thus means that foreigners pay less for the devalued currency and that residents of the devaluing country pay more for foreign currencies. The opposite of a devaluation is a **revaluation.**

A change in the price of foreign exchange under flexible exchange rates is referred to as currency **depreciation or appreciation**. A currency depreciates when, under floating rates, it becomes less expensive in terms of foreign currencies.

The Exchange Rate in the Long Run

- In long run, exchange rate between pair of countries is determined by relative purchasing power of currency within each country
  - Two currencies are at purchasing power parity (PPP) when a unit of domestic currency can buy the same basket of goods at home or abroad
    - The relative purchasing power of two currencies is measured by the *real exchange rate*
    - The real exchange rate, R, is defined as $R = \dfrac{eP_f}{P}$ (3), where P_f and P are the price levels abroad and domestically, respectively
    - $\rightarrow$If R =1, currencies are at PPP
    - $\rightarrow$If R > 1, goods abroad are more expensive than at home
    - $\rightarrow$If R < 1, goods abroad are cheaper than those at home

The Exchange Rate in the Long Run

$$R = \frac{eP_f}{P}$$

$\rightarrow$If R = 1, currencies are at PPP

$\rightarrow$If R > 1, goods abroad are more expensive than at home

$\rightarrow$If R < 1, goods abroad are cheaper than those at home

A government or central bank can peg the value of its currency, that is, fix the exchange rate, for a period of time. But in the long run, the exchange rate between a pair of countries is determined by the relative purchasing power of currency within each country.

Two currencies are at **purchasing power parity** when a unit of domestic currency can buy the same basket of goods at home or abroad. The relative purchasing power of two currencies is measured by the **real exchange rate**.

RECAP

• The balance-of-payments accounts are a record of the transactions of the economy with other economies. The capital account describes transactions in assets, while the current account covers transactions in goods and services, as well as transfers.

• Any payment to foreigners is a deficit item in the balance of payments. Any payment from foreigners is a surplus item. The balance-of-payments deficit (or surplus) is the sum of the deficits (or surpluses) on current and capital accounts.

• Under fixed exchange rates, central banks stand ready to meet all demands for foreign currencies at a fixed price in terms of the domestic currency. They finance the excess demands for, or supplies of, foreign currency (i.e., the balance-of-payments deficits or surpluses, respectively) at the pegged (fixed) exchange rate by running down, or adding to, their reserves of foreign currency.

• Under flexible exchange rates, the demands for and supplies of foreign currency are equated through movements in exchange rates. Under clean floating, there is no central bank intervention and the balance of payments is zero. But central banks sometimes intervene in a floating rate system, engaging in so-called dirty floating.

Trade in Goods, Market Equilibrium, and the Balance of Trade

In this section we fit foreign trade into the IS-LM framework. We assume that the price level is given and that the output demanded will be supplied. In an open economy, part of domestic output is sold to foreigners (exports) and part of spending by domestic residents purchases foreign goods (imports). We have to modify the IS curve accordingly. The most important change is that domestic spending no longer determines domestic output. Instead, spending on domestic goods determines domestic output. Some spending by domestic residents is on imports. Demand for domestic goods, by contrast, includes exports or foreign demand along with part of spending by domestic residents.

Spending by domestic residents is

$$DS = C + I + G \qquad (4)$$

Spending on domestic goods is

$$DS + NX = (C + I + G) + (X - M)$$
$$= (C + I + G) + NX \qquad (5)$$

Assume DS depends on the interest rate and income:

$$DS = DS(Y, i) \qquad (6)$$

Net Exports

- Net exports, (X-M), is the excess of exports over imports
- NX depends on:
  - ➢ domestic income
  - ➢ foreign income, Y_f
  - ➢ R

$$NX = X(Y_f, R) - M(Y, R) = NX(Y, Y_f, R)$$ (7)

- → A rise in foreign income improves the home country's trade balance and raises their AD
- → A real depreciation by the home country improves the trade balance and increases AD
- → A rise in home income raises import spending and worsens the trade balance, decreasing AD

GOODS MARKET EQUILIBRIUM

The increase in import demand caused by a $1 increase in income is called the **marginal propensity to import**.

The marginal propensity to import measures the fraction of an extra dollar of income spent on imports.

The fact that part of income will be spent on imports (rather than on domestic goods) implies that the IS curve will be steeper than it would be in a closed economy.

For a given reduction in interest rates it takes a smaller increase in output and income to restore goods market equilibrium.

The open economy IS curve includes net exports as a component of aggregate demand.

Therefore, the level of competitiveness, as measured by the real exchange rate R, affects the IS curve.

A real depreciation increases the demand for domestic goods, shifting the IS curve out and to the right.

Likewise, an increase in foreign income and, with it, an increase in foreign spending on our goods will increase net exports or demand for our goods.

Goods Market Equilibrium

- IS curve now includes NX as a component of AD

$$IS : Y = DS(Y, i) + NX(Y, Y_f, R) \qquad (8)$$

  - level of competitiveness (R) affects the IS curve
    - A real depreciation increases the demand for domestic goods $\rightarrow$ shifts IS to the right
  - An increase in Y_f results in an increase in foreign spending on domestic goods$\rightarrow$ shifts IS to the right

