Chapter One

1. Exchange Rate and the Foreign Exchange Market

- Each country has a currency in which the prices of Gs & Ss are quoted.
- E.g. **dollar** -United States, **euro** -Germany, p**ound sterling**-Britain, **yen** -Japan, **Birr** - Ethiopia, **shelling** - Kenya, and the **peso**-Mexico,
- International trade takes place via **exchange rates**, because it allow us to compare the prices of goods and services produced in different countries.
- E.g. Price **Yaris brand** automobile in **Ethiopia** @ CM price is Br. 350,000 whereas it costs shi.200,000 in **Kenya**.

<div align="center">

• **In which country price is dearer?**

</div>

✓ Comparison is possible if we know the **relative price** of Birr and Shelling.
✓ **exchange rate : -**The price of one currency in terms of another
 ✓ the amount of **domestic/ foreign** currency that is needed to obtain a unit of **foreign/domestic** currency.
 ✓ It can be expressed as a **ratio of price of dollar to foreign** currency OR price of foreign currency to price of dollar.

$$\epsilon = \frac{P_D}{P_f} \quad Or \quad \epsilon = \frac{P_f}{P_D}$$

Direct (American) terms   Indirect (American) terms

The foreign exchange market
– Is the market where one buys or sells the currency of **country A** with the currency of **country B**

A currency exchange rate
– Is simply the ratio of a **unit of currency of country A** to a **unit of the currency of country B** at the time of the buy or sell transaction

- **The demand for foreign currencies arises if:**
  – Tourists visit another country
  – A domestic firm wants to import from other nations
  – An individual wants to invest abroad

- **The supply of a nation's foreign currency arises from if:**
  – Foreign tourist expenditures in the nation
  – Export earning
  – Foreign investment

- **Exchange rates:** are determined by the interaction of the households, firms, and financial institutions that buy and sell foreign currencies to make international payments.

Four levels of transactors or participants

1. **traditional users** -Immediate users and suppliers of foreign currencies
   - ✓ importers/exporters/ tourists/investors.
2. **commercial bank-** act as clearing house b/n users and earners of foreign exchange. (central collection place)
3. **Foreign exchange brokers** -interbank / wholesale market, through whom the nation's commercial banks even out their **forex inflows and outflows** among themselves.
4. **nation's central bank** – act as the seller or buyer of last resort when nation's total forex earning and expenditure is unequal. (Have a right to recourse)

- **Characteristics of foreign exchange market:**
  - √ Volume is enormous:
  - √ Highly integrated globally:
  - √ Vehicle currency:

- **Functions of the Foreign Exchange Market**
  - **Transfer of Purchasing Power/funds:** transfer one nation's fund and currency to other.
  - **Provision of Credit:** when goods are at transit, it enables buyers to resell & made pay't.
  - **Minimizing Forex Risk:** esp. role of commercial banks as clearing house
  - It provides facilities for hedging (forex risk avoidance) and speculation (forex risk taking)

- **Different concepts of the exchange rate and Exchange rate regimes**
  - **Arbitrage:** purchase of a currency where it is cheaper, resale in the monetary center where it is more expensive, in order to make a profit.
  - It is the practice of **taking advantage of a state of imbalance** between two/more markets.
  - A person who engages in arbitrage is called an **arbitrageur**.
- **Triangular arbitrage** is the act of exploiting an arbitrage opportunity resulting from a pricing discrepancy among three different currencies in the foreign exchange market. **(cross exchange rate)**
- Suppose the current exchange rates of currency pairs are as follows:
  - ❖ EUR/$: 1.1837   EUR/ £ : 0.7231   £ /$: 1.6388
- In such a scenario, a foreign exchange trader could perform a triangular arbitrage by adopting the following steps:
  - Buy 10,000 Euros for **$11,837 USD**.
  - Sell the 10,000 Euros, for 7,231 British pounds (GBP).
  - The 7,231 GBP in turn could then be sold for **$11,850 USD**.
- **A profit of $11,850 - $11,837 = $13 per trade earned trader.**
- **Adv.** Increase demand for currency in the country where the currency is cheaper, increase supply of currency where the currency is more expensive
  - Rapidly equalizes exchange rate among countries=> tendency to unify monetary centers to single market.

❖TYPES OF FOREIGN EXCHANGE TRANSACTIONS:

- **1. Spot exchange rates/ spot transaction**
  - the day's rate offered by a dealer/bank=> **immediate delivery**
  - The most common type of foreign exchange transaction
  - involves the payment and receipt of the foreign exchange within two business days after the day the transaction is agreed upon.
  - The two-day period gives adequate time for the parties to send instructions to debit and credit the appropriate bank accounts at home and abroad.
    - Participants in spot transaction: **Commercial banks, Brokers, Customers of commercial and central banks.**

- **2. Forward exchange rates:**
  - **Agreed in advance rates to buy/sell a currency on a future date** at a rate agreed upon today.
  - Usually quoted 30, 90, 120 days in advance
  - Forward contracts can be renegotiated for one or more periods when they become due.

- **FD (forward discount)**
- ✓ If the forward rate **is below the present spot rate**, the foreign currency is said to be at a forward discount with respect to the domestic currency.

- **FP (forward premium)**
- ✓ If the forward rate **is above the present spot rate**, the foreign currency is said to be at a forward premium with respect to the domestic currency.

- Participants: Arbitrageurs, Traders, Hedgers and Speculators.

$$The\ forward\ premium/discount = \frac{F-S}{S} * \frac{12}{n} * 100$$

- Where, F = the forward rate of exchange

   S = the spot rate of exchange

       n = the number of months in the forward contract

- **3. Option rate:** A foreign exchange option **gives its owner the right to buy or sell a specified amount of foreign currency** at a specified price at any time up to a specified expiration date.

- **4. Swap rate:** is the **conversion of one currency to another currency at one point in time**, with an agreement to reconvert it back to the original currency at a specified time in the future.
  - involves the simultaneous purchase and sale of a given amount of foreign exchange for two different value dates.
  - The rates of both exchanges are agreed to in advance

- Since this agreement is executed as a single transaction, the dealer incurs no unexpected foreign exchange risk.

- **Foreign exchange rate determination**
  - **Under the flexible exchange rate system**, the equilibrium exchange rate is determined by the market forces of **Supply and Demand**.
  - **The demand for foreign exchange corresponds to the debit items on a nation's BoPs statement;**
    - Ethiopia demand for dollars may stream from its **desire to import US goods** and **services, to make investments in US**, /**to make transfer payments to residents in US.**
    - Ethiopia demand for dollars **varies inversely with its price**; that is, fewer dollars are demanded at higher prices than at lower prices.
    - As the birr **depreciates** against the dollar (**the birr price of the dollar rises**), US goods and services become more expensive to Ethiopian importers.
    - This is because more birrs are required to purchase each dollar needed to finance the import purchases.
  - **The supply of foreign exchange refers to the amount of foreign exchange that will be offered to the market at various exchange rates.**
    - For example, the supply of dollars is generated by the **desire of US residents and businesses** to **import Ethiopian goods and services**, **to lend funds and make investments in the Ethiopia**, and to extend **transfer payments to Ethiopian residents**.

R= Br/$

Millions of $/day
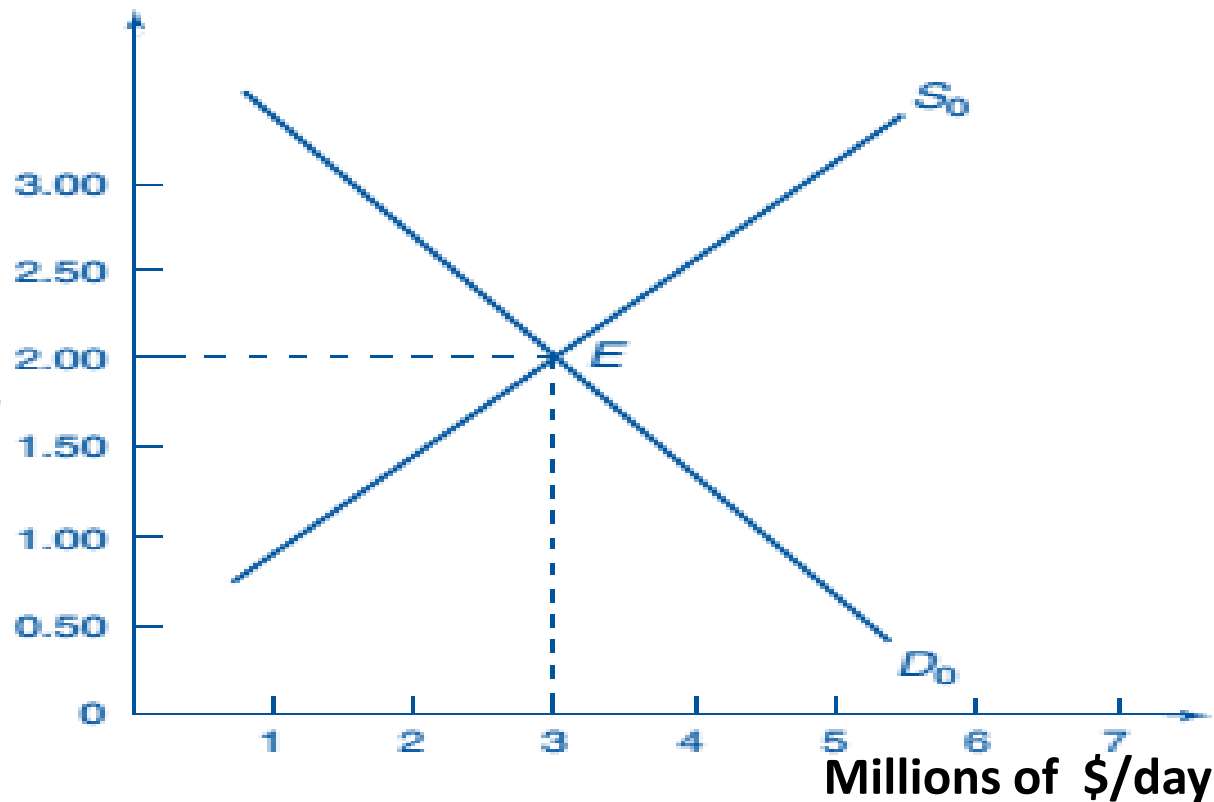
> ✓The higher the exchange rate **(R)**, the greater the quantity of dollars earned by or supplied to the Ethiopia. Dollar appreciation
> ✓It refers to Depreciation (increase) in the domestic currency price of foreign currency.

✎**Is a strong (appreciating) birr always good and a weak (depreciating) birr always bad?**

- *Foreign exchange risk, Hedging and speculation*
- *Foreign exchange risk*
  - Nation's DD and SS curves for forex shift causing spot and forward rates to fluctuate frequently.
    - Change in tastes for domestic and foreign products.
    - Growth and inflation rates in d/t nations
    - Change in relative interest
    - Change in the expectations.
- **Arises out of three types of exposures**
  - **Transaction exposure:** transaction involving future pay'ts and receipts in forex.
  - **Translation/ Accounting exposure:** a need to value inventories held abroad in terms of domestic currency
  - **Economic exposure:** estimating domestic currency value of future profitability of the firm

- *Hedging*
  - Refers to avoidance of forex risk / covering of an open position .
  - But cost of avoiding forex risk depends on the positive difference between the borrowing and deposit rates of interest.
  - Usually takes place in forward market.
- *Speculation*
  - Is opposite of hedging, in the hope of making profit
- **In spot market:** believing the spot rate of particular currency will rise, they can purchase currency now and hold it in deposit.
- **In forward markets:** believing the spot rate of particular currency will rise in the next three months than present three months.
- Effect of speculation
  - Stabilizing effect : purchase of foreign currency when domestic price of foreign currency falls in the expectation it will rise soon.
  - Destabilizing effect: sale of foreign currency when exchange rate falls with an expectation that it will fall further.

- *Interest arbitrage and efficiency of forex market*

- Interest arbitrage refers to the international flow of short-term liquid capital to earn higher returns abroad.

- **Uncovered interest arbitrage:** the transfer of funds to abroad to take an advantage of higher interest rates in foreign monetary centers involves the conversion of the Dc to the Fc to make investment.

- **At maturity date, Fc reconverted to Dc plus interest earned abroad.**

- **covered interest arbitrage:** refers to the spot purchase of the foreign currency to make the investment and the balancing with simultaneous forward sale (swap) of the foreign currency to cover the foreign exchange risk.

- **The interaction between foreign exchange rate and financial market**
- **Demand for foreign currency assets:**

- What influences the demand of (willingness to buy) deposits denominated in domestic or foreign currency?

- Factors that influence the **return on assets** determine the demand of those assets.

  – **Interest rate**

  – **Risk involved**

  – **Liquidity of asset**

The Demand of Currency Deposits (cont.)

- **Rate of return**: the percentage change in value that an asset offers during a time period.

  - The annual return for $100 savings deposit with an interest rate of 2% is $100 x 1.02 = $102, so that the rate of return = ($102 - $100)/$100 = 2%

- **Real rate of return**: inflation-adjusted rate of return,

  - which represents the **additional amount of goods & services** that can be purchased with earnings from the asset.

  - The real rate of return for the above savings deposit when inflation is 1.5% is: 2% – 1.5% = 0.5%. After accounting for the rise in the prices of goods and services, the asset can purchase 0.5% more goods and services after 1 year.

The Demand of Currency Deposits (cont.)

- If prices are fixed, the inflation rate is 0% and **Nominal rates of return = real rates of return**.

- Because trading of deposits in different currencies occurs on a daily basis, we often assume that prices do not change from day to day.

  - A good assumption to make for the short run.

The Demand of Currency Deposits (cont.)

- **Risk of holding assets** also influences decisions about whether to buy them.

- **Liquidity of an asset**, or ease of using the asset to buy goods and services, also influences the willingness to buy assets.

- But we assume that **risk and liquidity of currency deposits** in foreign exchange markets are essentially the same, regardless of their currency denomination.

  - Risk and liquidity are only of secondary importance when deciding to buy or sell currency deposits.

  - Importers and exporters may be concerned about risk and liquidity, but they make up a small fraction of the market.

The Demand of Currency Deposits (cont.)

- We, therefore, say that **investors are primarily** concerned about the **rates of return** on currency deposits.

- Rates of return that investors expect to earn are determined by

  - interest rates that the assets will earn.

  - expectations about appreciation or depreciation

The Demand of Currency Deposits (cont.)

- A currency deposit's **interest rate** is the amount of a currency that an individual or institution can **earn by lending a unit of** the currency for a year.

- The **rate of return** for a deposit in domestic currency is the interest rate that the deposit earns.

- To compare the rate of return on a deposit in domestic currency with one in foreign currency, consider
  - the interest rate for the foreign currency deposit
  - the expected rate of appreciation or depreciation of the foreign currency relative to the domestic currency.

The Demand of Currency Deposits (cont.)

- Suppose the interest rate on a dollar deposit is 2%.

- Suppose the interest rate on a euro deposit is 4%.

Q Does a euro deposit yield a higher expected rate of return?

  – Suppose today the exchange rate is **$1/€1**, and the expected rate one year in the future is **$0.97/€1**.

  – **$100 can be exchanged today for €100.**

  – These €100 will yield €104 after one year.

  – These €104 are expected to be worth $0.97/€1 x €104 = $100.88 in one year.

- The rate of return in terms of dollars from investing in euro deposits is ($100.88-$100)/$100 = 0.88%.

The Demand of Currency Deposits (cont.)

- Let's compare this rate of return with the rate of return from a dollar deposit.
    - The rate of return is simply the interest rate.
    - After 1 year the $100 is expected to yield $102: ($102-$100)/$100 = 2%

- The euro deposit has a lower expected rate of return: thus, *all* investors should be willing to dollar deposits and *none* should be willing to hold euro deposits.

The Demand of Currency Deposits (cont.)

- **Note that the expected rate of appreciation of the dollar was ($0.97- $1)/$1 = -0.03 = -3%.**

- We simplify the analysis by saying that the **dollar rate of return on euro deposits** approximately equals

  – the interest rate on euro deposits plus the expected rate of appreciation of euro deposits
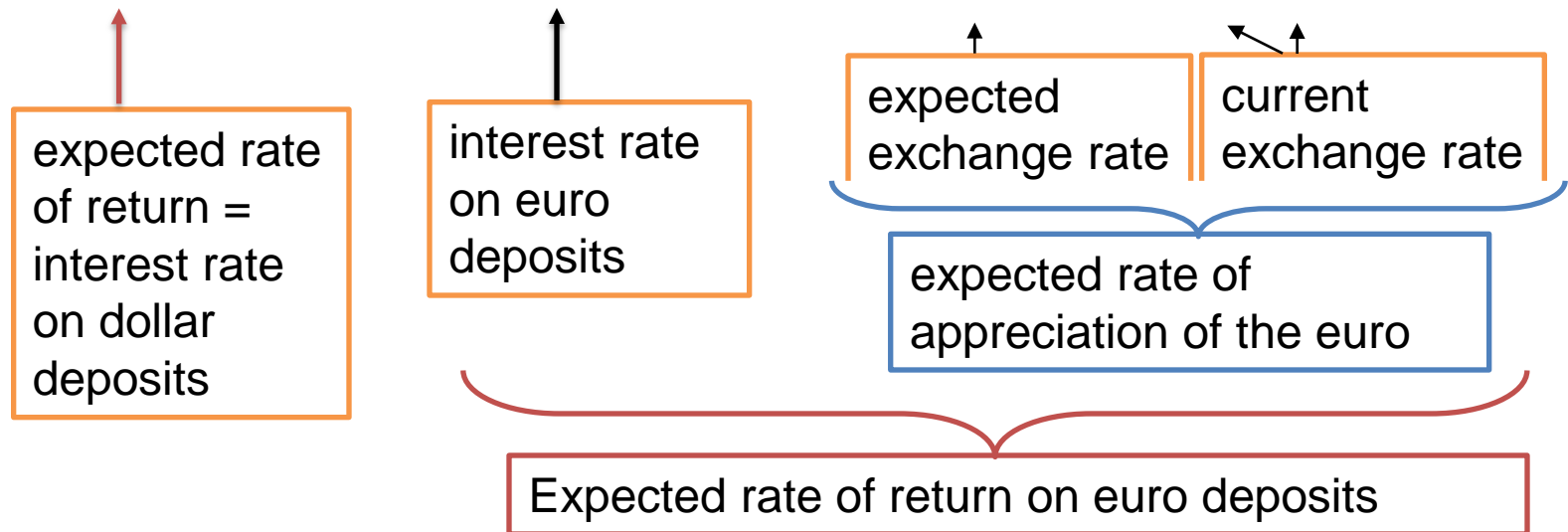
  – 4% + -3% = 1% ≈ 0.88%

$$-R_{\text{€}} \;+\; \frac{(E^e_{\$/\text{€}} - E_{\$/\text{€}})}{E_{\$/\text{€}}}$$

The Demand of Currency Deposits (cont.)

- The difference in the rate of return on dollar deposits and euro deposits is

- $R_{\$} - (R_{€} + (E^e_{\$/€} - E_{\$/€})/E_{\$/€}) =$

$$R_{\$} \quad\quad - R_{€} \quad - (E^e_{\$/€} - E_{\$/€})/E_{\$/€}$$

expected rate of return = interest rate on dollar deposits

interest rate on euro deposits

expected exchange rate

current exchange rate

expected rate of appreciation of the euro

Expected rate of return on euro deposits

E.g. Comparing Dollar Rates of Return on Dollar and Euro Deposits

Case	Dollar Interest Rate $R_\$$	Euro Interest Rate $R_\text{€}$	Expected Rate of Dollar Depreciation Against Euro $\dfrac{E^e_{\$/\text{€}} - E_{\$/\text{€}}}{E_{\$/\text{€}}}$	Rate of Return Difference Between Dollar and Euro Deposits $R_\$ - R_\text{€} - \dfrac{(E^e_{\$/\text{€}} - E_{\$/\text{€}})}{E_{\$/\text{€}}}$
1	0.10	0.06	0.00	0.04
2	0.10	0.06	0.04	0.00
3	0.10	0.06	0.08	-0.04
4	0.10	0.12	-0.04	0.02

❖ Expected annual real rate of return on dollar deposits is 4 % higher than that on euro.

❖ Interest difference is the same (4 percent), the two assets have the same expected rate of return.

❖ **A 4 % interest difference in favor of dollar deposits is offsetted by an 8% expected depreciation of the dollar, so euro deposits are preferred.**

❖ **Dollar is expected to appreciate by 4%, dollar deposits are preferred**

Equilibrium in the Foreign Exchange Market

- *The foreign exchange market is in equilibrium when deposits of all currencies offer the same expected rate of return.*

- Two currencies are equal when measured in the same currency is called the **interest parity condition.**

- A market said to efficient if price reflects all available information.

- similarly, **Forex market said to efficient** if forward exchange rate accurately predicts future spot exchange rate.
  - Available information, Investors cannot earn consistent and unusual profit.

- Note: even if Forex market were efficient we cannot expect forward rate same with spot rate b/se of **unforeseen events**=> volatility of 'e'

- **Intentionally Left As Page Breaker**

* * * * * * * * * *

Test _1 Friday May 10, 2019@11;00 local time

Chapter 2

Money, Interest Rates, and Exchange Rates

What Is Money?

- **Money** is an asset that is widely used as a means of payment.
  - Different groups of assets may be classified as money.
    - Money can be defined **narrowly or broadly**.
    - Currency in circulation, checking deposits, and debit card accounts form a narrow definition of money.
    - Deposits of currency are excluded from this narrow definition, although they may act as a substitute for money in a broader definition.

Money Supply

- The central bank substantially controls the quantity of money that circulates in an economy, the **money supply**.

  – In the US, the central banking system is the Federal Reserve and Ethiopia, NB.

- Money demand: represents the amount of monetary assets that people are willing to hold (instead of illiquid assets).

  ♦ What influences willingness to hold monetary assets?

  ♦ We consider individual demand of money and aggregate demand of money

What Influences Demand of Money for Individuals and Institutions?

1. **Interest rates/expected rates of return**

2. **Price level**: ... unexpected inflation

3. **Income**

What Influences Aggregate Demand of Money?

1. **Interest rates/expected rates of return**

   – A higher interest rate means a higher opportunity cost of holding monetary assets $\rightarrow$ lower demand of money.

2. **Prices**

   – A higher level of average prices means a greater need for liquidity to buy the same amount of goods and services $\rightarrow$ higher demand of money.

What Influences Aggregate Demand of Money? (cont.)

3. Income

– A higher real national income (GNP) means more goods and services are being produced and bought in transactions, increasing the need for liquidity $\rightarrow$ higher demand of money.

A Model of Aggregate Money Demand

The aggregate demand of money can be expressed as:

$$M^d = P \times L(R,Y)$$

where:

    $P\_$ is the price level

    $Y\_$ is real national income

    $R\_$ is a measure of interest rates

    $L(R,Y)$ is the aggregate demand of real monetary assets

Alternatively:

$$M^d/P = L(R,Y)$$

Aggregate demand of real monetary assets is a function of national income and interest rates.

Fig. 2-1: Aggregate Real Money Demand and the Interest Rate

Interest rate, R

For a given level of income, real money demand decreases as the interest rate increases.

$L(R,Y)$

Aggregate real money demand

Fig. 2-2: Effect on the Aggregate Real Money Demand Schedule of a Rise in Real Income

A Model of the Money Market

- The money market is where monetary or liquid assets, which are loosely called "money," are lent and borrowed.

  – Monetary assets in the money market generally have low interest rates compared to interest rates on bonds, loans, and deposits of currency in the foreign exchange markets.

  – Domestic interest rates directly affect rates of return on domestic currency deposits in the foreign exchange markets.

A Model of the Money Market

- In equilibrium:

$$M^s = M^d$$

- Alternatively, in real terms:

$$M^s/P = L(R,Y)$$

Fig 2-3: Determination of the Equilibrium Interest Rate

Fig 2-4: Effect of an Increase in the Money Supply on the Interest Rate

Interest rate, R

Real money supply

Real money supply increases

R^1 — 1

R^2 — 2

$L(R,Y)$

$\dfrac{M^1}{P}$ $\dfrac{M^2}{P}$ Real money holdings

An increase in the money supply lowers the interest rate for a given price level.

A decrease in the money supply raises the interest rate for a given price level.

Fig 2-5: Effect of Rise in Real Income on the Interest Rate

An increase in national income increases equilibrium interest rates for a given price level.

Fig 2-6: Simultaneous Equilibrium in the U.S. Money Market and the Foreign Exchange Market
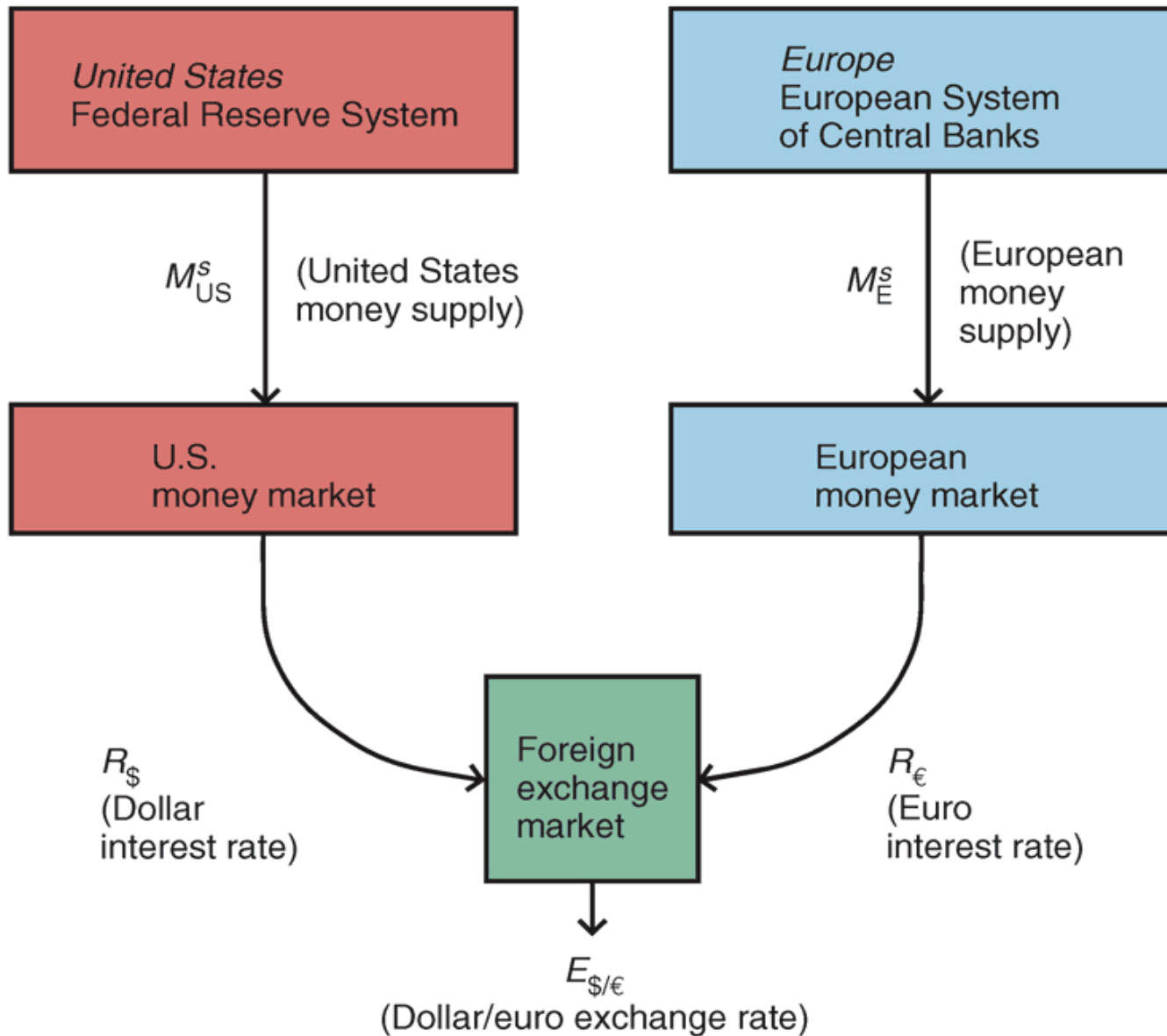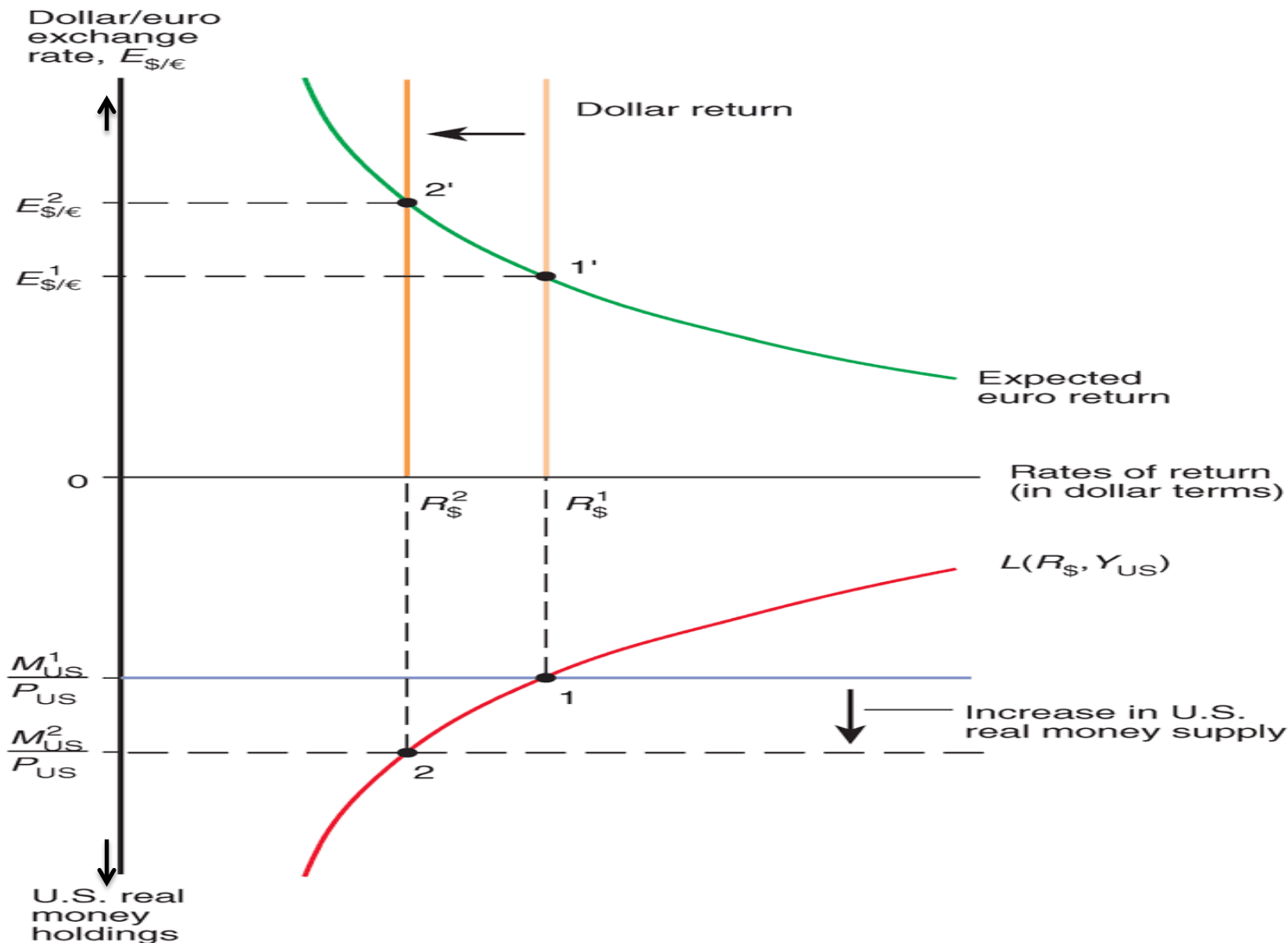
Fig 2-7: Money Market/Exchange Rate Linkages

United States
Federal Reserve System

Europe
European System
of Central Banks

M_{US}^s (United States money supply)

M_E^s (European money supply)

U.S. money market

European money market

$R_\$$ (Dollar interest rate)

Foreign exchange market

$R_\euro$ (Euro interest rate)

$E_{\$/\euro}$ (Dollar/euro exchange rate)

Fig 2-8: Effect of Increase in the **U.S. Money Supply** on the Dollar/Euro Exchange Rate and Dollar Interest Rate

Changes in the Domestic Money Supply

- ⇑M → ⇓R → E⇑(depreciates)

- What happens if there is a decrease in a country's money supply?

- An increase in the supply of euros causes a depreciation of the euro (appreciation of the dollar).

- The increase in the supply of Euros reduces interest rates in the EU, reducing the expected rate of return on euro deposits.

- This reduction in the expected rate of return on euro deposits causes the euro to depreciate.

- We predict no change in the U.S. money market due to the change in the supply of Euros.

Long Run and Short Run

- In the *short run*, prices do not have sufficient time to adjust to market conditions.

  - the analysis heretofore has been a short run analysis.

- In the *long run*, prices of factors of production and of output have sufficient time to adjust to market conditions.

  - Wages adjust to the demand and supply of labor.

  - Real output and income are determined by the amount of workers and other factors of production—by the economy's productive capacity—not by the quantity of money supplied.

  - (Real) interest rates depend on the **supply of saved funds** and the **demand of saved funds**.

Long Run and Short Run (cont.)

- In the long run, the quantity of money supplied is predicted not to influence the amount of output, (real) interest rates, and the aggregate demand of **real monetary assets** $L(R,Y)$.

- However, the quantity of money supplied is predicted to make level of average prices *adjust proportionally* in the long run.

  – The equilibrium condition $M^s/P = L(R,Y)$ shows that P is predicted to adjust proportionally when M^s adjusts because $L(R,Y)$ does not change.

Long Run and Short Run (cont.)

- In the long run, there is a direct relationship between the inflation rate and changes in the money supply.

  - $M^s = P \times L(R,Y)$

  - $P = M^s/L(R,Y)$

  - $p = \dfrac{\Delta P}{P} = \dfrac{\Delta M^s}{M^s} - \dfrac{\Delta L}{L}$

  - The inflation rate is predicted to equal the growth rate in money supply minus the growth rate in money demand.

Exchange Rate Overshooting

- The exchange rate is said to **overshoot** when its **immediate response** to a change is **greater** than its long run response.

- Overshooting is predicted to occur when monetary policy has an immediate effect on interest rates, but not on prices and (expected) inflation.

- Overshooting helps to explain why exchange rates are so *volatile*.

❖ Purchasing-Power Parity Theory

■ **Absolute Purchasing-Power Parity Theory**

▸ It postulates that the equilibrium exchange rate is equal to the ratio of the price levels in the two nations. Specifically:

▸ $$R = \frac{P}{P^*}$$

▸ Where, R is the exchange rate, P and P^* are respectively the general price level in the home nation and in the foreign nation

▸ **Law of One Price**

▸ If the price of wheat is \$0.50 per kg in US and \$1.50 in Ethiopia, firms would purchase wheat in US and resell it in Ethiopia, at a profit.

▸ This commodity arbitrage would cause the price of wheat to fall in Ethiopia and rise in US until the price is equal, say \$1 per kg in both economies.

- **Shortcoming of the Theory**

- **This version of the PPP theory can be very misleading. There are several reasons as following:**

- It appears to give the exchange rate that equilibrates trade in goods and services while completely disregarding the capital account(capital outflows would have a deficit in its balance of payment, capital inflows would have a surplus if the exchange rate were the one that equilibrated international trade in goods and services).

- The PPP theory will not even give the exchange rate that equilibrates trade in goods and services because of the existence of many non-traded goods (e.g. cement, bricks except the border areas) and services (e.g. hair stylists, family doctors).

- The absolute PPP theory fails to take into account transportation costs or other obstructions to the free flow of international trade.

Relative Purchasing-Power Parity Theory

- **The relative PPP theory** postulates that the change in the **exchange rate over a period of time** should be proportional to the relative change in the price levels in the two nations. This version of the PPP theory has some value.

- **Formula**

- Subscribing 0 refers to the base period and 1 to a subsequent period, the relative PPP theory postulates that :

$$R_1 = \frac{P_1 / P_0}{P_1^* / P_0^*} R_0$$

- Where R_1 and R_0 are respectively, the exchange rates in period 1 and in the base period.

Example

- If the general price level does not change in the foreign nation from the base period to current period (i.e. $P1^*/P0^*=1$), while the general price level in the home nation increases by 50 percent, the relative PPP theory postulates that the exchange rate should be 50 percent higher in current period as compared with the base period.

- **Relation between Relative PPP and Absolute PPP**

➤ while the very existence of capital flows, transportation costs, other obstructions to the free flow of international trade, and government intervention policies leads to the rejection of the absolute PPP, only a change in these would lead the relative **PPP theory off target.**

Problems of Relative PPPP Theory

- The ratio of the price of non-traded to the price of traded goods and services is **systematically higher in developed nations** than in developing nations

  - **Reason:** Techniques in the production of many non-traded goods and services (haircutting, for example) are often quite similar in developed and developing nations.

  - However, the labors in these occupations in developed nations must receive much higher wages comparable to the high wages in the production of traded goods and services.

  - This makes the price of non-traded goods and services systematically much higher in developed nations than in developing nations.

Problems of Relative PPPP Theory

- The relative PPP theory will tend to predict overvalued exchange rates for developed nations and undervalued exchange rates for developing nations, with distortions being larger the greater the differences in the levels of development

  - **Reason:** The general price index includes the prices of both traded and non-traded goods and services, and prices of the latter are not equalized by international trade but are relatively higher in developed nations.

- Significant structural changes also lead to problems with the relative PPP theory

- **Reason:** UK had liquidated many of its foreign investments during the war, so that the equilibrium exchange rate predicted by the relative PPP theory would have left a large deficit in the U.K. balance of payments after the war.

The end!!!

Chapter 2

Money, Interest Rates, and Exchange Rates

What Is Money?

- **Money** is an asset that is widely used as a means of payment.

  – Different groups of assets may be classified as money.

    - Money can be defined narrowly or broadly.

    - Currency in circulation, checking deposits, and debit card accounts form a narrow definition of money.

    - Deposits of currency are excluded from this narrow definition, although they may act as a substitute for money in a broader definition.

Money Supply

- The central bank substantially controls the quantity of money that circulates in an economy, the **money supply**.

  – In the US, the central banking system is the Federal Reserve and Ethiopia, NB.

- Money demand: represents the amount of monetary assets that people are willing to hold (instead of illiquid assets).

  ♦ What influences willingness to hold monetary assets?

  ♦ We consider individual demand of money and aggregate demand of money

What Influences Demand of Money for Individuals and Institutions?

1. **Interest rates/expected rates of return**

2. **Price level**: … unexpected inflation

3. **Income**

What Influences Aggregate Demand of Money?

1. **Interest rates/expected rates of return**
   - A higher interest rate means a higher opportunity cost of holding monetary assets → lower demand of money.

2. **Prices**
   - A higher level of average prices means a greater need for liquidity to buy the same amount of goods and services → higher demand of money.

What Influences Aggregate Demand of Money? (cont.)

3. Income

- A higher real national income (GNP) means more goods and services are being produced and bought in transactions, increasing the need for liquidity → higher demand of money.

A Model of Aggregate Money Demand

The aggregate demand of money can be expressed as:

$$M^d = P \times L(R,Y)$$

where:

    P is the price level

    Y is real national income

    R is a measure of interest rates

    $L(R,Y)$ is the aggregate demand of real monetary assets

Alternatively:

$$M^d/P = L(R,Y)$$

Aggregate demand of real monetary assets is a function of national income and interest rates.

Fig. 2-1: Aggregate Real Money Demand and the Interest Rate

For a given level of income, real money demand decreases as the interest rate increases.

Fig. 2-2: Effect on the Aggregate Real Money Demand Schedule of a Rise in Real Income

Interest rate, R

When income increases, real money demand increases at every interest rate.

Increase in real income

$L(R, Y^2)$

$L(R, Y^1)$

Aggregate real money demand

A Model of the Money Market

- The money market is where monetary or liquid assets, which are loosely called "money," are lent and borrowed.

    - Monetary assets in the money market generally have low interest rates compared to interest rates on bonds, loans, and deposits of currency in the foreign exchange markets.

    - Domestic interest rates directly affect rates of return on domestic currency deposits in the foreign exchange markets.

A Model of the Money Market

- In equilibrium:

$$M^s = M^d$$

- Alternatively, in real terms:

$$M^s/P = L(R,Y)$$

Fig 2-3: Determination of the Equilibrium Interest Rate

Fig 2-4: Effect of an Increase in the Money Supply on the Interest Rate

An increase in the money supply lowers the interest rate for a given price level.

A decrease in the money supply raises the interest rate for a given price level.

Fig 2-5: Effect of Rise in Real Income on the Interest Rate

An increase in national income increases equilibrium interest rates for a given price level.