Goods Market Equilibrium

- Higher foreign spending on our goods raises demand and requires an increase in output at given interest rates
  - Rightward shift of IS
- Full effect of an increase in foreign demand is an increase in interest rates and an increase in domestic output and employment
- Figure 13-3 can also be used to show the impact of a real depreciation
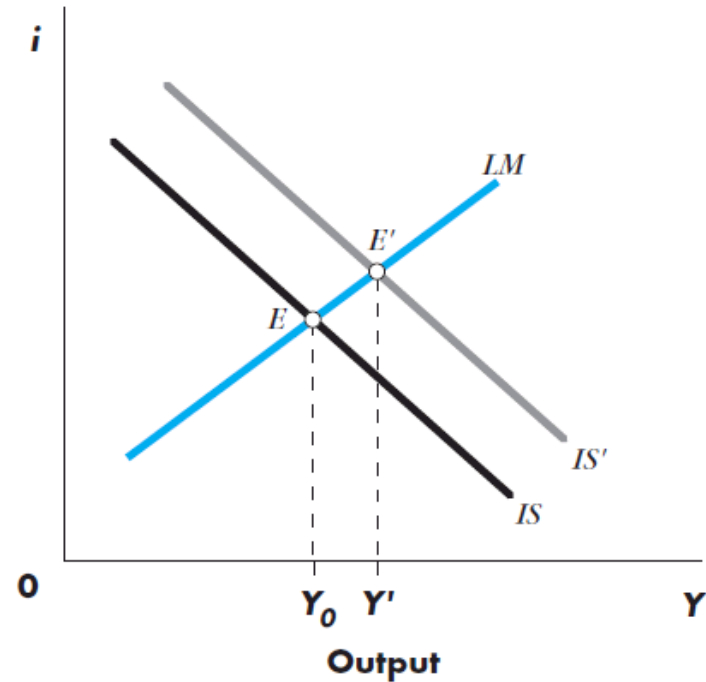
Rise in Foreign Income

$Yf \uparrow \rightarrow X \uparrow \rightarrow NX \uparrow \rightarrow IS \uparrow$

Real Depreciation, R ↑

$R \uparrow \rightarrow X \uparrow, M \downarrow \rightarrow NX \uparrow \rightarrow IS \uparrow$

Table: Effects of Disturbance on Income and Net Exports

	Increase in Home Spending	Increase in Foreign Income	Real Depreciation
Income	+	+	+
Net Exports	-	+	+

REPERCUSSION EFFECTS

In an interdependent world, our policy changes affect other countries as well as ourselves, and then feed back on our economy.

When we increase government spending, our income rises; part of the increase in income will be spent on imports, which means that income will rise abroad, too. The increase in foreign income will then raise foreign demand for our goods, which in turn adds to the domestic income expansion brought about by higher government spending, and so on.

Note that whereas an expansionary fiscal policy increases both our GDP and that of other countries, a depreciation of our exchange rate increases our income while reducing foreign incomes.

CAPITAL MOBILITY

One of the striking facts about the international economy is the high degree of integration, or linkage, among financial, or capital, markets—the markets in which bonds and stocks are traded.

In most industrial countries today there are no restrictions on holding assets abroad. U.S. residents, or residents in Germany or the United Kingdom, can hold their wealth either at home or abroad.

They therefore search around the world for the highest return (adjusted for risk), thereby linking together yields in capital markets in different countries. For example, if interest rates in New York rose relative to those in Canada, investors would turn to lending in New York, while borrowers would turn to Toronto. With lending up in New York and borrowing up in Toronto, yields would quickly fall into line.

In the simplest world, in which exchange rates are fixed forever, taxes are the same everywhere, and foreign asset holders never face political risks, we would expect all asset holders to pick the asset that has the highest return. That would force asset returns into strict equality everywhere in the world capital markets because no country could borrow for less.

In reality, though, none of these three conditions exists. There are tax differences among countries; exchange rates can change, perhaps significantly, and thus affect the payoff in dollars of a foreign investment; and, finally, countries sometimes put up obstacles to capital outflows or simply find themselves unable to pay. These are some of the reasons that interest rates are not equal across countries.

Our working assumption from now on involves **perfect capital mobility**.

Assumption of *perfect capital mobility*:
1. Capital is perfectly mobile internationally when investors can purchase assets in any country they choose, quickly, with low transaction costs, and in unlimited amounts.

2. When capital is perfectly mobile, asset holders are willing and able to move large amounts of funds across borders in search of the highest return or lowest borrowing cost.

3. Implies that interest rates in a particular country can not get too far out of line without bringing capital inflows/outflows that bring it back in line.

THE BALANCE OF PAYMENTS AND CAPITAL FLOWS

We introduce the role of capital flows within a framework in which we assume that the home country faces a given price of imports and a given export demand. In addition, we assume that the world rate of interest, (i.e., the rate of interest in foreign capital markets), is given. Moreover, with perfect capital mobility, capital flows into the home country at an unlimited rate if our interest rate is above that abroad. Conversely, if our rate is below that abroad, capital outflows will be unlimited.

Next we look at the balance of payments. The balance-of-payments surplus, BP, is equal to the trade surplus, NX, plus the capital account surplus, CF:

$$BP = NX(Y, Y_f, R) + CF(i - i_f) \qquad (9)$$

$$BP = NX(Y, Y_f, R) + CF(i - i_f)$$

- The trade balance is a function of domestic and foreign income and real exchange rate
- The capital account depends on the interest differential

An increase in income worsens the trade balance, and an increase in the interest rate above the world level pulls in capital from abroad and thus improves the capital account. It follows that when income increases, even the tiniest increase in interest rates is enough to maintain an overall balance-of-payments equilibrium. The trade deficit would be financed by a capital inflow.

BP curve: the balance of payments
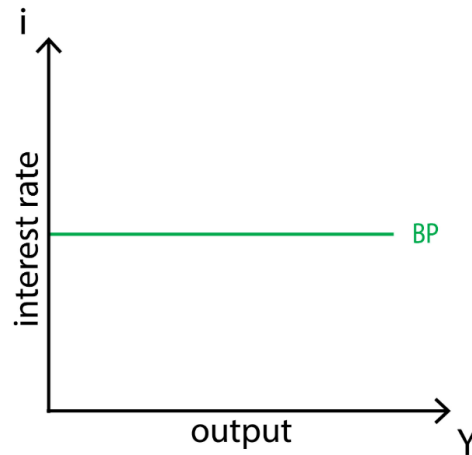
The BP curve shows at which points the balance of payments is at equilibrium. In other words, it shows combinations of production and interest rates that guarantee that the balance of payments is viably financed, which means that the volume of net exports that affect total production must be consistent with the volume of net capital outflows. It will usually slope up since the higher the production, the higher the imports, which will disturb the equilibrium of the balance of payments, unless interest rates rise (which would cause capital inflows to maintain the equilibrium). However, depending in how great the mobility of capital is, it will have a greater or smaller slope: the higher the mobility, the flatter the curve. Any point above the BP curve will mean a balance of payments surplus. Any points below the BP curve will mean a balance of payments deficit.