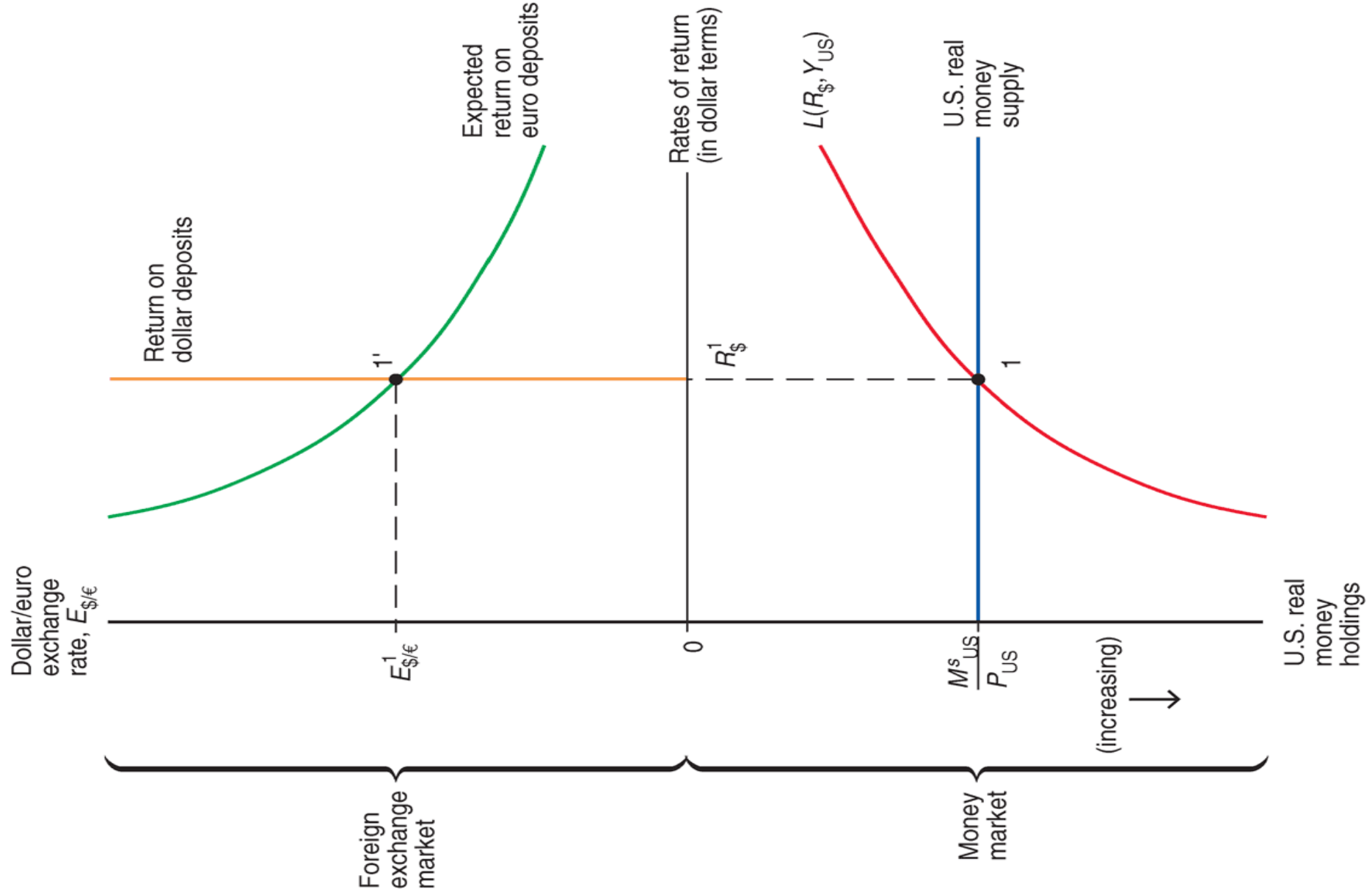Fig 2-6: Simultaneous Equilibrium in the U.S. Money Market and the Foreign Exchange Market
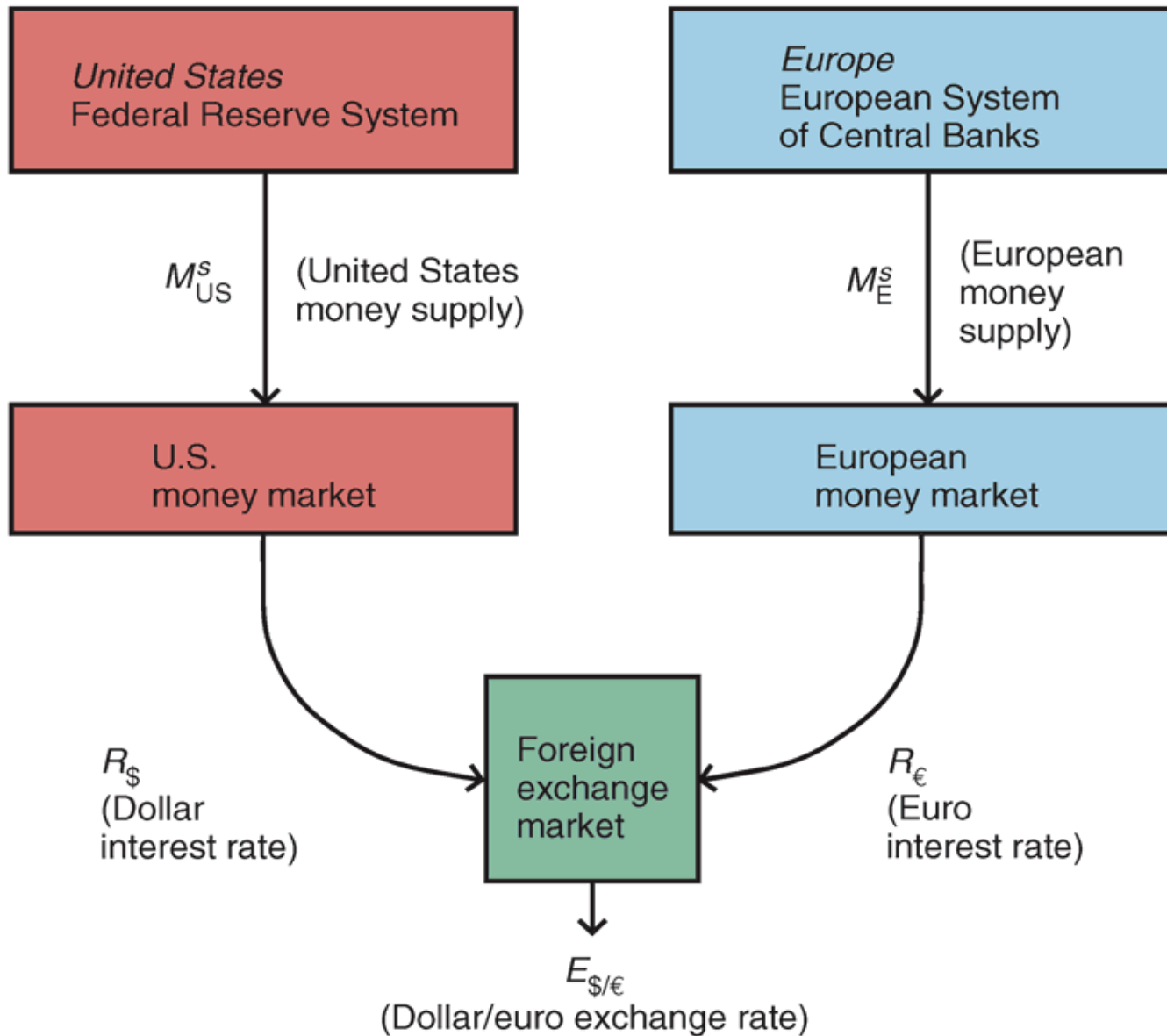
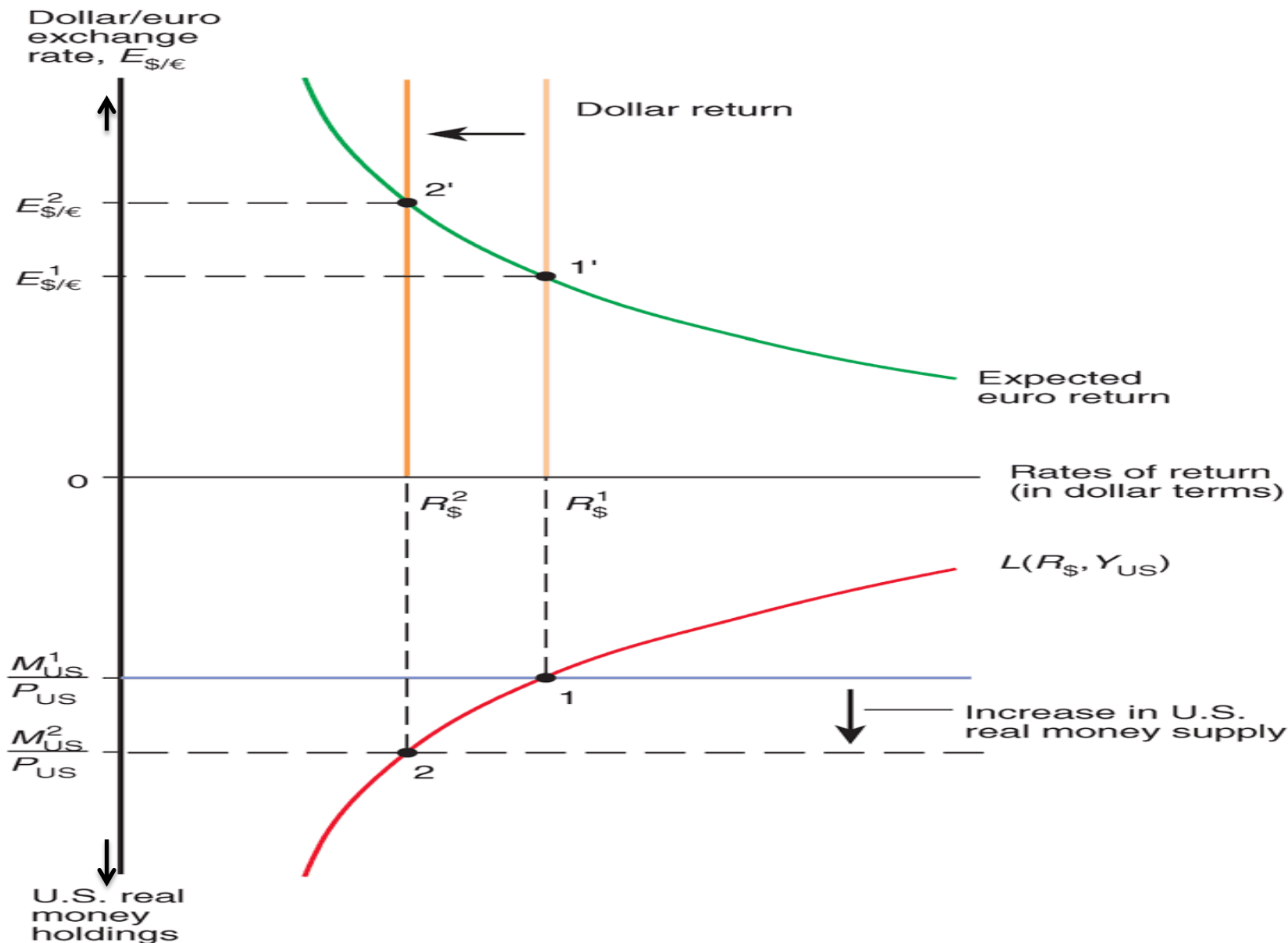# Fig 2-7: Money Market/Exchange Rate Linkages

Fig 2-8: Effect of Increase in the **U.S. Money Supply** on the Dollar/Euro Exchange Rate and Dollar Interest Rate

Changes in the Domestic Money Supply

- ⬆M ⟶ ⬇R ⟶E⬆(depreciates)

- What happens if there is a decrease in a country's money supply?

- An increase in the supply of euros causes a depreciation of the euro (appreciation of the dollar).

- The increase in the supply of Euros reduces interest rates in the EU, reducing the expected rate of return on euro deposits.

- This reduction in the expected rate of return on euro deposits causes the euro to depreciate.

- We predict no change in the U.S. money market due to the change in the supply of Euros.

Long Run and Short Run

- In the *short run*, prices do not have sufficient time to adjust to market conditions.

  – the analysis heretofore has been a short run analysis.

- In the *long run*, prices of factors of production and of output have sufficient time to adjust to market conditions.

  – Wages adjust to the demand and supply of labor.

  – Real output and income are determined by the amount of workers and other factors of production—by the economy's productive capacity—not by the quantity of money supplied.

  – (Real) interest rates depend on the **supply of saved funds** and the **demand of saved funds**.

Long Run and Short Run (cont.)

- In the long run, the quantity of money supplied is predicted not to influence the amount of output, (real) interest rates, and the aggregate demand of **real monetary assets** $L(R,Y)$.

- However, the quantity of money supplied is predicted to make level of average prices *adjust proportionally* in the long run.

  – The equilibrium condition $M^s/P = L(R,Y)$ shows that P is predicted to adjust proportionally when M^s adjusts because $L(R,Y)$ does not change.

Long Run and Short Run (cont.)

- In the long run, there is a direct relationship between the inflation rate and changes in the money supply.

    - $M^s = P \times L(R,Y)$

    - $P = M^s / L(R,Y)$

    - $p = \dfrac{\Delta P}{P} = \dfrac{\Delta M^s}{M^s} - \dfrac{\Delta L}{L}$

    - The inflation rate is predicted to equal the growth rate in money supply minus the growth rate in money demand.

Exchange Rate Overshooting

- The exchange rate is said to **overshoot** when its **immediate response** to a change is **greater** than its long run response.

- Overshooting is predicted to occur when monetary policy has an immediate effect on interest rates, but not on prices and (expected) inflation.

- Overshooting helps to explain why exchange rates are so *volatile*.

❖ Purchasing-Power Parity Theory

■ **Absolute Purchasing-Power Parity Theory**

▶ It postulates that the equilibrium exchange rate is equal to the ratio of the price levels in the two nations. Specifically:

▶ $$R = \frac{P}{P^*}$$

▶ Where, R is the exchange rate, P and P^* are respectively the general price level in the home nation and in the foreign nation

▶ **Law of One Price**

▶ If the price of wheat is $0.50 per kg in US and $1.50 in Ethiopia, firms would purchase wheat in US and resell it in Ethiopia, at a profit.

▶ This commodity arbitrage would cause the price of wheat to fall in Ethiopia and rise in US until the price is equal, say $1 per kg in both economies.

- **Shortcoming of the Theory**

- **This version of the PPP theory can be very misleading. There are several reasons as following:**

- It appears to give the exchange rate that equilibrates trade in goods and services while completely disregarding the capital account(capital outflows would have a deficit in its balance of payment, capital inflows would have a surplus if the exchange rate were the one that equilibrated international trade in goods and services).

- The PPP theory will not even give the exchange rate that equilibrates trade in goods and services because of the existence of many non-traded goods (e.g. cement, bricks except the border areas) and services (e.g. hair stylists, family doctors).

- The absolute PPP theory fails to take into account transportation costs or other obstructions to the free flow of international trade.

Relative Purchasing-Power Parity Theory

- **The relative PPP theory** postulates that the change in the **exchange rate over a period of time** should be proportional to the relative change in the price levels in the two nations. This version of the PPP theory has some value.

- **Formula**

- Subscribing 0 refers to the base period and 1 to a subsequent period, the relative PPP theory postulates that :

$$R_1 = \frac{P_1 / P_0}{P_1^* / P_0^*} R_0$$

- Where R_1 and R_0 are respectively, the exchange rates in period 1 and in the base period.

Example

- If the general price level does not change in the foreign nation from the base period to current period (i.e. $P1^*/P0^*=1$), while the general price level in the home nation increases by 50 percent, the relative PPP theory postulates that the exchange rate should be 50 percent higher in current period as compared with the base period.

- **Relation between Relative PPP and Absolute PPP**

➤ while the very existence of capital flows, transportation costs, other obstructions to the free flow of international trade, and government intervention policies leads to the rejection of the absolute PPP, only a change in these would lead the relative **PPP theory off target.**

Problems of Relative PPPP Theory

- The ratio of the price of non-traded to the price of traded goods and services is **systematically higher in developed nations** than in developing nations

  - **Reason:** Techniques in the production of many non-traded goods and services (haircutting, for example) are often quite similar in developed and developing nations.

  - However, the labors in these occupations in developed nations must receive much higher wages comparable to the high wages in the production of traded goods and services.

  - This makes the price of non-traded goods and services systematically much higher in developed nations than in developing nations.

Problems of Relative PPPP Theory

- The relative PPP theory will tend to predict overvalued exchange rates for developed nations and undervalued exchange rates for developing nations, with distortions being larger the greater the differences in the levels of development
  - **Reason:** The general price index includes the prices of both traded and non-traded goods and services, and prices of the latter are not equalized by international trade but are relatively higher in developed nations.
- Significant structural changes also lead to problems with the relative PPP theory
- **Reason:** UK had liquidated many of its foreign investments during the war, so that the equilibrium exchange rate predicted by the relative PPP theory would have left a large deficit in the U.K. balance of payments after the war.

The end!!!

Chapter Three

3. Balance of Payments and National Income Accounting

Objectives

- **To review national income accounting**
  - The national income accounts record all the income and expenditures of a country.
- **To review balance of payments accounting**
  - The balance of payments accounts record all international transactions of a country.

The National Income Accounts

- **Gross National Product (GNP)**
  - The value of all final goods and services produced by a country's factors of production and sold on the market in a given time period.
  - The Output of a country in a given time period.

- **Gross Domestic Product (GDP)**
  - The value of all final goods and services produced by the factors of production within a country's borders.
  - GDP = GNP - Net receipts of factor income from the rest of the world.

The National Income Accounts

- **The National Income Identity**

  $$Y = C + I + G + EX - IM$$

  where:
  - Y is GNP
  - C is consumption ($C^d + C^f$),
  - I is investment, ($I^d + I^f$)
  - G is government purchases, ($G^d + G^f$)
  - EX is exports
  - IM is imports, ($C^f + I^f + G^f$).

The National Income Accounts

❖ **Consumption (C)**

✓ The share of GNP consumed by the private sector.

❖ **Investment (I)**

✓ The share of GNP used by private firms to produce future output.

❖ **Government Purchases (G)**

✓ The share of GNP used by federal, state, or local governments

❖ **Exports (EX)**

✓ The share of GNP exported to the rest of the world.

❖ **Imports (IM)**

✓ The share of GNP imported from the rest of the world.

The Balance Of Payments Accounts

- The balance of payments accounts use Double-entry Bookkeeping Principles: each transaction generates a debit (value inflow) and a credit (value outflow).

- It has three accounts:
  - **Current account (CA)**
  - **Capital Account, (KA) and**
  - **financial account, (FA)**

❖**CA**-The difference between exports and imports of goods and services including net unilateral transfers

❖**FA**: accounts for flows of financial assets.

❖**KA:** flows of special categories of assets (capital): typically non-market, non-produced, or intangible assets like debt forgiveness, copyrights and trademarks.

CURRENT ACCOUNT

1. Merchandise Trade   (Goods account)

2. Services
- tourism
- transportation
- business, professional and other services

3. Income (Factor Services)
- Investment Income
- Employee Compensation

4. Unilateral Current Transfers
(incl. workers remittances)
- government grants ⎱ gov't transfers
- government pensions ⎰
- private remittances and other transfers (including taxes)

- # The Current Account (CA)
  - **CA = EX – IM**
  - A country has a *CA* surplus when its *CA* > 0.
  - A country has a *CA* deficit when its *CA* < 0.
  - *CA* measures the size and direction of international borrowing.
  - A country's current account balance equals the change in its net foreign wealth.
  - It's also equal to the difference between national income and domestic residents' spending $C + I + G$, $i.e. Y - (C + I + G) = CA$.
  - **S − I = CA**, there may be a condition when S>I or S<I such that CA<0 or CA>0.
  - The current account is a measure of foreign savings at home.
  - **Q. Are current account deficits good or bad?**

Interpreting a current account deficit

- Two views
    - A deficit is a sign that a country is spending more than it earns, **a weakness** which must be corrected by either/both reducing expenditure or switching expenditure from imports in favour of exports
    - A deficit is a **sign of strength** because it means the country is sufficiently profitable to attract continued flows of foreign capital (focus on the basic balance)

CAPITAL AND FINANCIAL ACCOUNT

2. Capital Account

  • Unilateral Capital Transfers (debt forgiveness, investment grants)

– The capital account records the exports and imports of assets.

– Capital inflow: An export of assets.

– Capital outflow: An import of assets.

Ⓡ Example. An Ethiopian citizen buys a $1000 typewriter from an Italian company, and the Italian company deposits the $1000 in its account at NB in Ethiopia.

  ❖ Entries in the Ethiopian balance of payments:

  – Purchases (imports) typewriter: Debit CA of $1000.

  – Sells (exports) asset: Credit to KA of $1000.

  ➢ **CA (-$1000) + KA (+$1000) = 0**

3. Financial Account: has at least 3 subcategories:
- ✓ Official (international) reserve assets
- ✓ All other assets:
- ✓ Statistical discrepancy

Financial Account (Private)

- • Direct Foreign Investment
- • Portfolio Investment (long term and short term)

Financial inflow
- ✓ Foreigners loan to domestic citizens by buying domestic assets
- ✓ Domestic assets sold to foreigners are a credit (+) because the domestic economy acquires money during the transaction

Financial outflow
- ✓ Domestic citizens loan to foreigners by buying foreign assets
- ✓ Foreign assets purchased by domestic citizens are a debit (-) because the domestic economy gives up money during the transaction

- **Official Reserve Transactions (ΔRFX)**
  - Official international reserves
    - foreign assets held by central banks to cushion against financial instability.
  - Official foreign exchange intervention
    - Exchange rate intervention often requires to alter the amount of official reserves.

- ❖ **Official Reserve Transactions** (gold, IMF credits and SDRs, foreign exchange reserves)
  - Changes in domestic assets held by foreign monetary authority
  - Changes in foreign assets held by domestic monetary authority

The BOP Accounts……….

- The key relation: **CA + KA = ΔRFX**

- This is an accounting identity

- Accounting:

  – Exports are recorded as credits (+) in CA, KA, FA

  – Imports are recorded as debits (-) in CA, KA, FA

- Official Settlements Balance (B)= CA + KA+ FA = 0, *Due to the double entry of each transaction*

  - *If B>0, then BoP said to be surplus*
  - *If B<0, then Bop said to be deficit*

  Data from a transaction may come from different sources that differ in coverage, accuracy, and timing

☻ **any imbalance in the official settlements balance must be financed (paid for) by official reserves flows**

Types of disequilibrium in the BoPs

- **Cyclical disequilibrium:** due to cyclical factors like trade cycle.
- **Secular Disequilibrium**: long-term phenomenon like capital improvement, population growth, territorial expansion, technological advancement, innovation…etc.
- **Structural disequilibrium**: structural changes like production of substitutes goods
- **Causes for**:
  - Cyclical fluctuation
  - Huge development and investment program
  - rapid economic development
  - Shift in production
  - Huge population and its high rate of growth
  - Demonstration effect

Correcting a balance of payments imbalance

- Recall **(S - I) + (T–G) = (X–M),** problem is to reduce excessive (X–M)
- *Expenditure reduction policies*
  - Increase S
  - Reduce I
  - Reduce G – T through restrictive fiscal policies
- *Expenditure switching policies*
  - Commercial policy (tariffs, etc)
  - Improved cost competitiveness
  - Exchange rate changes

I. **Monetary measures include**

a) Deflation

b) Exchange rate depreciation and

c) Exchange control

II. **Non monetary measures include**

a) Import quota

b) Tariff

c) Export promotion ,policies and programs

Recap

The Balance of Payments Account

Current Account

    1. Exports

    2. Imports

3. Trade balance (1) – (2)

    4. Net investment income

    5. Official transfers

6. Current account balance (3) + (4) + (5)

Private Capital Account

    7. Foreign purchases of domestic assets (capital inflow)

    8. Domestic purchases of foreign assets (capital out flow)

9. Capital account balance (7) – (8)

Official Reserves Transactions Account

    10. Official transactions

    11. Statistical discrepancy

12. Private balance of payments (6) + (9) + (11)

13. Balance of payments (12) + (10)   must be zero

Cont'd…

® What does the balance of payments account measure?

=>measures flows of currencies b/n a country and the rest of the world

® Balance of Payments Forces: Price Levels and Exchange Rates

✓ When inflation differs among countries with **flexible exchange rates**, we would expect the value of the country's currency with the greater inflation to fall relative other currencies.

✓ When inflation differs among countries with **fixed exchange rates**, the country with the higher inflation rate will tend to lose official reserves.

✓ when a country runs out of reserves, it must devalue its currency.

❖ i.e. $E_R = E_X \left(\dfrac{P_{domestic}}{P_{foreign}}\right)$

The end!!!

CHAPTER 4

BASIC THEORIES OF THE BALANCE OF PAYMENTS

THREE APPROACHES

Three Approaches

❖The Absorption Approach to the Balance of trade

❖The Elasticities Approach to the Balance of trade

❖The Monetary Approach to the BoP (MABoP)

1. Absorption Approach to BOT

- Recall the national income identity:

  $$Y = C + I + G + (X - M)$$

  So

  $$Y - A = X - M$$

  where $A = C + I + G$ is the total domestic spending or absorption.

Absorption approach to BOP (cont'd)

- If $Y > A$, then $X - M > 0$ or BOT > 0.

  If $Y < A$, then $X - M < 0$ or BOT < 0.

- Does devaluation always improve BOT?

- Recall: If **Y = Y* ≡ Full employment** level of output, then all resources are already employed and hence, $(X - M) \uparrow$ needs $A \downarrow$.

- If $Y < Y^*$, then $(X - M) \uparrow$ obtains **through increasing Y with A unchanged**, i.e. by producing more to sell to foreigners.

Absorption approach

- So, when Y < Y*, devaluation would improve BOT.

- But when Y > Y*, devaluation would increase (X−M) but create inflation.

2. The Elasticities Approach to BOT

- ε_d = the responsiveness of quantity demanded to changes in price

$$\varepsilon_d = \frac{\%\Delta Q^d}{\%\Delta P}$$

which is usually negative

Elasticities

- $|\varepsilon_d| > 1 \Leftrightarrow$ the demand is **elastic**
- $|\varepsilon_d| < 1 \Leftrightarrow$ the demand is **inelastic**
- If the demand is **elastic**, the 1% rise in price leads to **more than** 1% decline in quantity demanded.

Devaluation and BOT

- Does the devaluation of a currency improve the country's balance of trade?

- Consider $E_{Br/\$}$ = the Ethiopian Birr price of the dollar

Devaluation and BOT (cont'd)

- (1) If the demand curve for the dollar slopes downward and the supply curve of the dollar slopes upward, then the devaluation of the Birr leads to an excess supply of the dollar, which causes the Ethiopian trade deficit to decrease.

Devaluation and BOT (cont'd)

- (1): stable FX market equilibrium
- (2): unstable FX market equilibrium
- The case (2) could occur when Ethiopian demand for US imports and US demand for Ethiopian exports are both very inelastic.
- The greater the elasticities of both country's demand for the other country's goods, the greater the improvement in Ethiopia trade balance after a Birr devaluation.

Devaluation and BOT

- The condition that guarantees the case (1) is called Marshall-Lerner Condition.

- It states the condition that assures the improvement.

    - The sum of price elasticity of export and import greater than unity

J Curve Effect

- After the devaluation, it is often observed that the trade balance initially deteriorates for a while before getting improved.
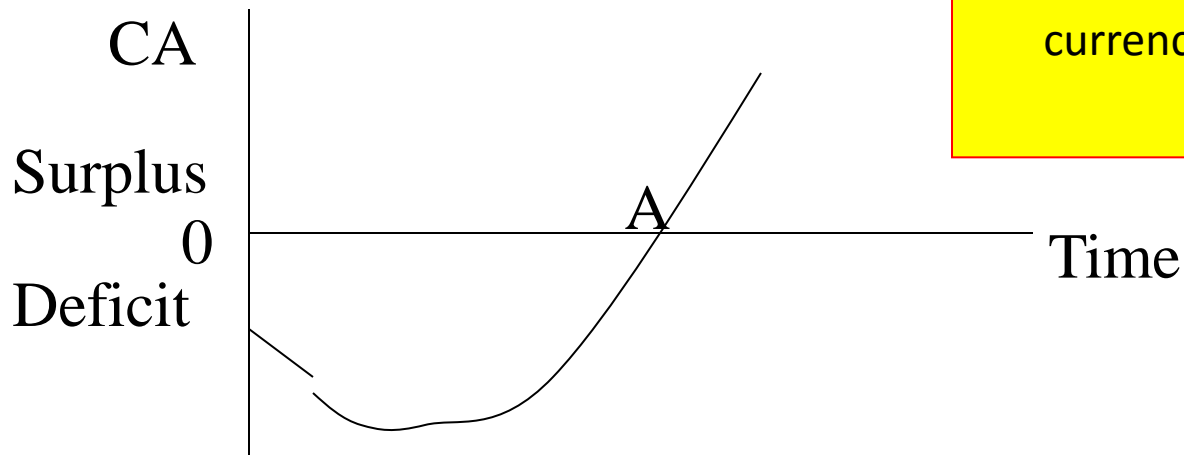
✓ It states that the real net export could improve or deteriorate in the medium term due to a depreciation of the currency

CA

Surplus

0

Deficit

A

Time

Elasticities and J-Curves

- Why do we have a J-Curve?

- The initial demands tend to be **inelastic**.

- Suppose Ethiopia imports **good X** from the US and exports **good Y** to the US.

- Devaluation $\Rightarrow E_{Br/\$} \uparrow$

$$\Rightarrow P_X^{Br} \uparrow \ \& \ P_Y^{\$} \downarrow$$

$$\Rightarrow Q_X^d \downarrow \ \& \ Q_Y^d \uparrow$$

✓ The current account could immediately decrease after a currency depreciation, then increase gradually as the volume effect begins to dominate the value effect.

Elasticities and J-Curves

- But if Ethiopian demand for X is inelastic, the % decrease in Q_X^d would be smaller than the % increase in P_X^{Br} so that Imports = $P_X^{Br} Q_X^d$ would increase.

- Further, if US demand for Y is inelastic, the % increase in Q_Y^d would be smaller than the % decline in $P_Y^{\$}$ so that Exports = $P_Y^{\$} Q_Y^d$ would fall.

❖ Causes of the J Curve Effect
✂ The Currency Contract Period
✂ The Pass-Through Effect

Pass Through

- Devaluation $\Rightarrow$ **Import prices** ↑ in the home country and **export prices** ↓ in foreign countries.

  But prices do **not adjust instantaneously**.

- Persistent BOP deficit $\Rightarrow$ devaluation

  $\Rightarrow$ Home demand for imports ↓ and foreign demand for exports ↑

  $\Rightarrow$ an **improvement in BOP** in the L-R

Pass-through Analysis

- How do prices adjust to exchange rate changes in the S-R?

- Differences in the pass-through effect across countries ← Producers **adjust profit margins**

- Example: When the yen appreciated against the dollar substantially during late 1980s, Japanese auto-makers limited the pass-through of higher prices by reducing the profit margins on their products.

Pass-though analysis (cont'd)

- In general,
- **Depreciation** of the Birr $\Rightarrow$ Foreign sellers **cut** their profit margins
- **Appreciation** of the Birr $\Rightarrow$ Foreign sellers **increase** their profit margins

3. Monetary Approach to BOP

o External balance problems are monetary in nature and that balance of payment deficits are a reflection of excessive money supply.

- ✓ **Simple version:** Money contraction => rise in interest rates => reduces pending => reduces incomes => reduces imports.

- ✓ **Sophisticated version:** A sale of foreign exchange => reduces the stock of high powered money => reduces the money stock.

Money supply and Money demand

- Considering money supply, we obtain

$$M^S = m \,(DC + IR) = m(Cu+R) \qquad (1)$$

Dc-domestic credit, **IR**-International Reserve, **CU**- Currency and **R**-Bank reserve

- Consider Money demand function:

$$M^d = k \bullet P \bullet L \qquad (2)$$

where P = price level at home and L is the liquidity preference function, which depends on income and the interest rate. k is a constant.

PPP again

- Now assume PPP

$$P = E \bullet P^* \tag{3}$$

  where E = home currency price of the

  foreign currency

  P* = price level in the foreign country

- Substituting (3) into (2), we have

$$M^d = k \bullet E \bullet P^* \bullet L \tag{4}$$

Monetary equilibrium

- In equilibrium, $M^d = M^S$.
- So, from (1) and (4), we have
$$k \bullet E \bullet P^* \bullet L = m \, (DC + IR)$$
- Under fixed exchange rates, if the central bank is supplying more money than what domestic residents demand, the excess supply will be eliminated through capital outflows.
- International capital flows adjust monetary disequilibria.

- Under flexible exchange rates, the adjustment mechanism is different.

- The KA is assumed to depend on the interest rate differential.

  - **KA = f(id-if, St).**

- changes in the level of exchange rates adjust monetary disequilibria.

Nice time with reading

Performance survey

1. *How would you understand the link between balance of payment disequilibrium and the domestic money market disequilibrium.*

2. *Examine how devaluation affects the balance of payment within the context of monetary model.*

3. *Compare and contrast the effects of money supply, rise in domestic income and foreign price shocks on balance of payment under fixed and floating rates*

CHAPTER FIVE
5. Economic Policy in an Open Economy

❖**Muldel-fleming model** to shows how a nation can use FP and MP to achieve both internal and external balance without any change in the exchange rate.

Goods Market & the IS Curve

- Keynesian Cross assumes:
  - Real interest rate is constant (hence $I=I(r_0)=I_0$).
  - Exchange rate, e, is constant (hence $X=X(e)=X_0$.)

- **Goods Market Equilibrium**

  Y (Actual Exp)= C (Y-T) + I(i) + G + NX(e, Y, Y^{ROW})[Planned Exp]

  – IS Curve summarizes relation between interest rate (*i*) and output (*Y)*, in domestic goods market equilibrium.
  – IS Curve is **downward-sloping** in representing effect of interest rate on level of investment, and so *i-Y* **diagram** GDP.
  – IS Curve **shifts** with changes in *G, T, e, Y^{ROW}*.

Deriving the IS Curve

1. Increase in interest rate to i_2.
2. Result is <u>fall</u> in Planned Investment, ΔI.
3. Planned Expenditure line shifts down. Output <u>falls</u> by Multiplier effect, ΔY.
4. Relationship between i and Y summarized by the **IS Curve**.

Keynesian Cross

E

$Y=E$

$E(i_1)$

2. ΔI

$E(i_2)$

3.

Y_2 Y_1

Y

Investment Demand

i

i_2

1.

i_1

ΔI

$I(i)$

$I(i_2)$ $I(i_1)$ I

IS Curve

i

4.

$IS(G_0, e_0)$

Y_2 Y_1 Y

130
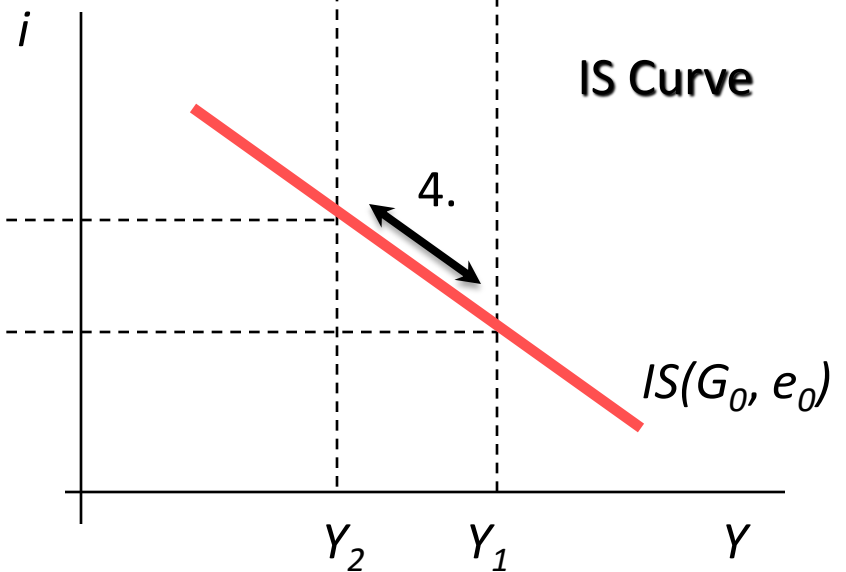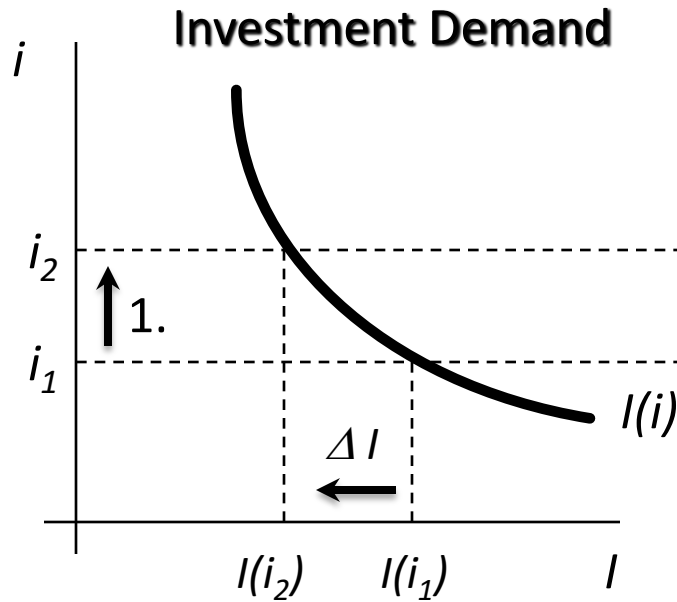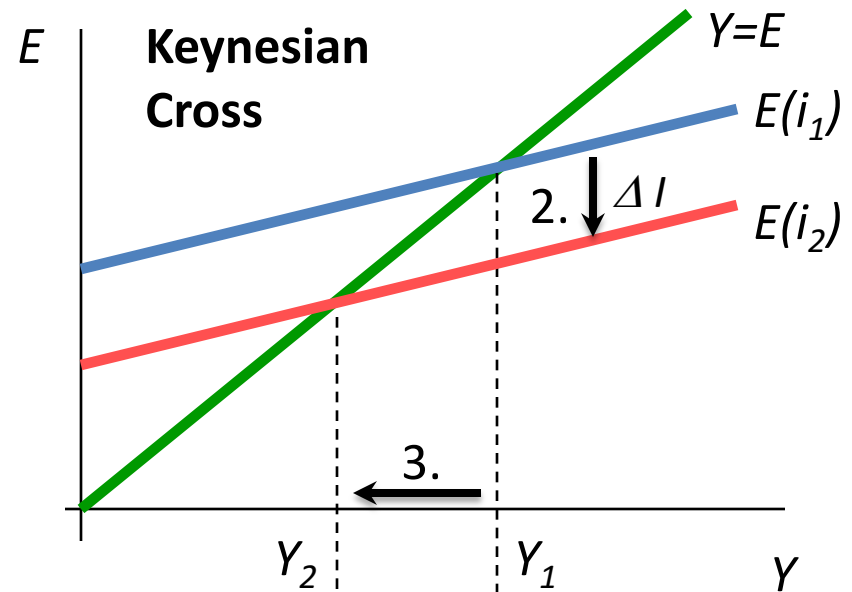
Change in Exchange Rate

- Anything shifting Expenditure Curve with interest rate fixed, will also shift the IS Curve.

- At right show effect of depreciation in nation's exchange rate (*e* rises) on E and IS Curves.

- Exports rise, shifts up E_1 to E_2 which raises *Y* at any *i*.

$$\Delta Y \ = \ [\frac{1}{(1-c(1-t)+m}]\Delta X$$

- IS Curve shifts out to IS_2.
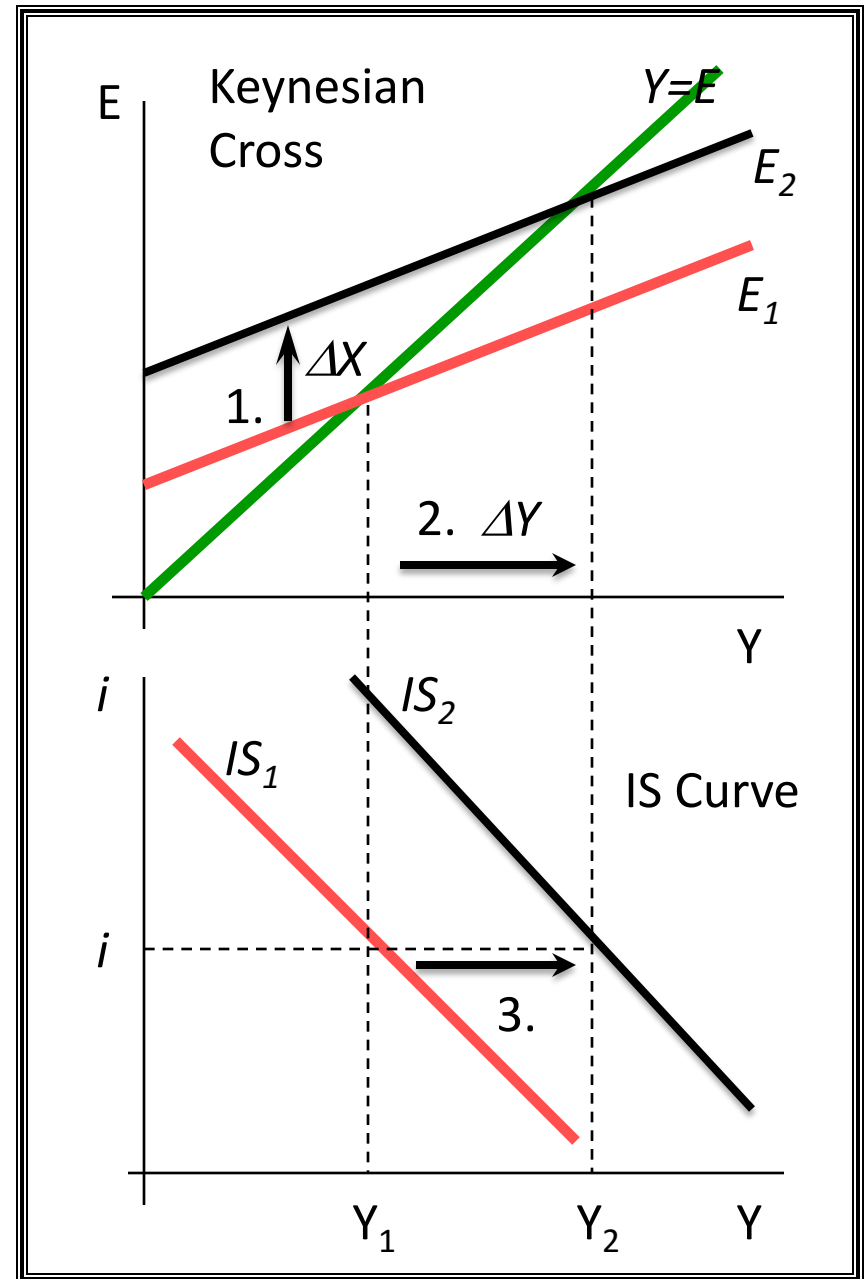
Open Economy IS Curve

- **Shape of IS Curve:**
  - Shows the relationship between the interest rate and level of income that arises in goods market equilibrium.
  - Slope of IS Curve reflects effect of interest rate on planned expenditures through *I* and *C*.

- **Shifts in IS Curve:**
  - IS Curve is drawn for <u>given</u> level of exchange rate.
    - Rise in *e*, increases *NX* which shifts IS out.
  - IS Curve is drawn for <u>given</u> fiscal policy, *G* and *T*.
    - Changes in fiscal policy that increase demand (*G* up or *T* down) shift the IS Curve to the right (out).

Money Market & the LM Curve

Domestic Money Market

- **Money Demand**

$$M^d/P = f(Y, i, E(\pi))$$

- **Money Supply**

$$M^s/P = a(DR + IR)/P$$

  – a = Money Multiplier
  – DR = Domestic Reserves, IR = International Reserves

- **Money Market Equilibrium**

$$M^s/P = a(DR + IR)/P = f(Y, i, E(\pi))$$

  – LM Curve summarizes relation between interest rate, i, and output, Y, in domestic money market equilibrium.
  – LM Curve is upward-sloping in **i-Y diagram**.
  – LM shifts with changes in M^s or P or $Y, E(\pi)$.