POLICY DILEMMAS: INTERNAL AND EXTERNAL BALANCE

The potential for capital flows to finance a current account deficit is extremely important. Countries frequently face policy dilemmas, in which a policy designed to deal with one problem worsens another problem. In particular, there is sometimes a conflict between the goals of external and internal balance.

External balance exists when the balance of payments is close to balance. Otherwise, the central bank is either losing reserves—which it cannot keep on doing—or gaining reserves—which it does not want to do forever.

Internal balance exists when output is at the full employment level.

INTERNAL AND EXTERNAL BALANCE UNDER FIXED EXCHANGE RATES
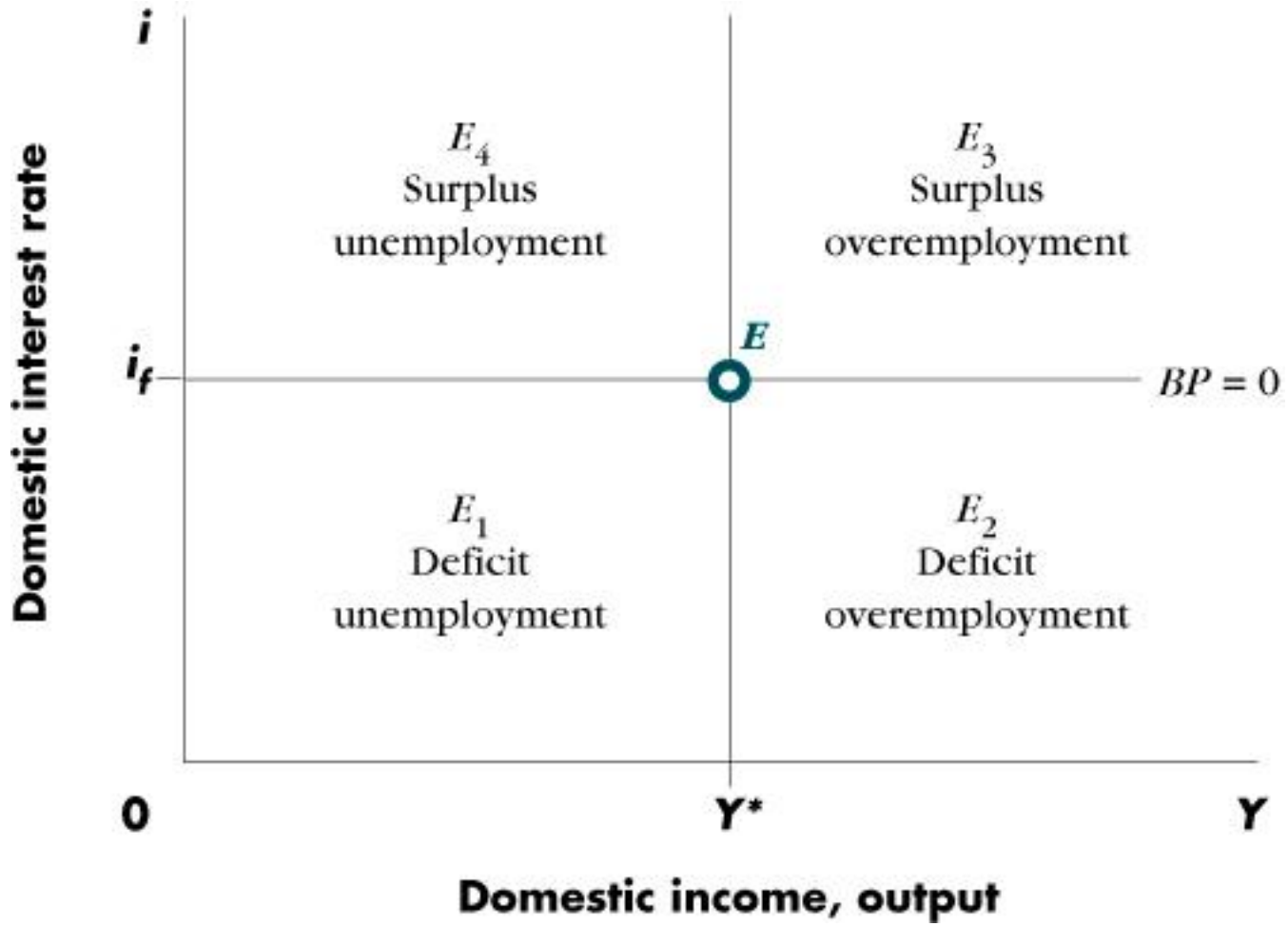
In Figure, we show the schedule BP = 0, derived from BP equation, along which we have balance-of-payments equilibrium. Our key assumption—perfect capital mobility—forces the BP = 0 line to be horizontal. Only at a level of interest rates equal to that of rates abroad can we have external balance: If domestic interest rates are higher, there is a vast capital account and overall surplus; if they are below foreign rates, there is an unlimited deficit.

Thus, BP = 0 must be flat at the level of world interest rates. Points above the BP = 0 schedule correspond to a surplus, and points below to a deficit. We have also drawn in Figure, the full employment output level Y*. Point E is the only point at which both internal balance and external balance are achieved. Point E1 for example, corresponds to a case of unemployment and a balance-of-payments deficit. Point E2 by contrast, is a case of deficit and overemployment.