Liquidity Preference & Money

Interest Rate

M^s/P

Real Money Supply, M^s/P
- set by *DR + IR*

Real Money Demand, *f(i,Y)*
- opportunity cost, *i*

- transaction demand
  depends on level of *Y*

i_0

f(i, Y_0)

Real Money Balances   *M/P*
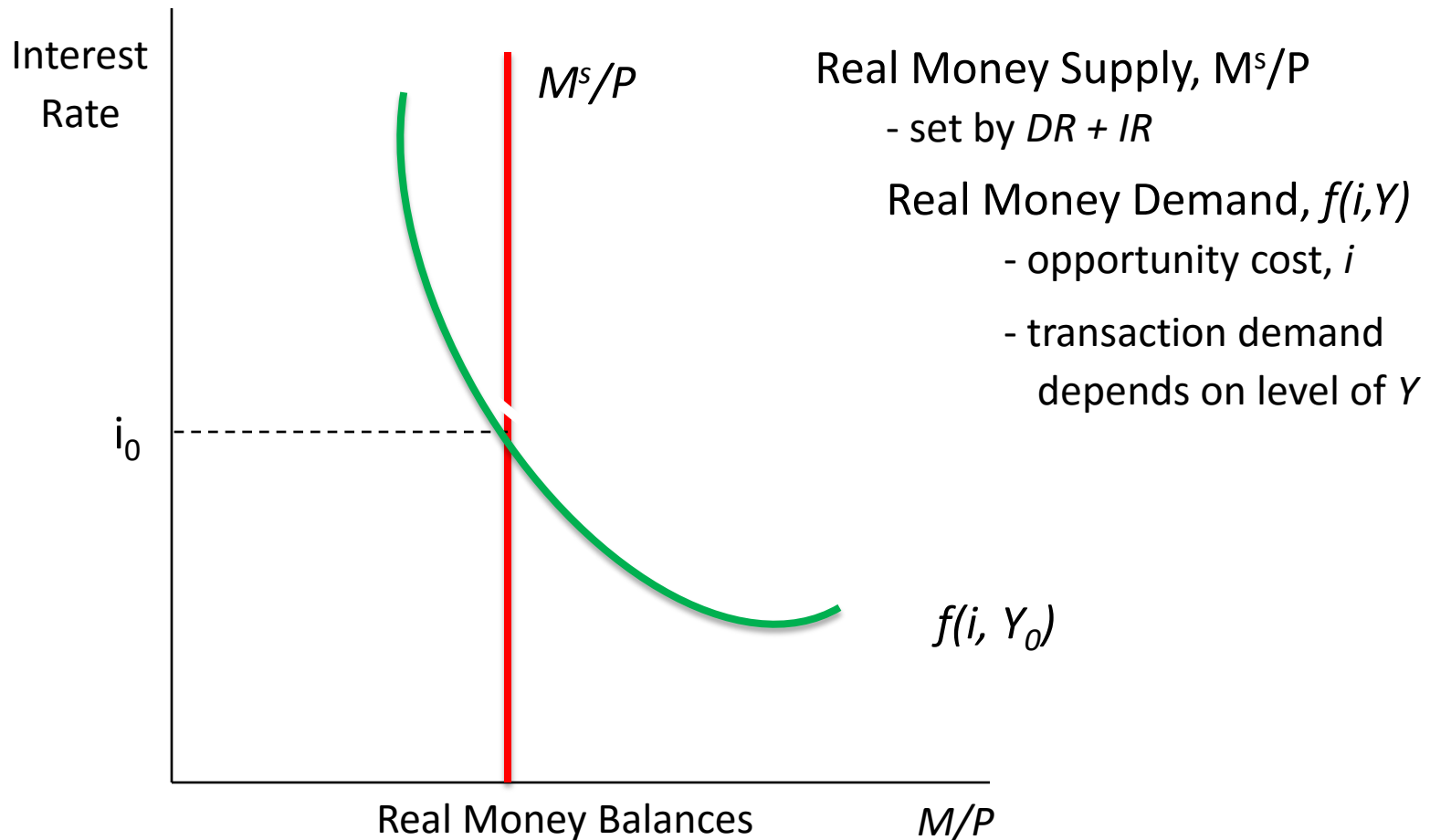
Deriving the LM Curve

1. Begin in equilibrium at *(i₁, Y₁)*. Now increase Real GDP to Y_2.
2. Transaction Demand for money increases, shifts out to *L(i, Y_2)*.
3. New Money market equilibrium at Y_2 with higher interest rate, i_2.
4. LM Curve summarizes relationship between *i* and *Y* in Money market.
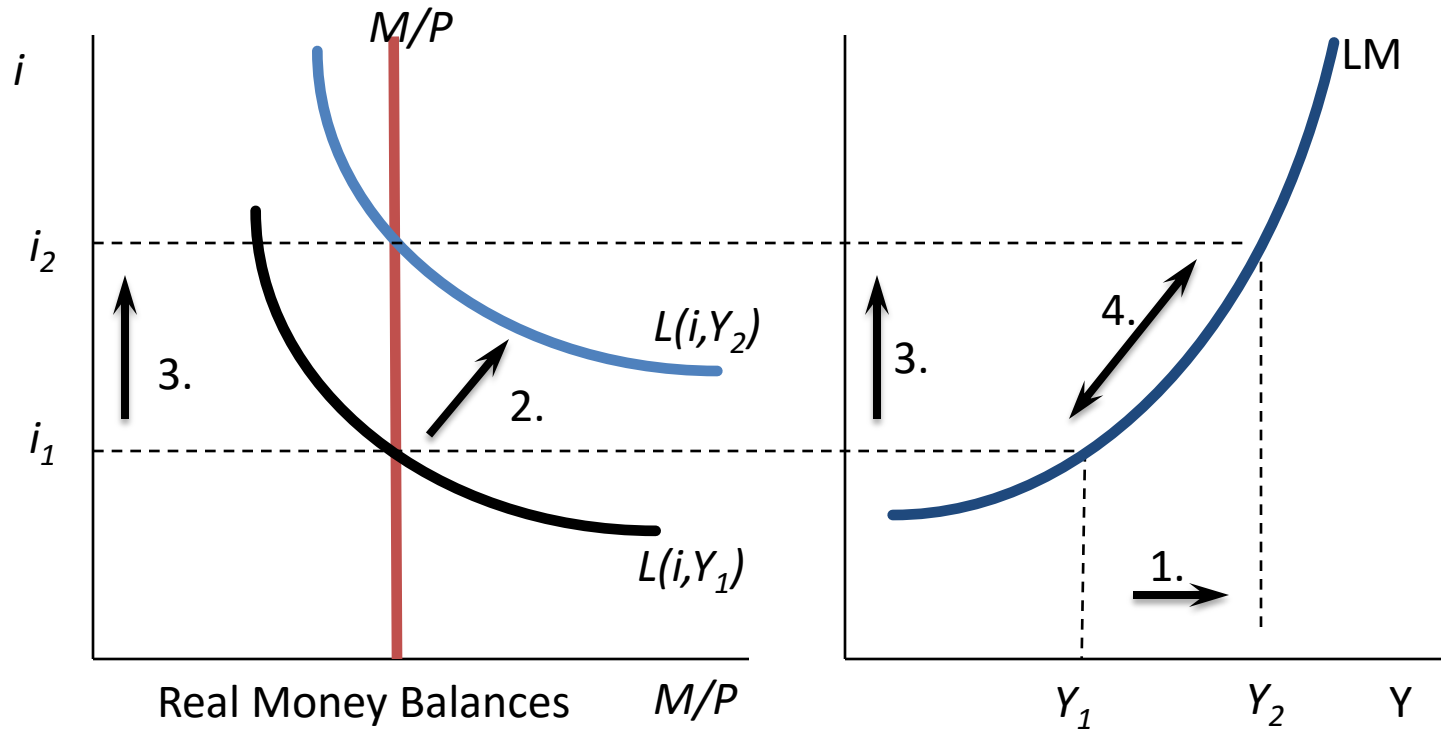
Shifts in the LM Curve

1. Central Bank reduces *DR* or *IR*. Result is a fall in *M/P*.

2. Reduction in *M/P*, with $L(i,Y_1)$ given results in higher interest rate, i_2.

3. Y_1 now associated with higher i_2, LM Curve has shifted up and back.
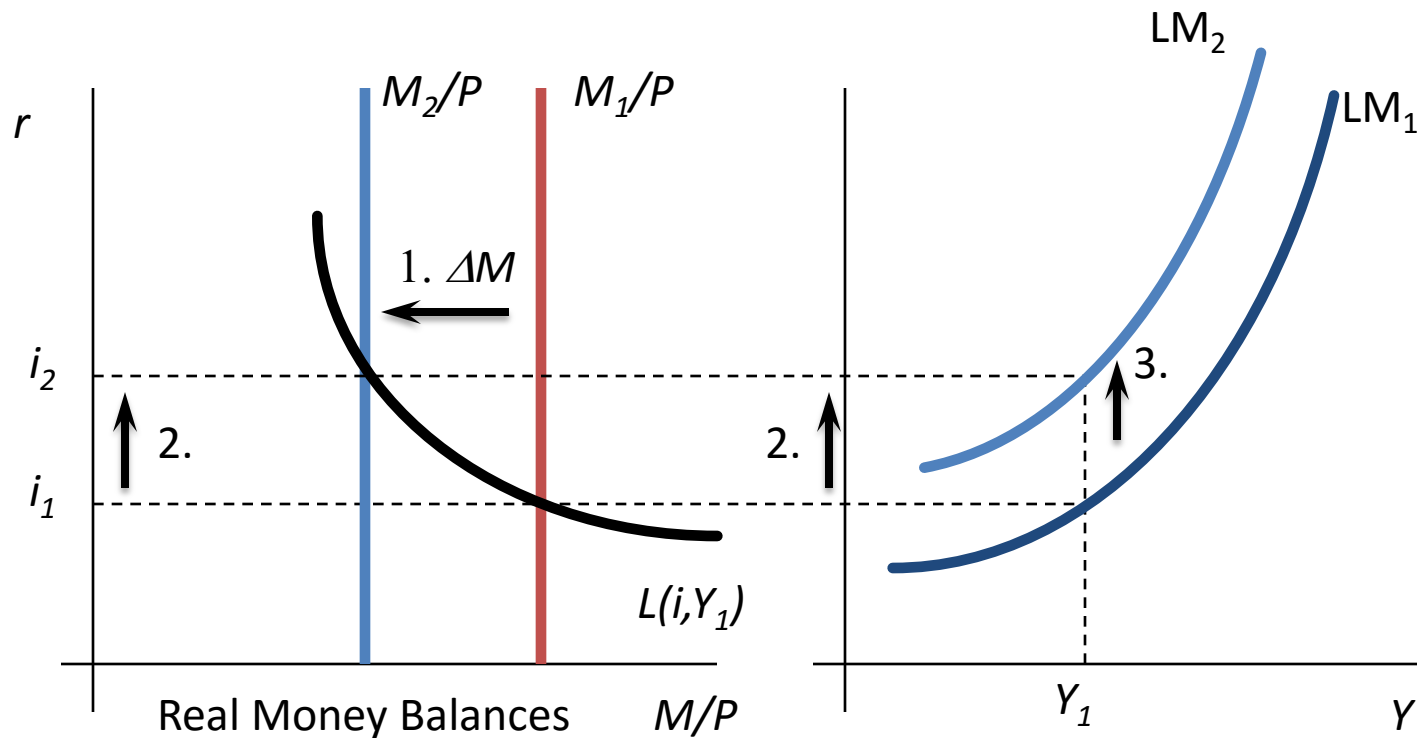
Open Economy LM Curve

- **Shape of LM Curve:**
  - Shows the relationship between the interest rate and level of income that arises in money market equilibrium.
  - Slope of LM Curve reflects relative strength of interest rate and transactions on Money Demand.

- **Shifts in LM Curve:**
  - LM Curve does <u>not</u> depend on exchange rate.
    - BUT changes in Int'l Reserves will affect M^S and LM.
  - LM Curve reflects <u>given</u> monetary policy, *DR + IR*.
    - Changes in monetary policy that increase M^s (*DR or IR* up) shift the LM Curve to the right (out).

External Balance & the BP Curve

Balance of Payments

- **Current Account**   **+   -   +**

$$CAB = NX(e, \; Y, \; Y^{ROW},)$$

- **Capital Account**   **+   -**

$$CAP = \varphi(i, \; i^* + xa)$$

- **Balance of Payments**

$$BOP = NX(e, \; Y, \; Y^{ROW}) + \varphi(i, \; i^* + xa) = 0$$

  – BP Curve summarizes relation between interest rate, i, exchange rate, e, and output, Y, for BOP=0.

  – BP Curve is upward-sloping in i-Y diagram. BP shifts with changes in e or i^* or Y, Y^{ROW}.

Deriving the BP Curve

1. Begin with *BOP=0* at *(i₁, Y₁)* and given level of *e*. Now increase Real GDP to Y_2.

2. Demand for imports increases, result is fall in CAB. At original *i* will have *BOP < 0*.

$BP(e_0, BOP=0)$
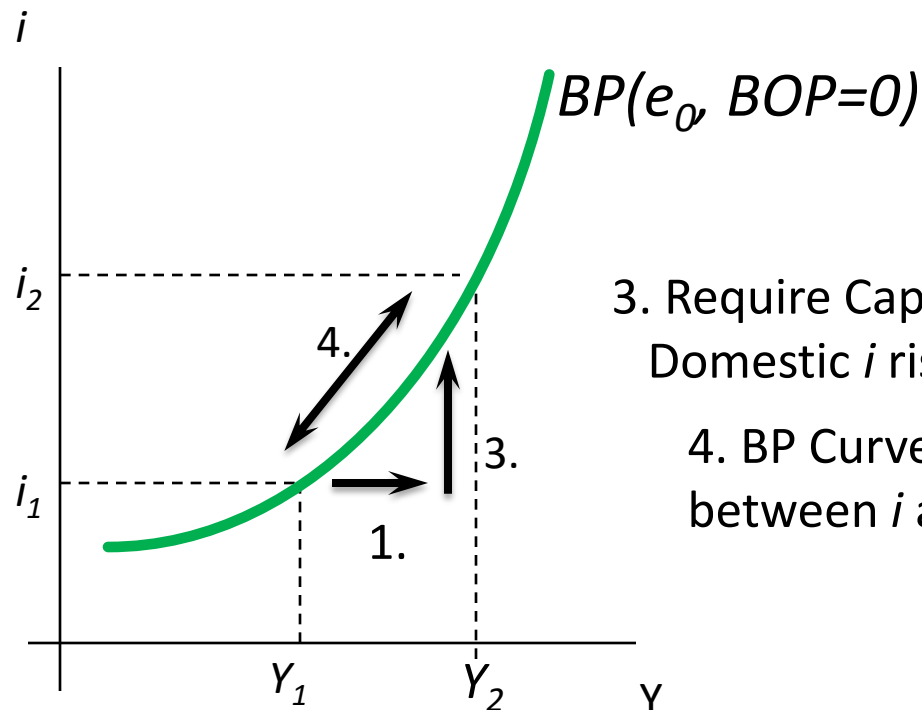
3. Require Capital inflows to return *BOP = 0*. Domestic *i* rises to new equilibrium at i_2.

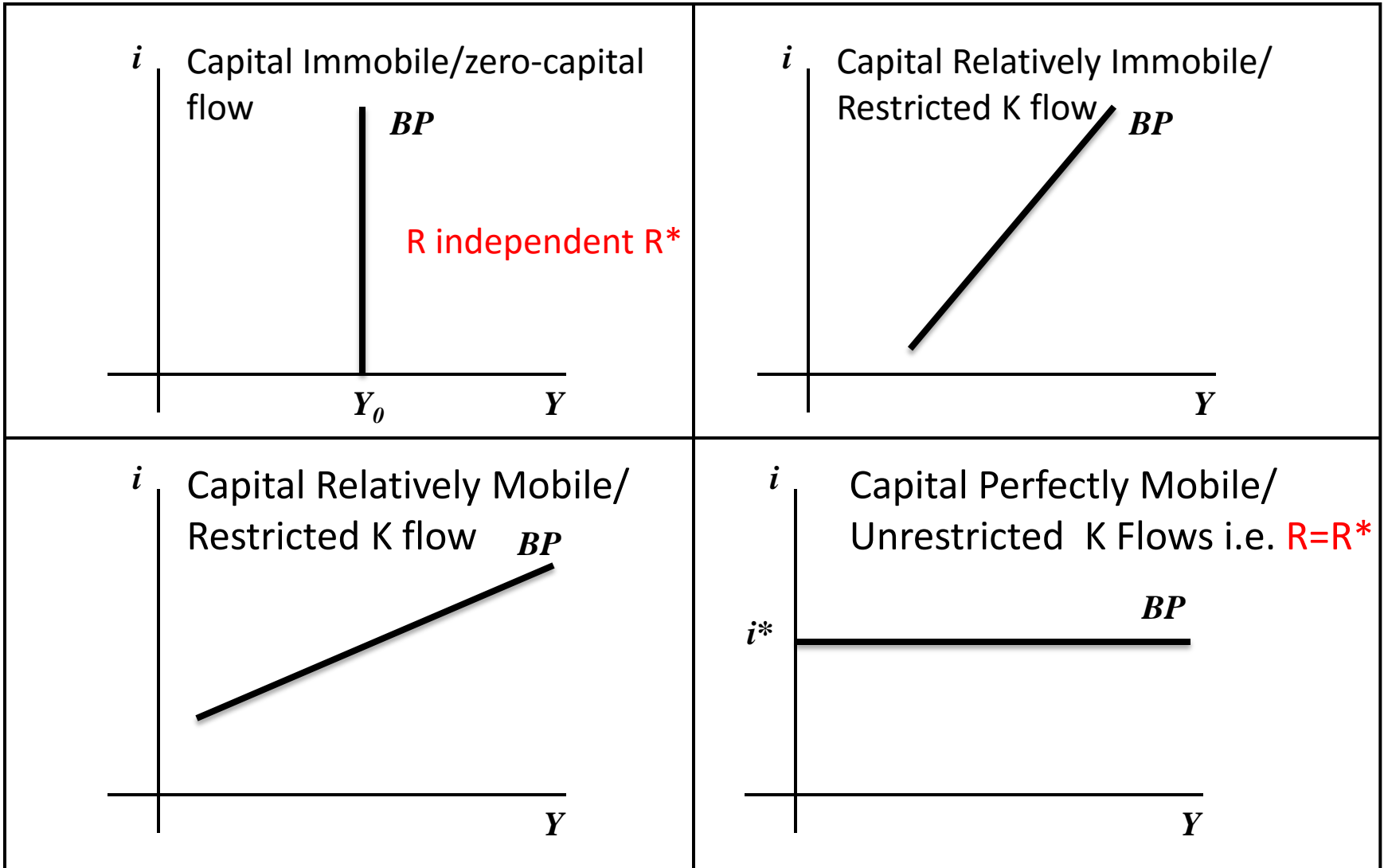4. BP Curve summarizes relationship between *i* and *Y* when *BOP=0* and *e* fixed.

Shifts in the BP Curve

1. Begin in overall BOP equilibrium at i_1, Y_1, e_1.

2. Depreciation in home currency, e rises.

3. EXR Depreciation raises NX and $BOP >0$ at Y_1. Need to lower NX to get back to $BOP=0$.

$BP(e_1)$ $BP(e_2)$

$e_2 > e_1$

i_1

Y_1 Y_2 Y
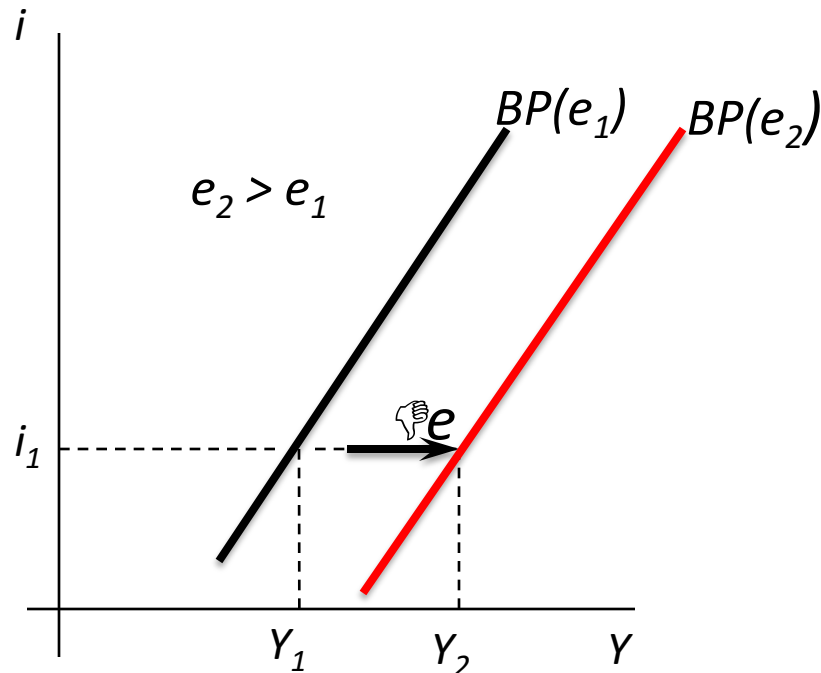
4. For given i, lower NX by rise in Y which increases imports.

5. Depreciation in home currency shifts BP curve out.

Capital Mobility & the BP Curve

Capital Immobile/zero-capital flow

i

BP

R independent R*

Y_0 Y

Capital Relatively Immobile/ Restricted K flow

i

BP

Y

Capital Relatively Mobile/ Restricted K flow

i

BP

Y

Capital Perfectly Mobile/ Unrestricted K Flows i.e. R=R*

i

BP

$i*$

Y

Open Economy BP Curve

- **Shape of BP Curve:**
  - Shows relationship between interest rate and income level for Balance of Payments equilibrium .
  - Slope of BP Curve reflects relative mobility of capital between nations from interest differentials.