We can talk about policy dilemmas in terms of points in the four quadrants of the above Figure. For instance, at point E1 there is a deficit in the balance of payments, as well as unemployment. An expansionary monetary policy would deal with the unemployment problem but worsen the balance of payments, thus apparently presenting a dilemma for the policymaker. The presence of interest-sensitive capital flows suggests the solution to the dilemma: If the country can find a way of raising the interest rate, it would obtain financing for the trade deficit.

That means that both monetary and fiscal policies would have to be used to achieve external and internal balance simultaneously. Each point in above Figure can be viewed as an intersection of the IS and LM curves. Each curve has to be shifted, but how? How the adjustment takes place depends critically on the exchange rate regime.

Mundell-Fleming Model: Perfect Capital Mobility Under Fixed Exchange Rates

- The Mundell-Fleming model incorporates foreign exchange under perfect capital mobility into the standard IS-LM framework

- Under perfect capital mobility, the slightest interest differential provokes infinite capital inflows → *central bank cannot conduct an independent monetary policy under fixed exchange rates*

WHY?

Under perfect capital mobility, the slightest interest differential provokes infinite capital flows.

It follows that with perfect capital mobility, central banks cannot conduct an independent monetary policy under fixed exchange rates.

To see why, suppose a country wishes to raise interest rates. It tightens monetary policy, and interest rates rise. Immediately, portfolio holders worldwide shift their wealth to take advantage of the new rate. As a result of the huge capital inflow, the balance of payments shows a huge surplus; foreigners try to buy domestic assets, tending to cause the exchange rate to appreciate and forcing the central bank to intervene to hold the exchange rate constant. It buys the foreign money, in exchange for domestic money. This intervention causes the home money stock to increase. As a result, the initial monetary contraction is reversed. The process comes to an end when home interest rates have been pushed back down to the initial level.

In other words, a small interest differential moves enough money in or out of the country to completely swamp available central bank reserves.

The only way to keep the exchange rate from falling is for the monetary authority to back off from the interest rate differential.

The conclusion is this: Under fixed exchange rates and perfect capital mobility, a country cannot pursue an independent monetary policy. Interest rates cannot move out of line with those prevailing in the world market. Any attempt at independent monetary policy leads to capital flows and a need to intervene until interest rates are back in line with those in the world market.

TABLE: Payments Imbalances, Intervention, and the Money Supply with Fixed Exchange Rates and Perfect Capital Mobility

1. Tightening of money.
2. Increased interest rates.
3. Capital inflow, payments surplus.
4. Pressure for currency appreciation.
5. Intervention by selling home money and buying foreign money.
6. Monetary expansion due to intervention lowers interest rate.
7. Back to initial interest rates, money stock, and payments balance.

Table shows the steps in the argument. The commitment to a fixed rate involves step 5.

With the exchange rate tending to appreciate because foreigners are trying to buy the domestic currency, the central bank has to provide the domestic currency. Just as in an open market operation the central bank buys and sells bonds for money, so in intervention in the foreign exchange market the monetary authority buys and sells foreign money (yen, euros, or Canadian dollars) for domestic money. Thus, the money supply is linked to the balance of payments. Surpluses imply automatic monetary expansion; deficits imply monetary contraction.

Mundell-Fleming Model: Perfect Capital Mobility Under Fixed Exchange Rates

- A country tightens money supply to increase interest rates:
  - Portfolio holders worldwide shift assets into country
  - Due to huge capital inflows, balance of payments shows a large surplus
  - The exchange rate appreciates and the central bank must intervene to hold the exchange rate fixed
  - The central bank buys foreign currency in exchange for domestic currency
  - Intervention causes domestic money stock to increase, and interest rates drop
  - Interest rates continue to drop until return to level prior initial intervention

Monetary Expansion with Fixed Exchange Rate

- Consider a monetary expansion that starts from point E → shifts LM down and to the right to E′
  - At E′ there is a large payments deficit, and pressure for the exchange rate to depreciate
  - Central bank must intervene, selling foreign money, and receiving domestic money in exchange
   - Supply of money falls, pushing up interest rates as LM moves back to original position
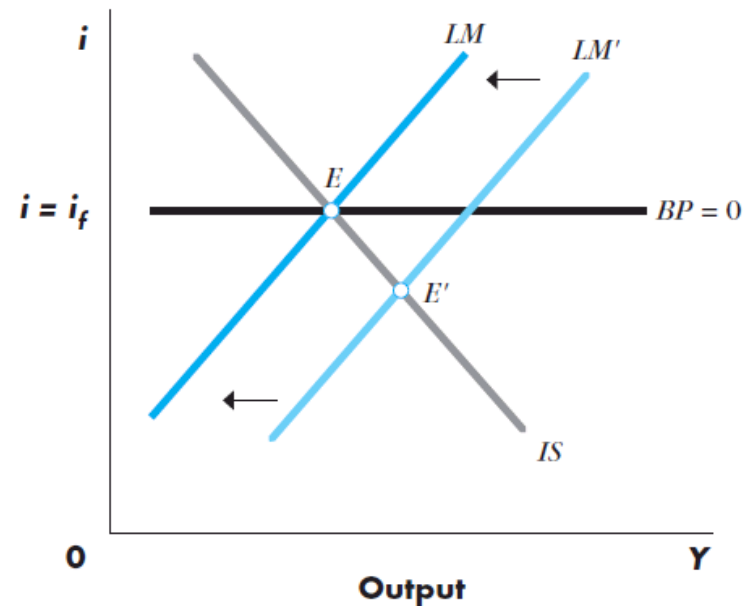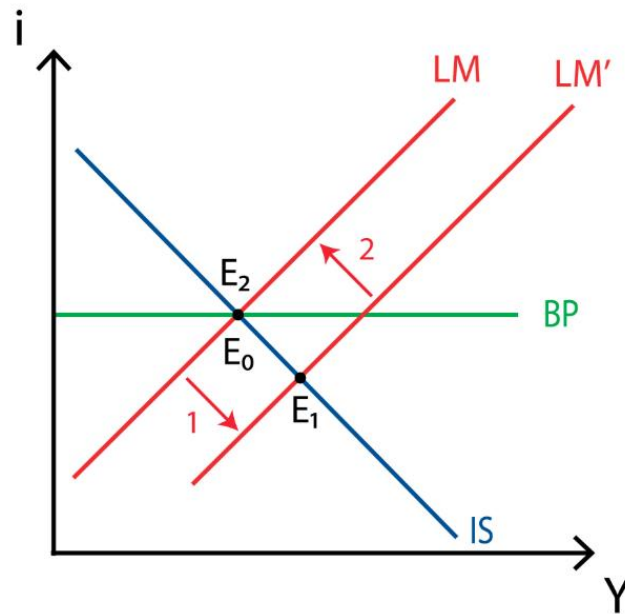
An expansionary monetary policy will shift the LM curve to LM', which makes the equilibrium go from point E0 to E1. However, since we are below the BP curve, we know the economy has a balance of payments deficit. Since exchange rates are fixed, government intervention is required: the government will purchase domestic currency and sell foreign currency, which will drop the money supply and therefore shift the LM' curve to its original position (which makes the equilibrium go to E2). Monetary policy has therefore no effect under these circumstances.