- **Shifts in BP Curve:**
  - BP Curve reflects <u>given</u> exchange rate.
    - Rise in e, raises NX at any i, Y rises to keep BOP=0.
    - BP Curve shifts out at any i.
  - BP Curve reflects <u>given</u> ROW variables, $i*$ and $Y*$.
    - Changes in ROW variables that increase NX or Capital inflows shift the BP Curve to the right (out).

Open Economy SR Equilibrium: IS-LM-BP Model

- IS-LM-BP Model described by 3 equations

  (IS) $Y = C(Y-T, W) + I(i) + G + NX(e, Y, Y^{ROW})$

  (LM) $M^s/P = a(DR + IR)/P = f(Y, i, E(\pi))$

  (BP) $BOP_0 = NX(e, Y, Y^{ROW}) + \varphi(i, i^* + xa)$

- IS-LM-BP with **Fixed Exchange Rate Regime**:
  - **Endogenous Variables**: *Y, i, M (BOP=ΔIR)*
  - **Exogenous Variables**: *G, T, DR, P, e*

- IS-LM-BP with **Flexible Exchange Rate Regime**:
  - **Endogenous Variables**: *Y, i, e*
  - **Exogenous Variables**: *G, T, M (BOP=0), P*

IS-LM-BP Model

LM Curve
- shifts with ΔM or ΔP

Interest Rate

LM([DR+IR]/P)

i₁

Y₁ *Income, Output*

IS(e₀, G₀, T₀)

IS Curve
- shifts with Δe, ⇩G or ΔT

BP(e₀, i, Y*)*

BP Curve
- shifts with Δe or ΔROW variables

Reach equilibrium by changes in all 3 endog. variables: *i, Y, e or M*
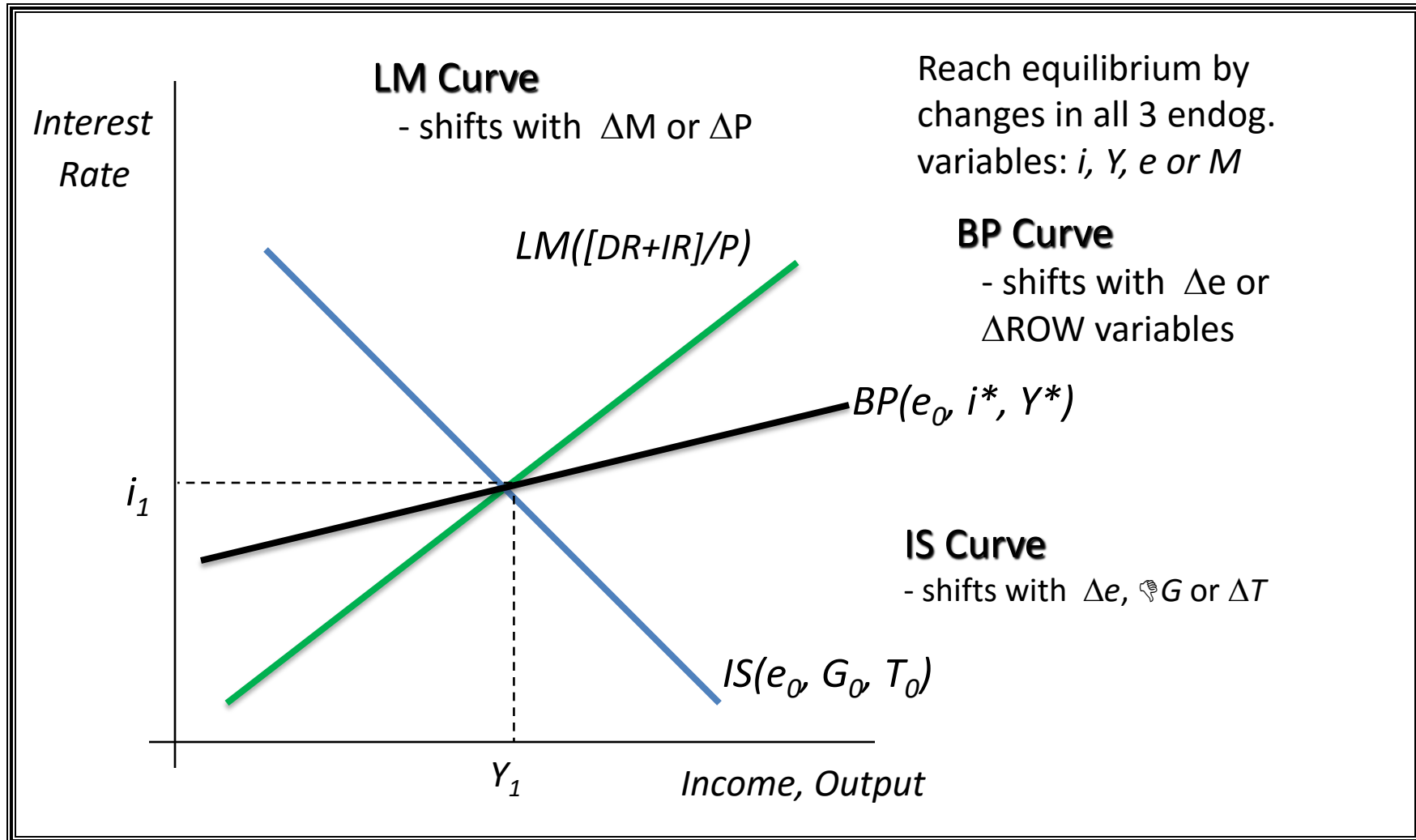
CHAPTER 6:
6. Prices and Output in an Open Economy:
6.1. Aggregate Demand and Aggregate Supply

Organization

- Aggregate Demand, Aggregate Supply, and Equilibrium in a Closed Economy
- Aggregate Demand in an Open Economy Under Fixed and Flexible Exchange Rates
- Effect of Economic Shocks and Macroeconomic Policies on Aggregate Demand in Open Economies with Flexible Prices
- Effect of Fiscal and Monetary Policies in Open Economies with Flexible Prices
- Macroeconomic Policies to Stimulate Growth and to Adjust to Supply Shocks

■ Aggregate Demand in a Closed Economy

- **Aggregate Demand (AD) curve**

□ It shows the relationship between the total quantity demanded of goods an services in an economy and the general price level, while holding constant the nation's supply of money, government expenditures , and taxes

□ The aggregate demand curve is downward sloping, indicating that the total quantity of domestic goods and services demanded in the nation is greater the lower the price level

□ Figure 6.1 shows how the aggregate demand curve is derived from the IS-LM model of the previous chapter
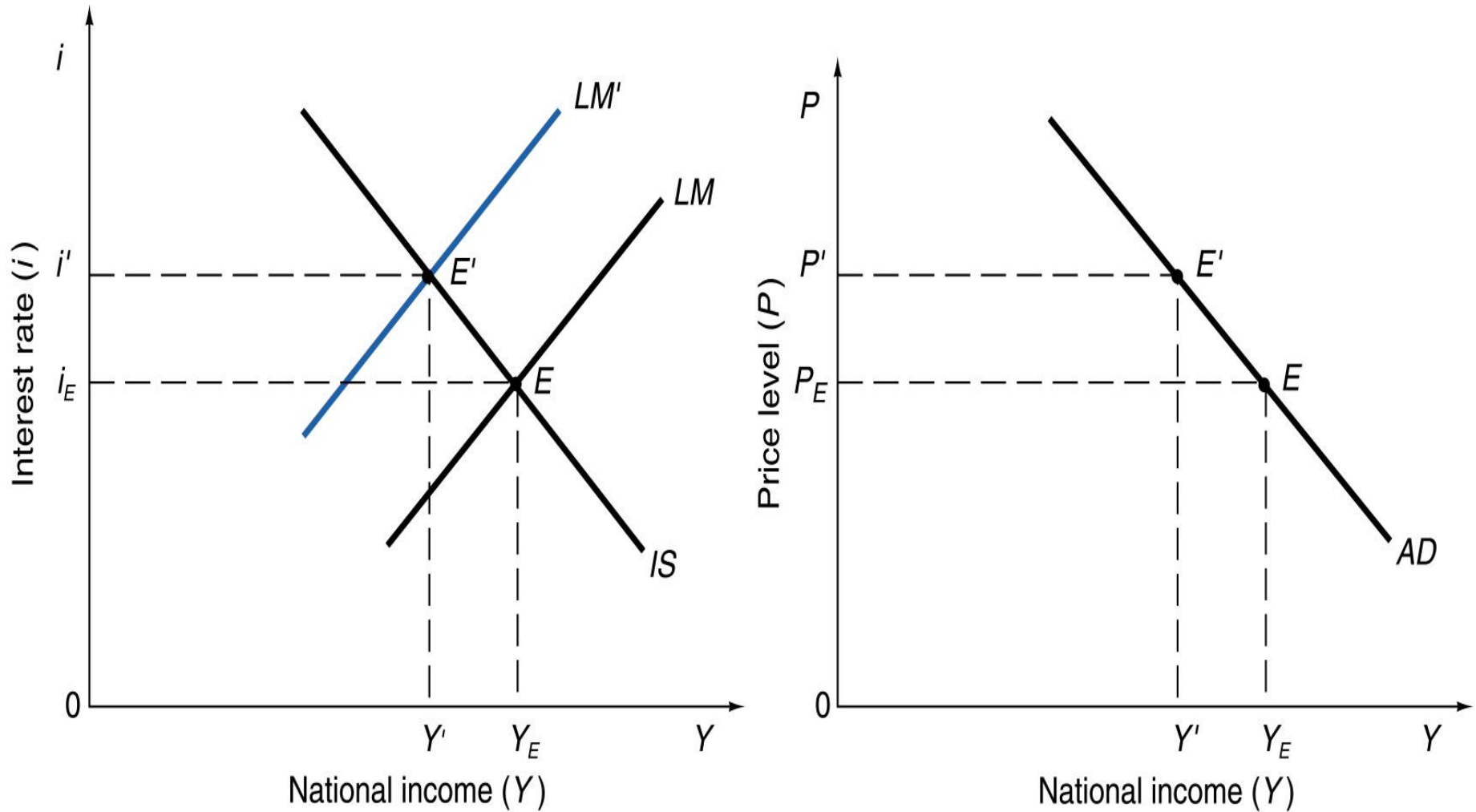
FIGURE 6-1 Derivation of the AD Curve from the *IS-LM* Curves.

Explanation of Figure 6.1

- The intersection of the IS and LM curves at a given price level determines the equilibrium interest rate (i_E) and national income (Y_E) at point E in the left panel.

- This defines point E at price P_E and income Y_E on aggregate demand curve AD in the right panel.

- An increase in price from P_E to P' reduces the real value of the nation's given money supply and causes the LM curve to shift to the left to LM', thus resulting in the lower income level of Y' at point E' in the left panel and on the AD curve in the right panel

◼ Aggregate Supply in the Long Run and in the Short Run

- **Aggregate Supply (AS) curve**

☐ **It shows the relationship between the total quantity supplied of goods and services in an economy and the general price level**

☐ **This relationship depends crucially on the time horizon under consideration**

☐ **The long-run aggregate supply (LRAS) curve does not depend on prices but only on the quantity of labor, capital, natural resources, and technology available to the economy. The quantity of inputs available to an economy determines the natural level of output (Y_N) for the nation in the long run.**

☐ **The short-run aggregate supply (SRAS) curve, slopes upward, indicating that higher prices lead to larger outputs in the short run (See Figure 6.2)**
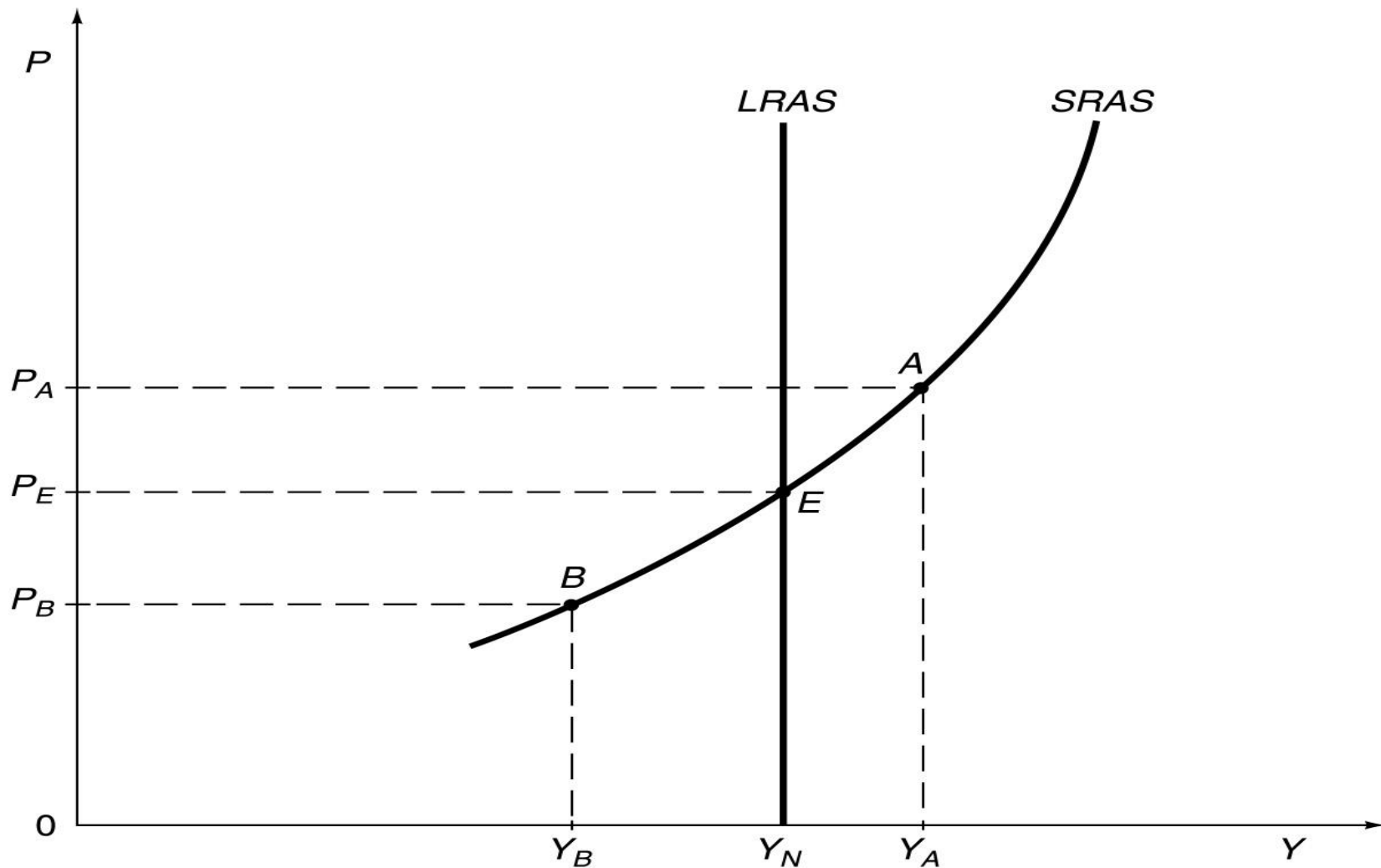
FIGURE 6-2 The Long-Run and Short-Run Aggregate Supply Curves.

Explanation of Figure 6.2

- The long-run aggregate supply curve (LRAS) is independent of prices and is vertical at the nation's natural level of output (Y_N), which depends on the availability of labor, capital, natural resources, and technology in the nation.

- The nation's short-run aggregate supply curve (SRAS) slopes upward, indicating that the nation's output can temporarily exceed (point A) or fall short (point B) of its natural level (point E) because of imperfect information or market imperfections.

■ Short-Run and Long-Run Equilibrium in a Closed Economy

- Figure 6.3 At the intersection of the AD, LRAS, and SRAS curves at point E, the nation is simultaneously in long-run and short-run equilibrium.

- An unexpected increase in AD to AD′ defines the new short-run equilibrium point A at the intersection of AD′ and SRAS curves at P_A and Y_A. Y_A exceeds the natural level of output of Y_N.

- In the long run, as expected prices increase and match actual prices, the SRAS curve shifts up to SRAS′ and defines the new long-run equilibrium point C at the intersection of AD′, LRAS, and SRAS′ curves at P_C and P_N.
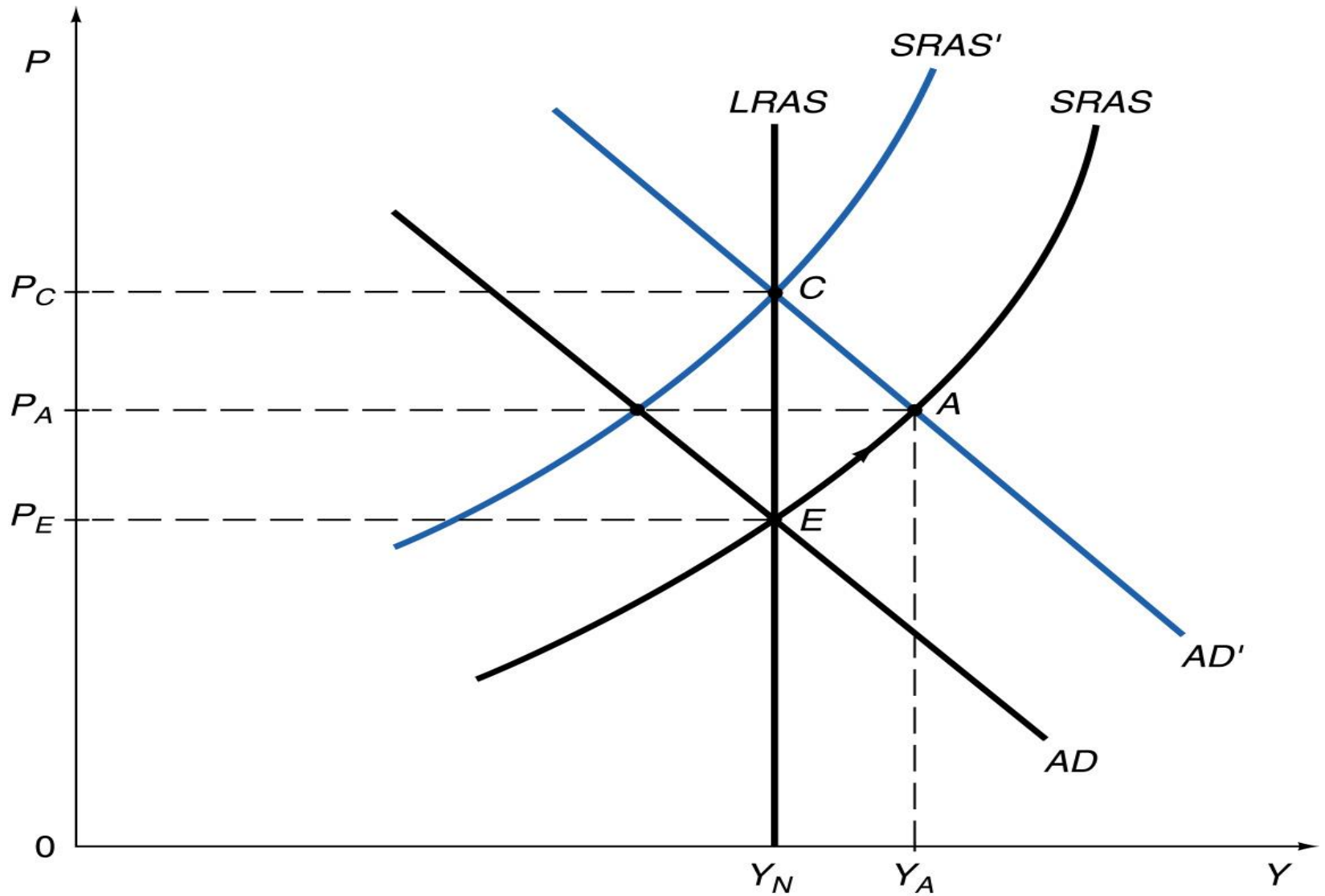
FIGURE 6-3 Equilibrium in a Closed Economy.