Fiscal Expansion with Fixed Exchange Rate

- Monetary policy is infeasible, but fiscal expansion under fixed exchange rates and perfect capital mobility is effective
  - A fiscal expansion shifts the IS curve up and to the right → increases interest rates and output
  - The higher interest rates creates a capital inflow with the tendency to appreciate the exchange rate
  - To manage the exchange rate the central bank *must* expand the money supply → shifting the LM curve to the right
    - Pushes interest rates back to their initial level, but output increases yet again
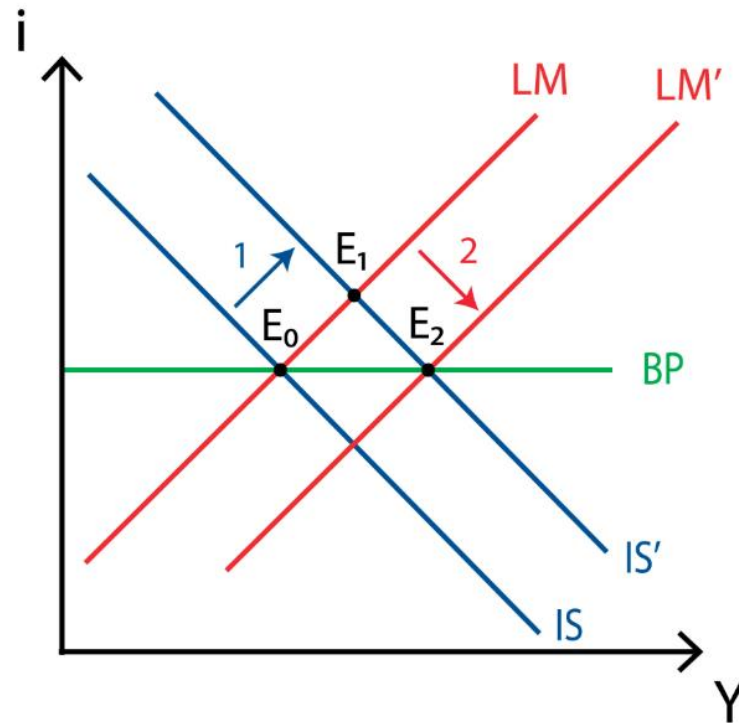
An expansionary fiscal policy will shift the IS curve to IS', moving the equilibrium form point E0 to point E1. Since the economy has now a balance of payments surplus, and because the exchange rate is fixed, government will intervene: they'll purchase foreign currency and sell domestic currency. This will increase the money supply, shifting the LM curve to the right. The final equilibrium is reached at point E2 where, at the same interest rate, production has increased greatly: fiscal policy works perfectly under these circumstances.

Perfect Capital Mobility and Flexible Exchange Rates

- Use the Mundell-Fleming model to explore how monetary and fiscal policy work in an economy with a flexible exchange rate and perfect capital mobility
  - Assume domestic prices are fixed
- Under a flexible exchange rate system, the central bank does not intervene in the market for foreign exchange
  - The exchange rate must adjust to clear the market so that the demand for and supply of foreign exchange balance
  - Without central bank intervention, the balance of payments must equal zero
  - The central bank can set the money supply at will since there is no obligation to intervene → no automatic link between BP and money supply

Perfect Capital Mobility and Flexible Exchange Rates

- Perfect capital mobility implies that the balance of payments balances when $i = i_f$ (10)
  - A real appreciation means home goods are relatively more expensive, and IS shifts to the left
  - A depreciation makes home goods relatively cheaper, and IS shifts to the right
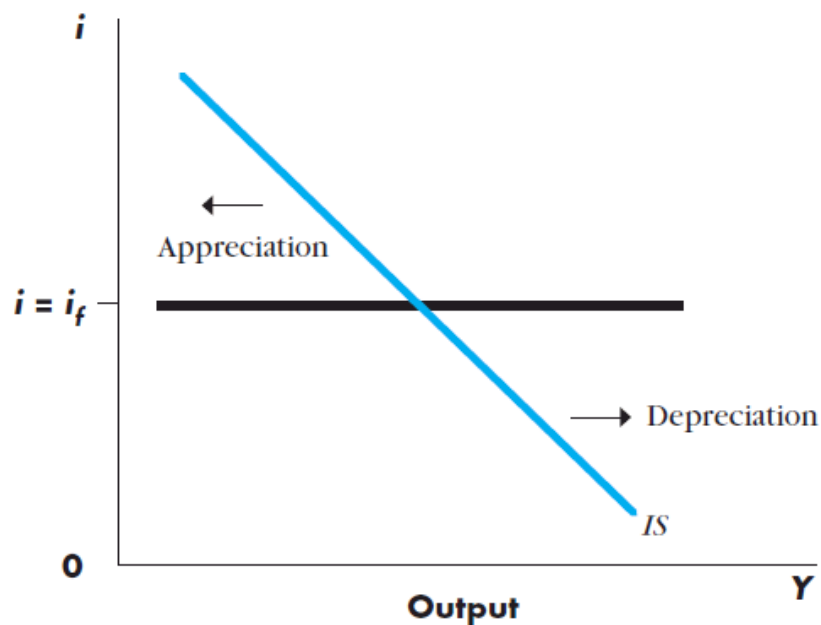
Perfect Capital Mobility and Flexible Exchange Rates

- The arrows in Figure 13-6 make the link between the interest rate and AD
  - When $i > i_f$, the currency appreciates
 - When $i < i_f$, the currency depreciates
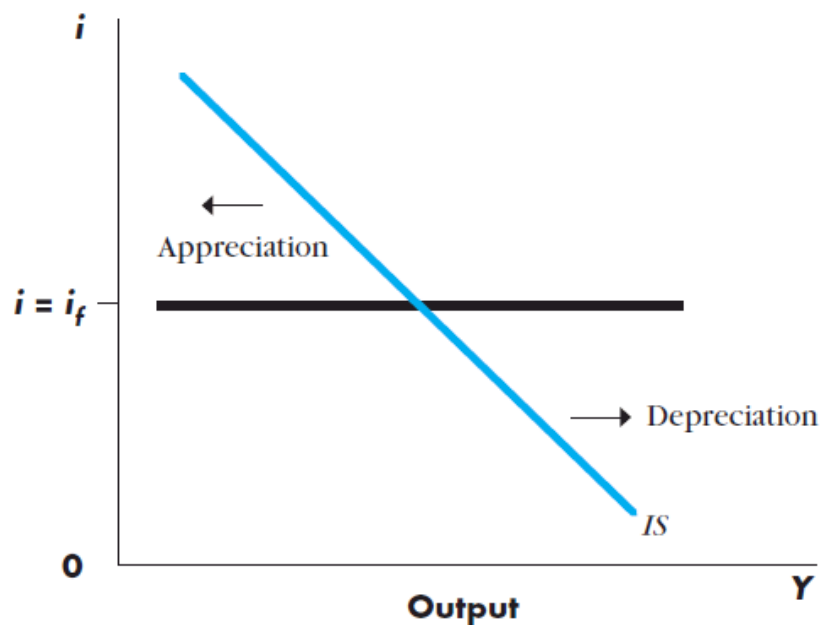
Adjustment to a Real Disturbance

- Using equations 8-10 we can show how various changes affect the output level, interest rate, and exchange rate

  <u>Suppose exports increase:</u>
  - At a given output level, interest rate, and exchange rate, there is an excess demand for goods
  - IS shifts to the right
  - The new equilibrium, E′, corresponds to a higher income level and interest rate
  - Don't reach E′ since BP in disequilibrium → exchange rate appreciation will push economy back to E
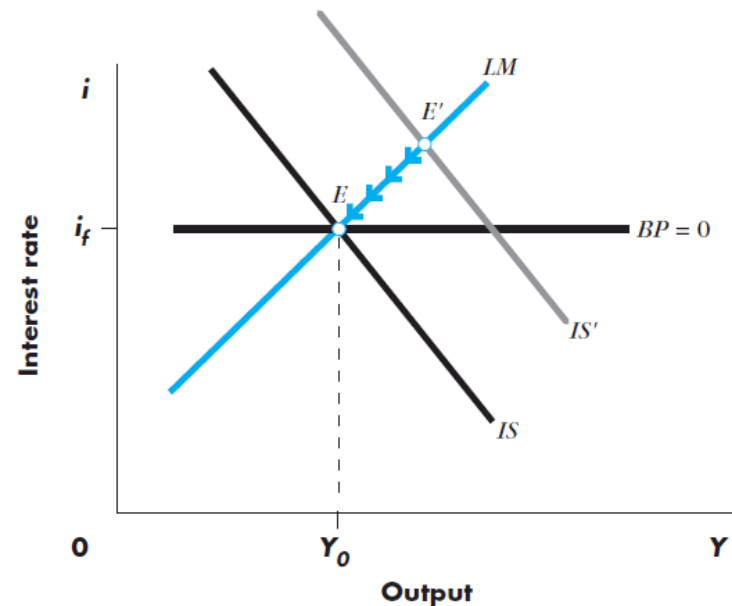
Adjustment to a Real Disturbance

- Using equations 8-10 we can show how various changes affect the output level, interest rate, and exchange rate

Suppose there is a fiscal expansion:

- — Same result as with increase in exports → tendency for demand to increase is halted by exchange appreciation

Real disturbances to demand do not affect equilibrium output under flexible exchange rates with capital mobility.
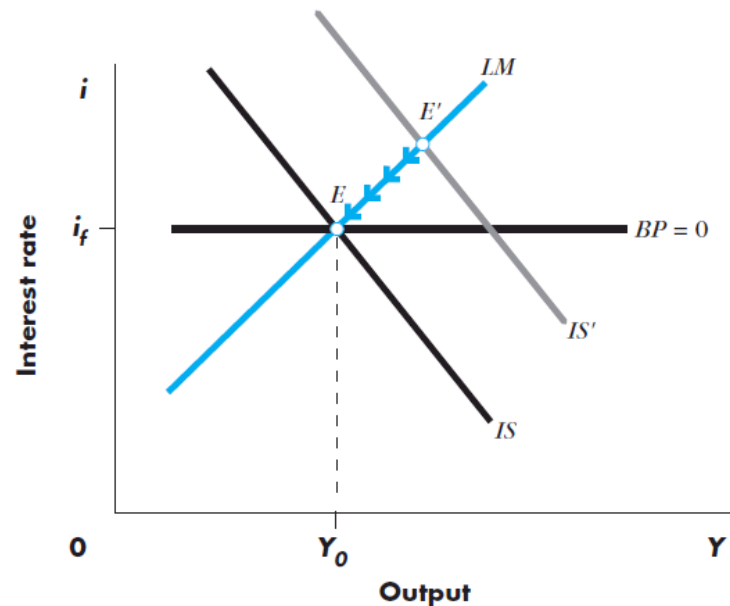
THE ADJUSTMENT PROCESS

Suppose that the increase in foreign demand takes place and that, in response, there is a tendency for output and income to increase. The induced increase in money demand will raise interest rates and thus bring us out of line with international interest rates. The resulting capital inflows immediately put pressure on the exchange rate. The capital inflows cause our currency to appreciate.