6.3 Aggregate Demand in an Open Economy Under Fixed and Flexible Exchange Rates

- ◾ **Aggregate Demand in an Open Economy Under Fixed Exchange Rates**

- • **Figure 6.5**

- ☐ **It shows the derivation of an open economy's aggregate demand curve under fixed exchange rates and compares it to the aggregate demand curve derived in Figure 6.1 for the closed economy**

- ☐ **The left panel of Figure 19.5 shows original equilibrium point E in the goods and money markets and in the balance of payments at i_E and Y_E, as in Figure 6.2. This gives point E in the right panel of Figure 6.5**
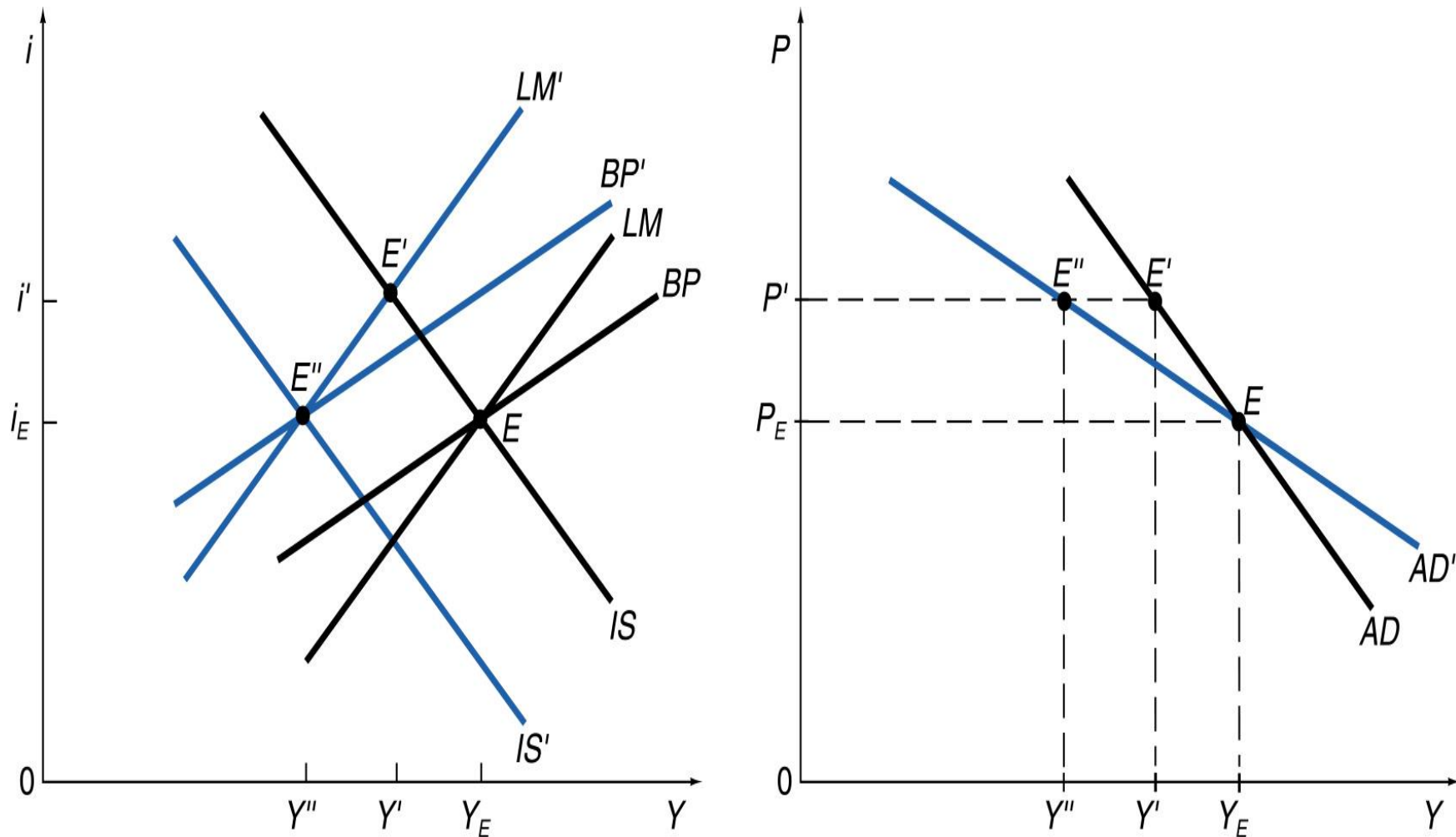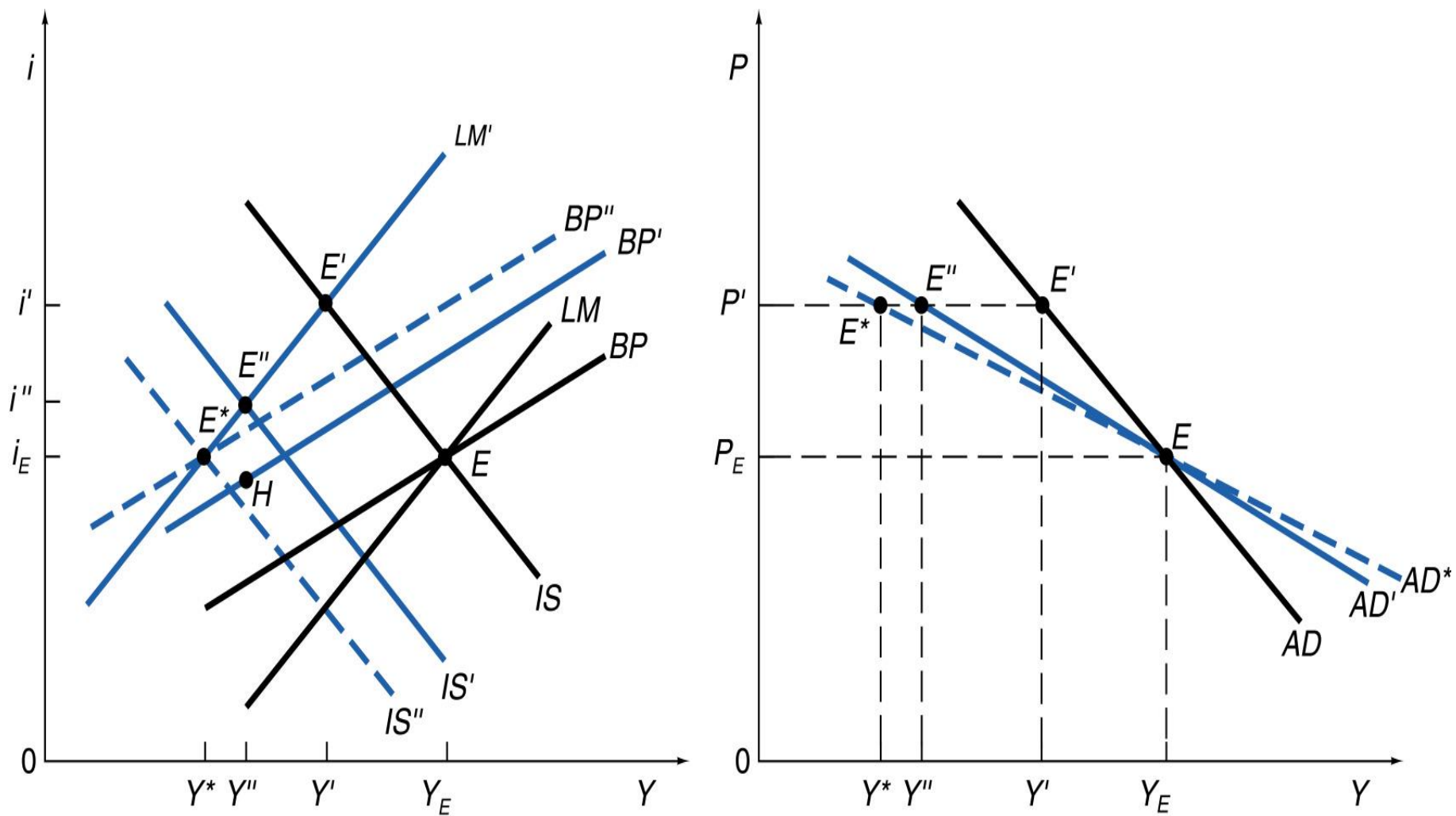
FIGURE 6-5 Derivation of a Nation's Aggregate Demand Curve Under Fixed Exchange Rates.

- Explanation of Figure 6.5

- From equilibrium point E at the intersection of the *LM, IS,* and *BP* curves at price level P_E and income Y_E in the left panel, we get point E in the right panel.

- An increase in the price level to P' causes the LM, BP, and IS curves to shift to the left to LM', BP', and IS', thus defining new equilibrium point E'', where these curves intersect.

- By joining points E and E'' in the right panel, we derive open-economy aggregate demand curve AD', which is flatter or more elastic than closed-economy aggregate demand curve AD

- **Aggregate Demand in an Open Economy Under Flexible Exchange Rates**

- **Figure 6.6**

□ **It shows the derivation of an open economy's aggregate demand curve under flexible exchange rates and compares it to the aggregate demand curve that we derived in Figure 6.1 for the closed economy and in Figure 6.6 shows original equilibrium point E in the goods and money markets and in the balance of payments at i_E and Y_E, as in Figure 6.5. This gives point E in the right panel of Figure 6.6**

FIGURE 6-6 Derivation of the Nation's Aggregate Demand Curve Under Flexible Exchange Rates.

- Explanation of Figure 6.6
- Starting from equilibrium point E in the left and right panels, an increase in the price level to P' causes the *LM, BP*, and *IS* curves to shift to the left to *LM', BP',* and *IS'.* Since the *LM'* and *IS'* curves intersect above the *BP'* curve, the nation has a surplus in its balance of payments.
- The nation's currency then appreciates.
- This causes the *IS'* curve at point E^*.
- This gives point E^* in the right panel. Joining points E and E^* in the right panel gives aggregate demand curve AD^*, which is more elastic than AD and AD'

6.4 Effect of Economic Shocks and Macroeconomic Policies on Aggregate Demand in Open Economies with Flexible Prices

■ **Introduction**

- **This section examines the effect of real and monetary shocks as well as fiscal and monetary policies on aggregate demand in open economies with flexible prices under fixed and flexible exchange rates**

■ **Real-Sector Shocks and Aggregate Demand**

• **Figure 6.7**

☐ Starting from point E in both panels, an increase in the nation's exports and/ or reduction in the nation's imports with unchanged domestic prices causes the *IS* and *BP* curves to shift rightward to *IS'* and *BP'*.

☐ Under fixed exchange rates, this leads to a surplus in the nation's balance of payments and a rightward shift of the *LM* curve to *LM'*, which defines new equilibrium point E ″ .

☐ Thus, the *AD* curve shifts rightward to *AD″* .

☐ With flexible exchange rates, the nation's currency appreciates so that the *BP'* and *IS'* curves shift back to *BP* and *IS* at original equilibrium point E in both panels
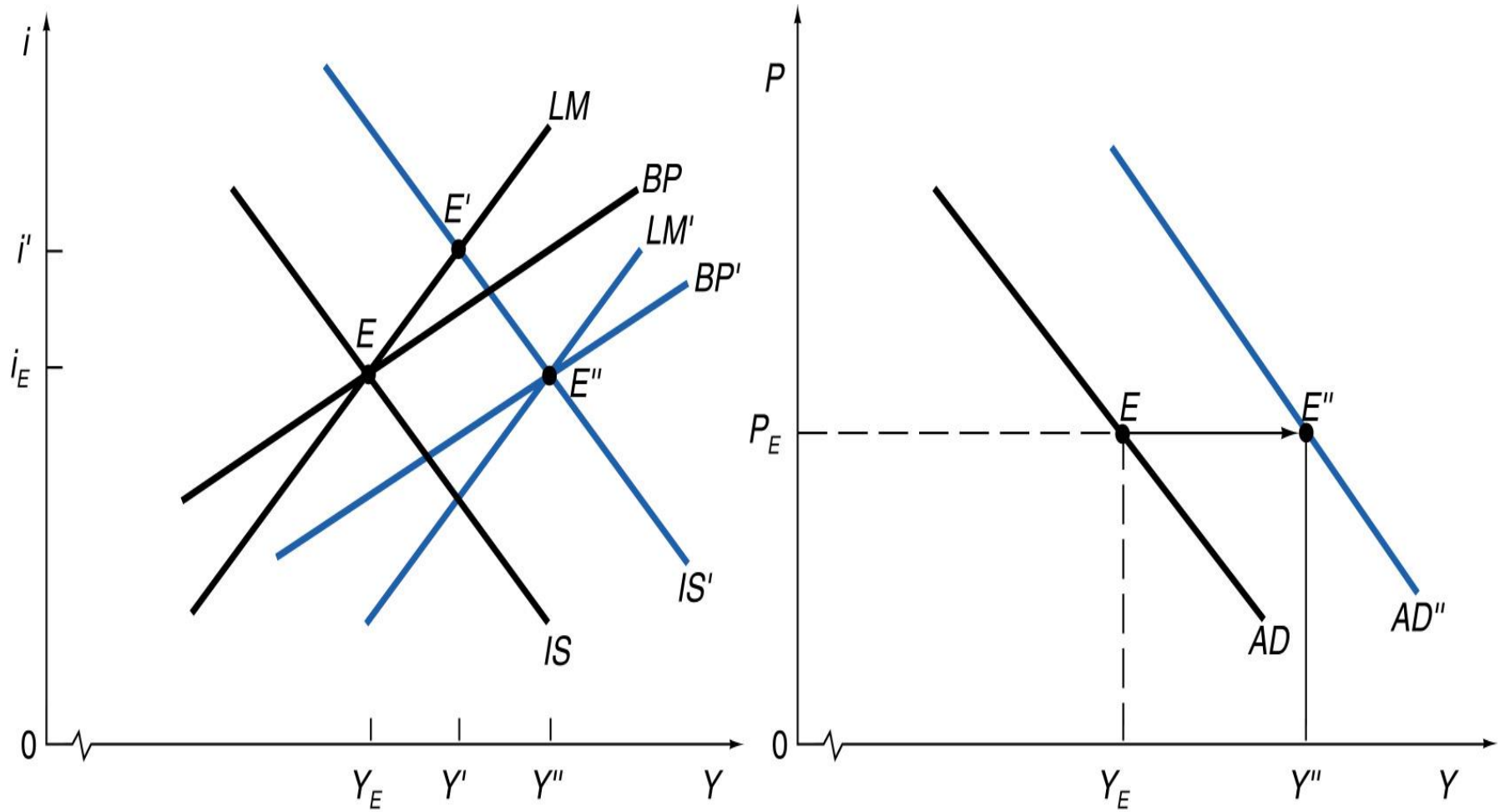
FIGURE 6-7 Changes in the Nation's Trade Balance and Aggregate Demand.

■ **Monetary Shocks and Aggregate Demand**

- **Figure 6.8**

☐ Starting from equilibrium point E in both panels, an autonomous short-term capital inflow with unchanged domestic prices and fixed exchange rates causes the nation's *BP* and *LM* curves to shift rightward to *BP'* and *LM'*, thus defining new equilibrium point E″ with higher national income Y″ in the left panel.

☐ Thus, the nation's aggregate demand curve shifts to the right. With flexible exchange rates, the nation's currency appreciates, so that the *BP'* and *IS* curves shift to the left to *BP″* and *IS',* and they define new equilibrium point E″ along the original *LM* curve, so that the nation's aggregate demand curve shifts to the left
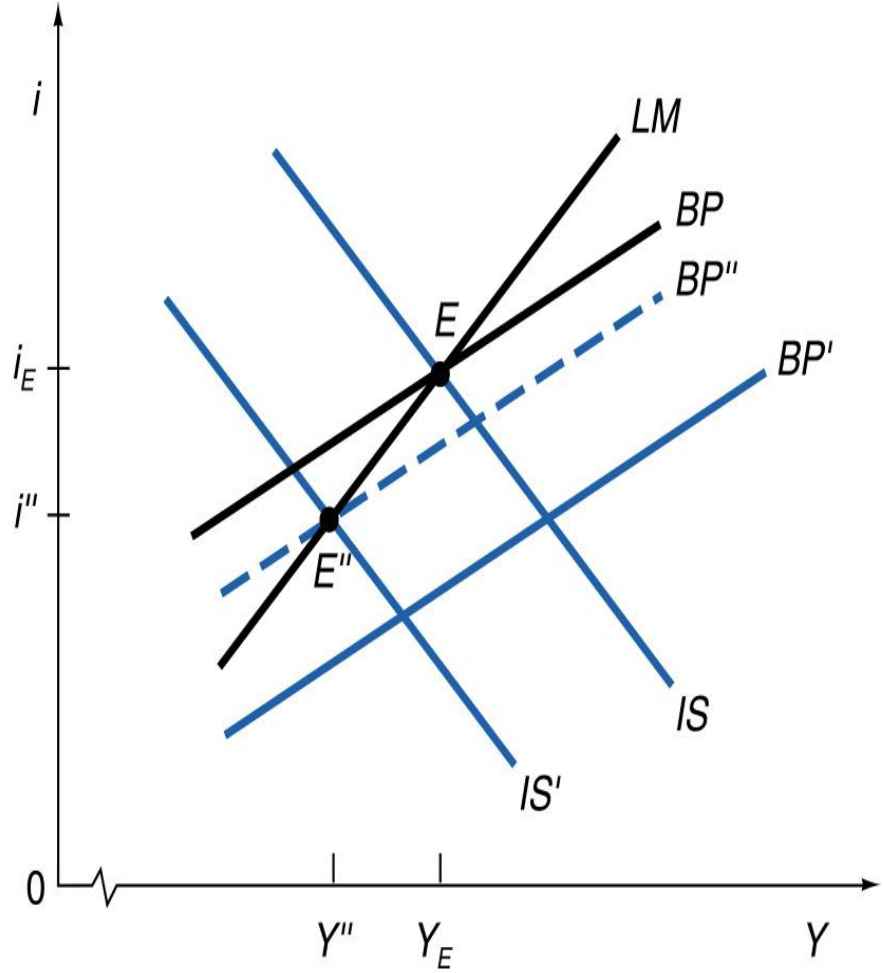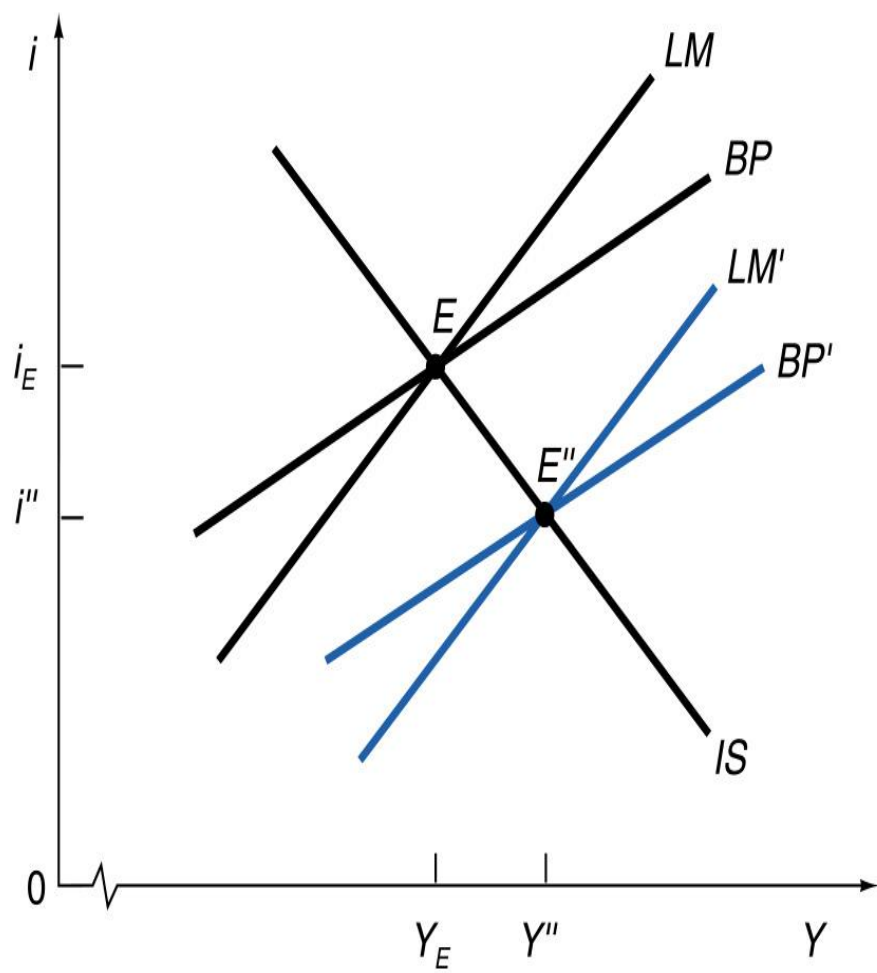
FIGURE 6-8 Short-Term Capital Flows and Aggregate Demand.

Fiscal and Monetary Policies and Aggregate Demand in Open Economies

- In chapter 5, that under highly elastic short-term international capital flows fiscal policy is effective while monetary policy is not, whereas the opposite is the case under flexible rates

- Specifically, under fixed exchange rates and highly elastic short-term international capital flows, expansionary fiscal policy will lead to capital inflows and is very effective in shifting the nation's aggregate demand curve to the right. Similarly, contractionary fiscal policy will lead to capital outflows and is very effective in shifting the nation's aggregate demand curve to the left

- Under flexible exchange rates and high international short-term capital flows, the opposite is the case. That is, easy monetary policy will be very effective in shifting the nation's aggregate demand curve to the right, and tight monetary policy will be effective in shifting the nation's demand curve to the left

6.5 Effect of Fiscal and Monetary Policies in Open Economies with
Flexible Prices

■ **Introduction**

- **Under fixed exchange rates and highly elastic short-term international capital flows, fiscal policy is effective whereas monetary policy is ineffective**

- **On the other hand, with flexible exchange rates, monetary policy is effective and fiscal policy is not**

- **This section examines fiscal policy under fixed exchange rates and monetary policy under flexible rates**

■ Figure 6.9

● Starting from long-run equilibrium point E in the left panel, expansionary fiscal policy shifts the *AD* curve up to *AD'* and defines short-run equilibrium point A at P_A and $Y_A > Y_N$
In the long-run , the SRAS curve shifts up to SRAS' defining equilibrium point C at P_C and Y_N .