The exchange appreciation means, of course, that import prices fall and domestic goods become relatively more expensive. Demand shifts away from domestic goods, and net exports decline. In terms of Figure above, the appreciation implies that the IS schedule shifts back from IS' to the left. Next, we have to ask how far the exchange appreciation will go and to what extent it will dampen the expansionary effect of increased net exports.

The exchange rate will keep appreciating as long as our interest rate exceeds the world level. This implies that the exchange appreciation must continue until the IS schedule has shifted back all the way to its initial position. This adjustment is shown by the arrows along the LM schedule. Only when we return to point E will output and income have reached a level consistent with monetary equilibrium at the world rate of interest.

We have now shown that under conditions of perfect capital mobility, an expansion in exports has no lasting effect on equilibrium output. With perfect capital mobility the tendency for interest rates to rise, as a result of the increase in export demand, leads to currency appreciation and thus to a complete offset of the increase in exports. Once we return to point E, net exports are back to their initial level. The exchange rate has, of course, appreciated. Imports will increase as a consequence of the appreciation, and the initial expansion in exports is, in part, offset by the appreciation of our exchange rate.

FISCAL POLICY with Flexible exchange rate

We can extend the usefulness of this analysis by recognizing that it is valid for disturbances other than an increase in exports.

The same analysis applies to a fiscal expansion. A tax cut or an increase in government spending would lead to an expansion in demand in the same way as does increased exports. Again, the tendency for interest rates to rise leads to appreciation and therefore to a fall in exports and increased imports.

The important lesson here is that real disturbances to demand do not affect equilibrium output under flexible rates with perfect capital mobility.
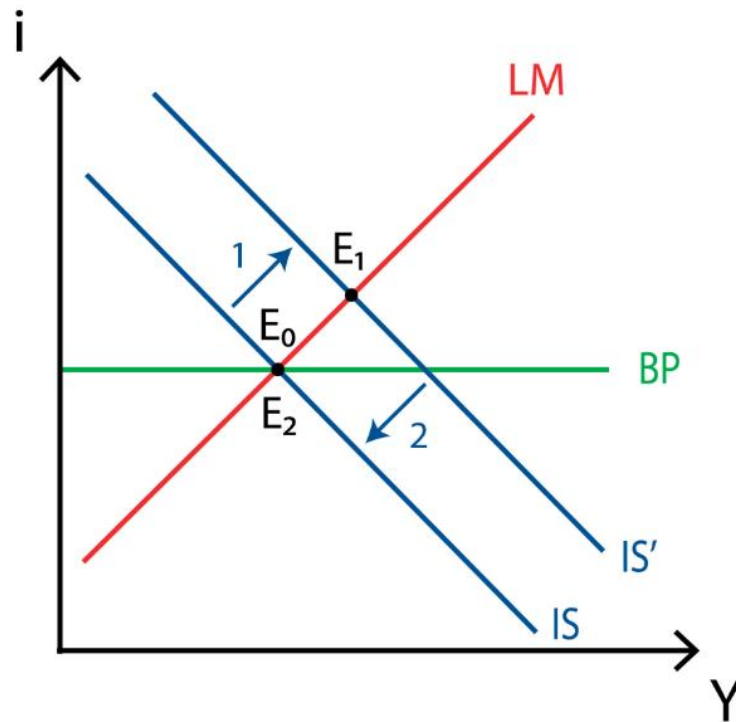
An expansionary fiscal policy will shift the IS curve to IS', moving the equilibrium from point E0 to point E1. The economy will therefore have a balance of payments surplus, which in this case of flexible exchange rate will appreciate the domestic currency. This will decrease net exports, since we are able to import more goods and services with less money, while foreigners will import less of our products because of our appreciated domestic currency. This drop in net exports will shift the IS' curve back to its original position. Since now the final equilibrium E2 corresponds to the initial equilibrium, we know fiscal policy is no good in this case.

Adjustment to a Change in the Money Stock (Monetary Policy with flexible excahnage rate)

Suppose there is an increase in the nominal money supply:

- The real stock of money, M/P, increases since P is fixed
- At E there will be an excess supply of real money balances
- To restore equilibrium, interest rates will have to fall → LM shifts to the right
- At point E′, goods market is in equilibrium, but i is below the world level → capital inflows depreciate the exchange rate
- Import prices increase, domestic goods more competitive, and demand for home goods expands
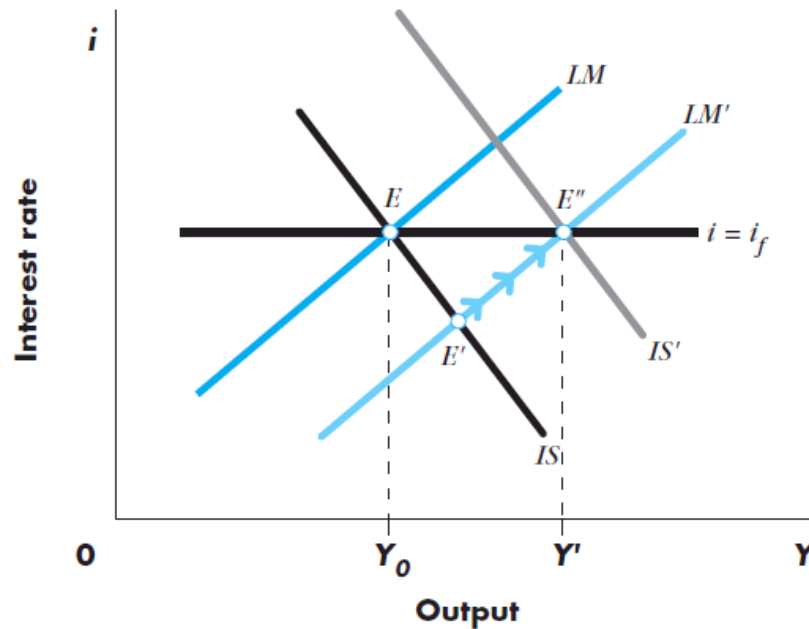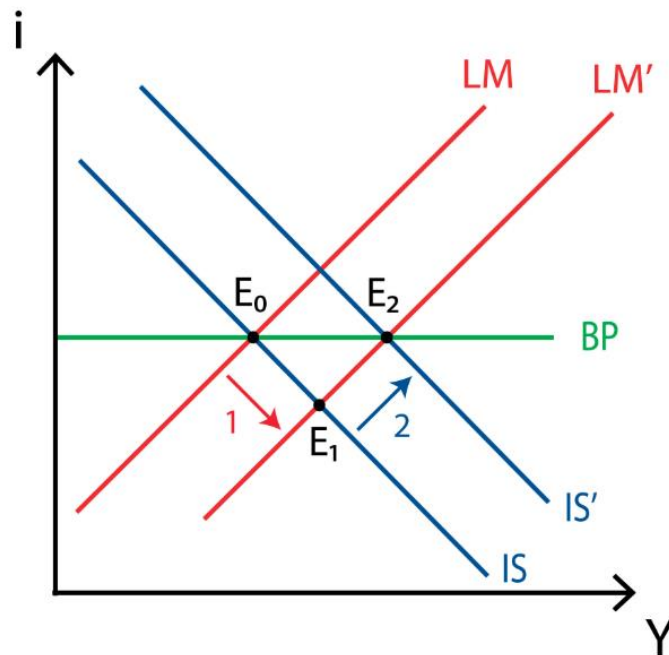- IS shifts right to E″, where i = i_f
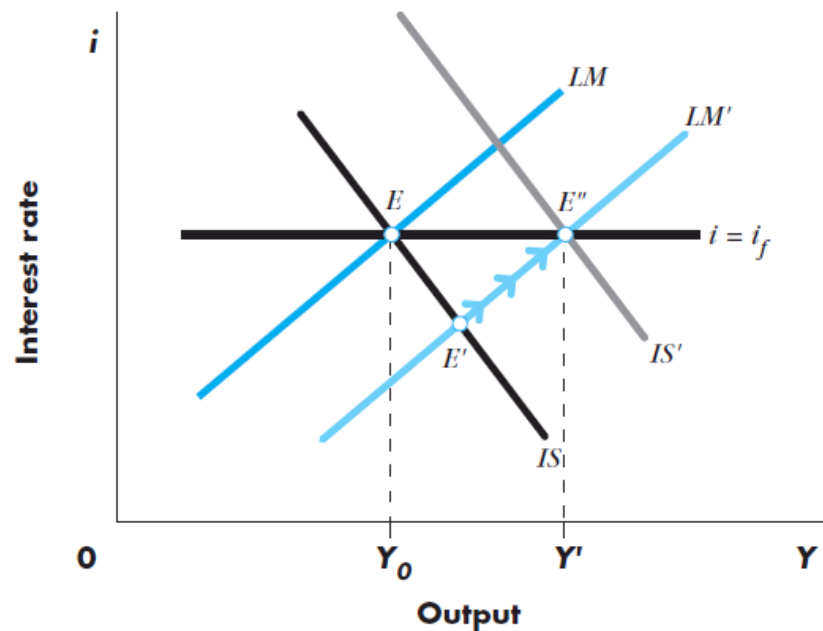
Adjustment to a Change in the Money Stock

Suppose there is an increase in the nominal money supply

- Result: A monetary expansion leads to an increase in output and a depreciation of the exchange rate under flexible rates

An expansionary monetary policy will shift the LM curve to LM', which makes the equilibrium go from point E0 to E1. However, since now exchange rates are flexible, we have a different situation: the balance of payments deficit will depreciate the domestic currency. This will increase net exports (since foreigners can now buy more of our products with the same amount of money), which will shift the IS curve to the right (to IS'). The final equilibrium is reached at point E2 where, at the same interest rate, production has increased greatly: monetary policy works perfectly under these circumstances.

How do our results compare with those in a fixed exchange rate world?

Under fixed rates, the monetary authorities cannot control the nominal money stock, and an attempt to expand money will merely lead to reserve losses and a reversal of the increase in the money stock.

Under flexible rates, by contrast, the central bank does not intervene, and so the money stock increase is not reversed in the foreign exchange market. The depreciation and expansion in output actually do take place, given the assumed fixed prices. The fact that the central bank can control the money stock under flexible rates is a key aspect of that exchange rate system.

BEGGAR-THY-NEIGHBOR POLICY AND COMPETITIVE DEPRECIATION

We have shown that a monetary expansion in the home country leads to exchange depreciation, an increase in net exports, and therefore an increase in output and employment. But our increased net exports correspond to a deterioration in the trade balance abroad. The domestic depreciation shifts demand from foreign goods toward domestic goods. Abroad, output and employment decline. It is for this reason that a depreciation-induced change in the trade balance has been called a **beggar-thy-neighbor policy**—it is a way of exporting unemployment or of creating domestic employment at the expense of the rest of the world.

Nevertheless, from the point of view of an individual country, exchange depreciation works to attract world demand and raise domestic output. If every country tried to depreciate to attract world demand, we would have **competitive depreciation** and a shifting around of world demand rather than an increase in the worldwide level of spending. And if everyone depreciated to roughly the same extent, we would end up with exchange rates about where they started. Coordinated monetary and fiscal policies rather than depreciations are needed to increase demand and output in each country when worldwide aggregate demand is at the wrong level.