● Starting from recession point R in the right panel with P_R and $Y_R < Y_N$, the nation could use expansionary fiscal policy to shift the *AD* curve up to *AD'* so as to reach equilibrium point C at P_C and Y_N at the intersection of the *AD'*, *SRAS*, and *LRAS* curves. The nation, however, could in time have reached equilibrium point E and P_E and Y_N automatically as a result of falling domestic prices because of recession and the *SRAS* curve shifting down to SRAS'
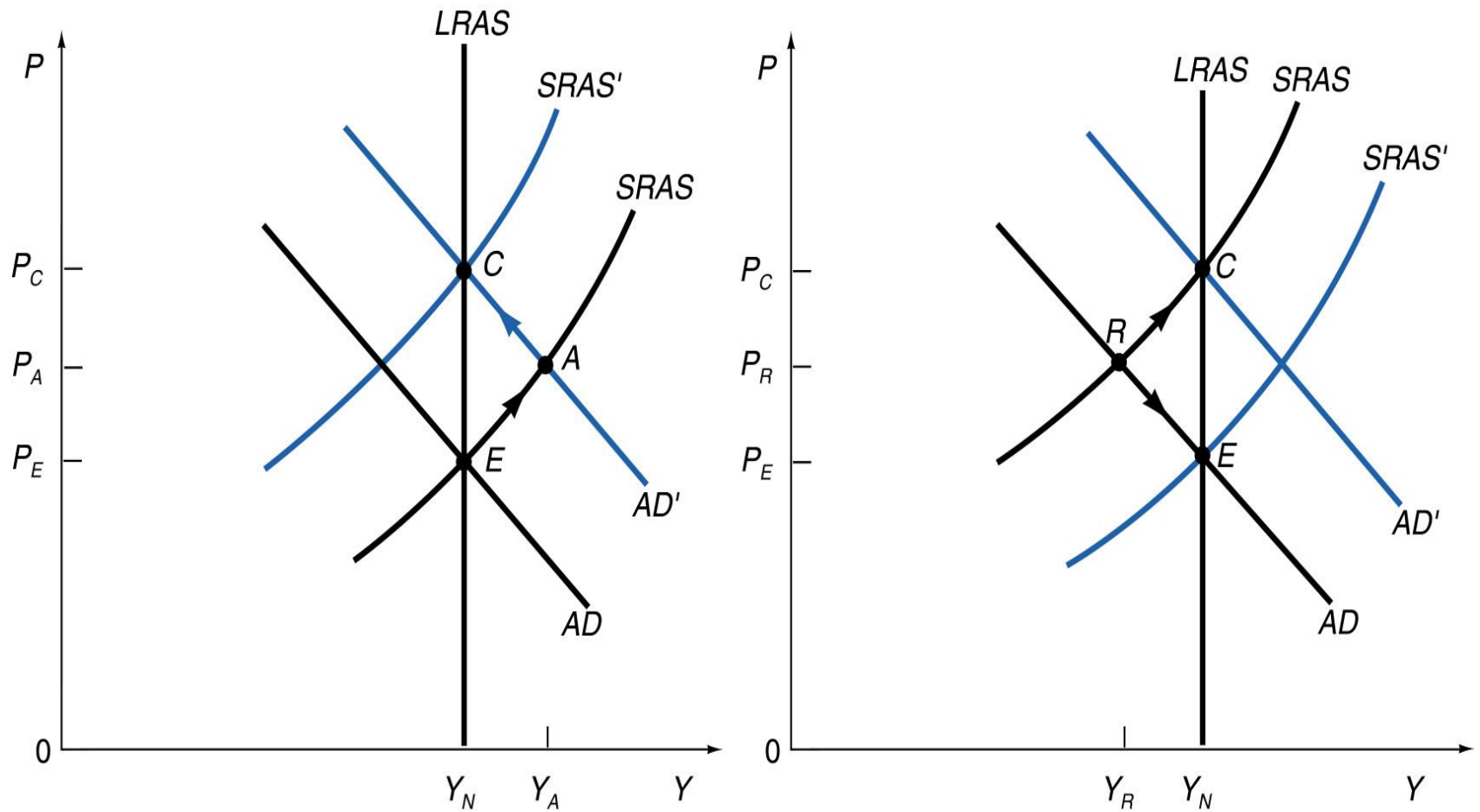
FIGURE 6-9 Expansionary Fiscal Policy from the Natural Level of Output and Recession Under Fixed Exchange Rates.

- **Case Study 6.10**

□There is some evidence that nations with more independent central banks suffer less inflation than nations with central banks that are less independent and more responsive to political pressures
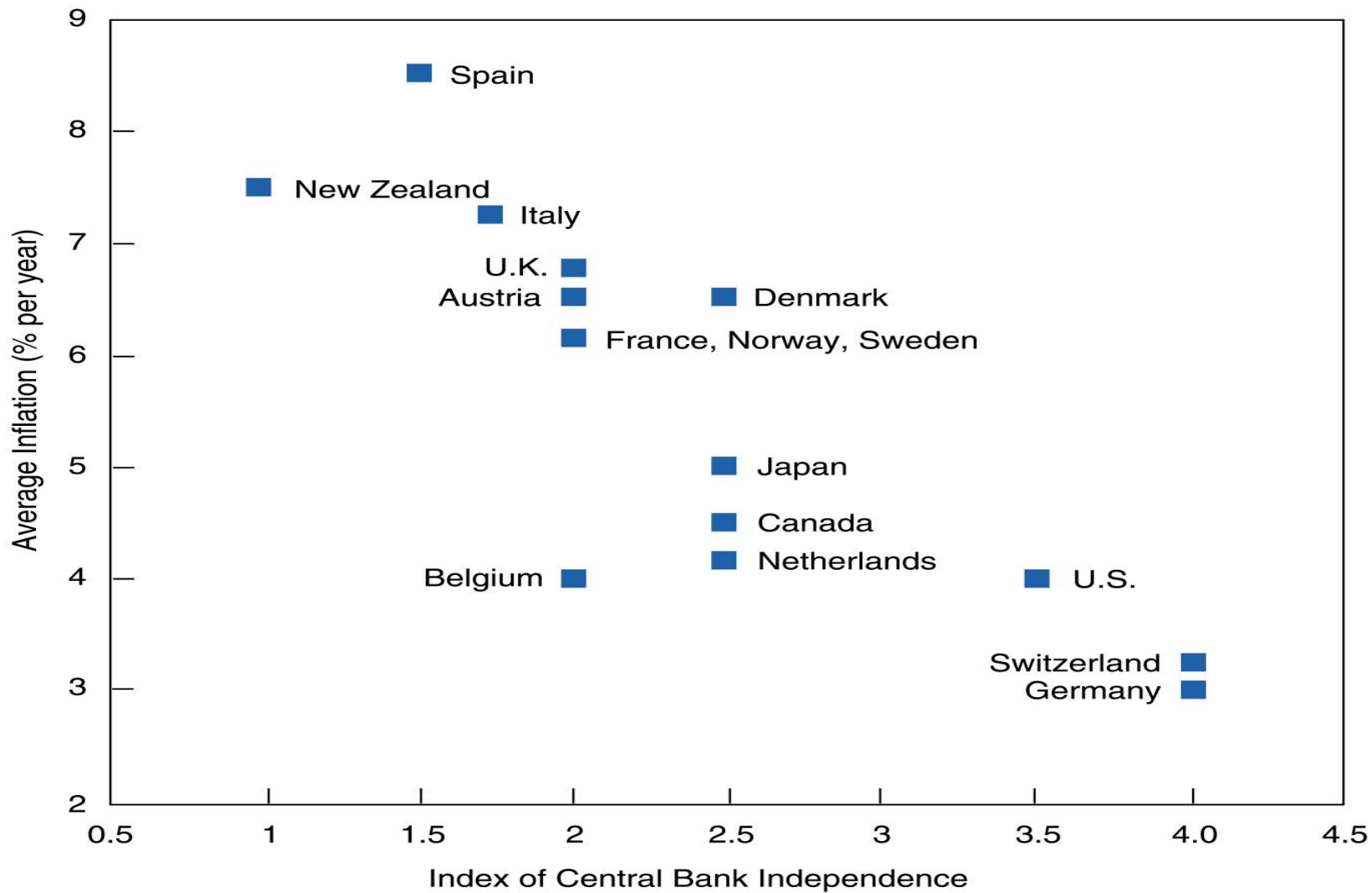
FIGURE 6-10 Index of Central Bank Independence and Average Inflation.

6.6 Macroeconomic Policies to Stimulate Growth and to Adjust to Supply Shocks

■ **Introduction**

- **This section examines fiscal and monetary policies to stimulate long-run growth and adjust to supply shocks in open economies with flexible prices**

Macroeconomic Policies for Growth

Figure 6.11

- Governments can stimulate long-run growth by increasing expenditures on education, infrastructures, basic research, and to improve the functioning of markets, also by tax incentives and low long-term interest rates to encourage private investment to the extent that efforts to stimulate long-run growth in the economy are successful, however, they will shift the nation's LRAS curve to the right, leading to more employment, higher incomes, lower prices, and possibly an appreciated currency in the long run

- The use of expansionary macroeconomic policies to stimulate growth can be examined with Figure 6.11
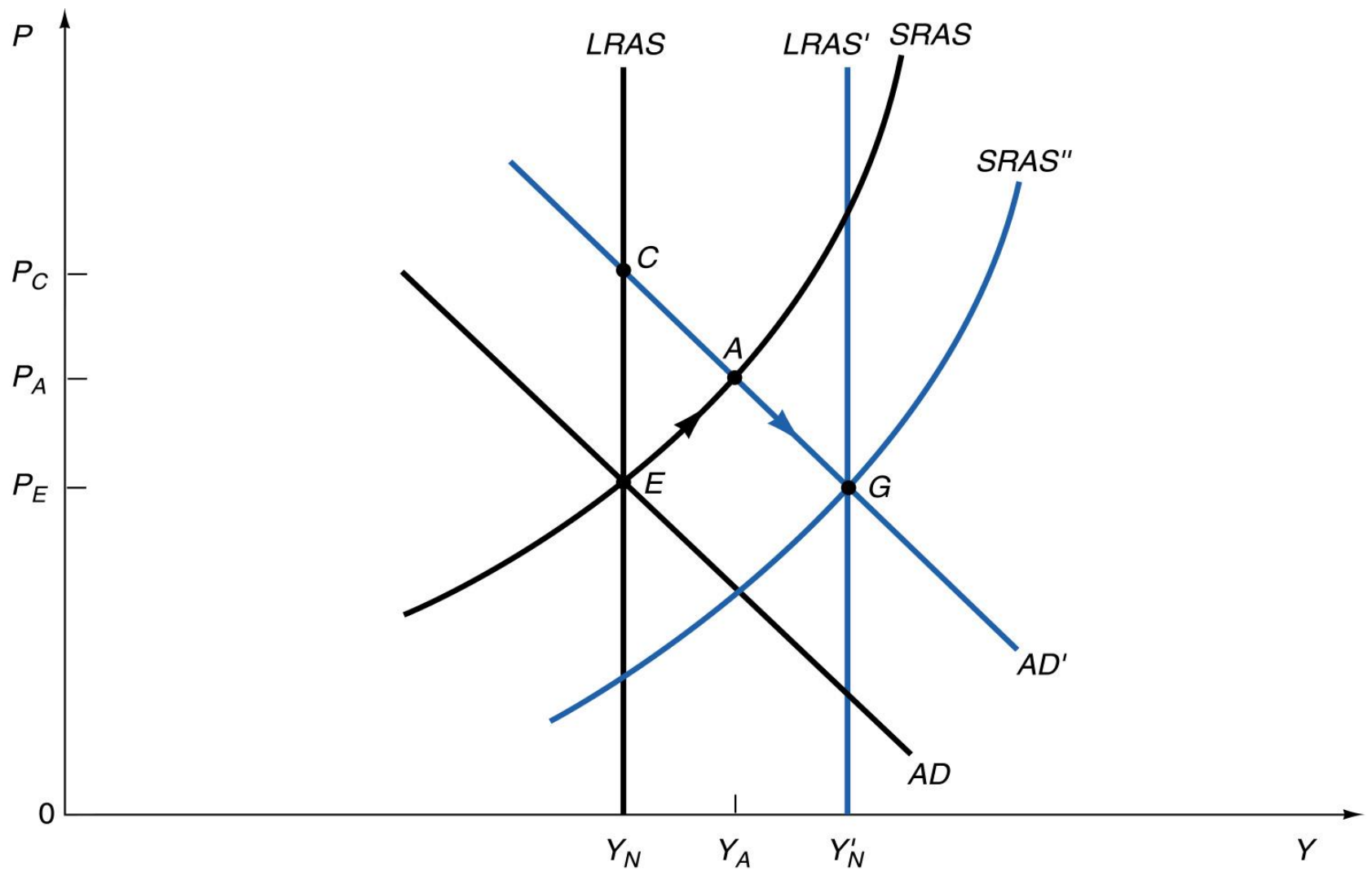
FIGURE 6-11 Macroeconomic Policies for Long-Run Growth.

- Explanation of Figure 6.11

☐ Starting at original long-run equilibrium point E, expansionary macroeconomic policies for growth shift the *AD* curve to the right to **AD'** and define new short-run equilibrium point A and $P_A > P_E$ and $Y_A > Y_N$.

☐ With long-run growth, the *LRAS* and *SRAS* curves shift to the right to *LRAS'* and *SRAS''* and define equilibrium point G at $P_G = P_E$ and $Y_N' > Y_N$

◼ Macroeconomic Policies to Adjust to Supply Shocks

- **Figure 6.12**

From original long-run equilibrium point **E,** the increase in petroleum prices causes the **SRAS** curve to shift up SRAS', thus defining short-run equilibrium point **E'** at **P'> P_E** and Y_N'< YN . Over time, prices fall because of recession, and the nation reaches new long-run equilibrium point **E″** at the intersection of the **LRAS', SRAS″** , and **AD** curves at **P″ < P'** and **Y″** $_N$ > **Y'**$_N$. An expansionary monetary policy that shifts the **AD** curve to the right to **AD'** would lead to alternative long-run equilibrium point **E*** with **P*P'** and **Y″** $_N$

- **Case Study (Figure 6.13)**

Monetary policy and booms and busts in the US economy
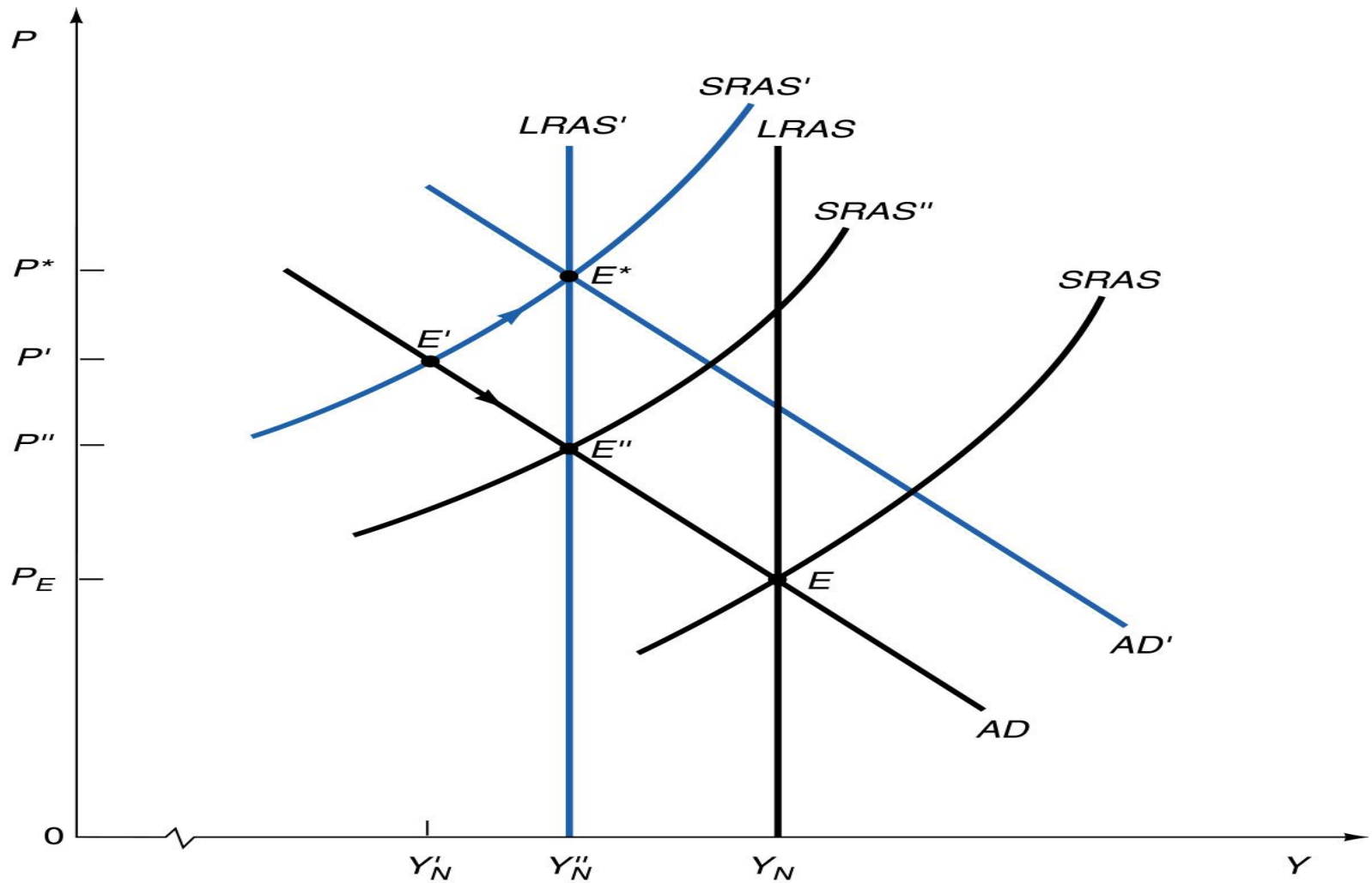
FIGURE 6-12 Macroeconomics Policies to Adjust to Supply Shocks.
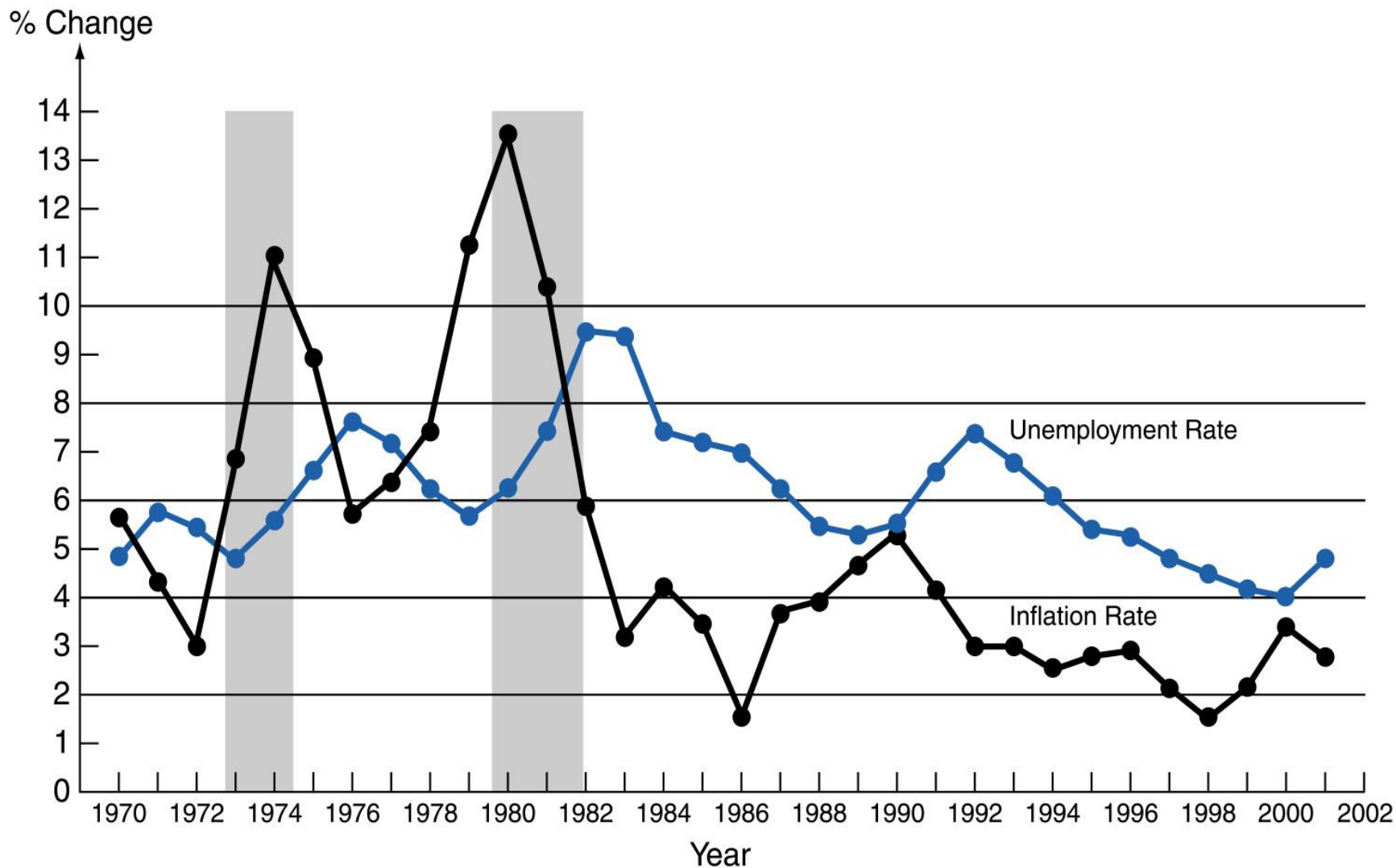
FIGURE 6-13 Stagflation in the United States, 1970-2001.

Chapter Summary

- **Open-economy macroeconomics**
- **Aggregate Demand and Aggregate Supply**
- **Relationship between Prices and Output**
- **Model of *IS*, *LM* and *BP***
- **Expansionary fiscal policy under fixed exchange rates or monetary policy under flexible rates**
- **Macroeconomic policies can be used to achieve long-run growth**