The Open Economy Revisited

Cheng Sun

Guanghua School of Management

Fall 2016

Today's Class: Part I

- The open economy revisited: the Mundell-Fleming Model and the exchange rate regime
  - The Mundell-Fleming Model
  - The small open economy under floating exchange rates
  - The small open economy under fixed exchange rates
  - Interest rate differentials
  - Should exchange rates be floating or fixed?
  - From the short run to the long run

The Mundell-Fleming Model

- The key assumption: small open economy with perfect capital mobility
  - The interest rate in this economy is determined by the world level
  - This world interest rate is assumed to be exogenously fixed.
  - The international flow of capital is rapid enough to keep the domestic interest rate equal to the world interest rate.
- The goods market and the IS* curve
  - The goods market: $Y = C(Y - T) + I(r) + G + NX(e)$
  - $\epsilon = eP/P^*$, and the Mundell-Fleming model assumes prices are fixed.
  - Use the nominal exchange rate e instead of ϵ.
  - Using the assumption of perfect capital mobility $r = r^*$, $Y = C(Y - T) + I(r^*) + G + NX(e)$.

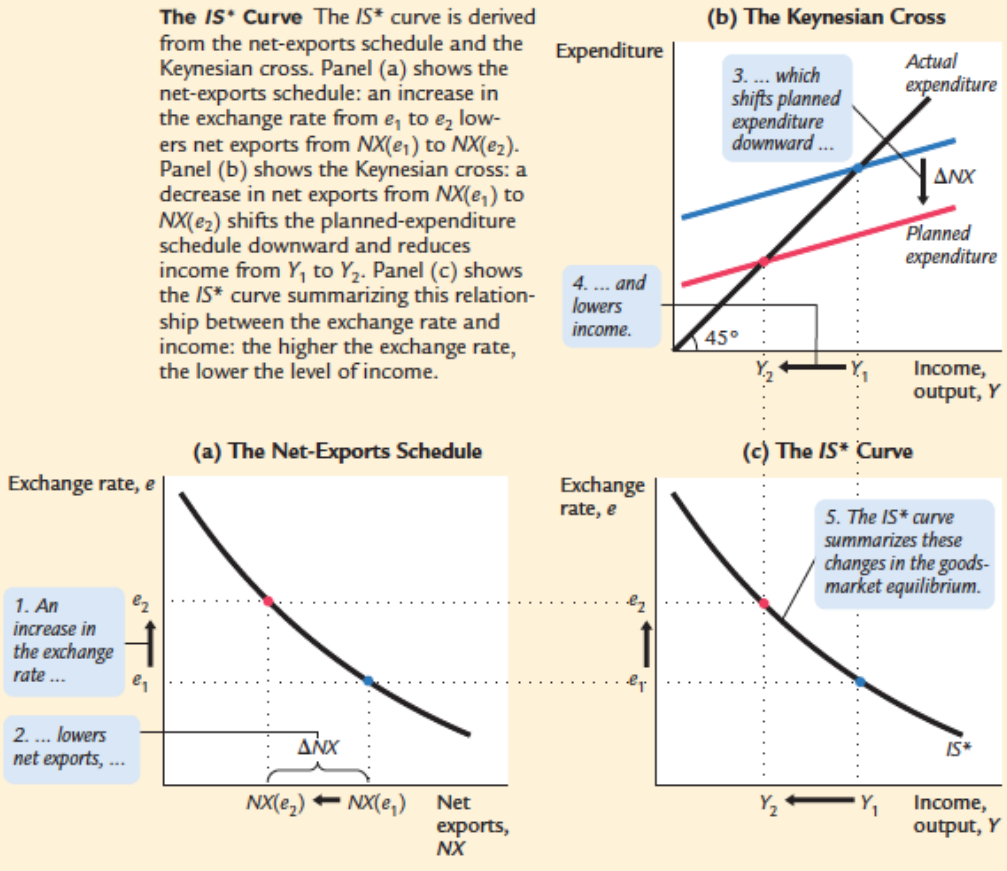
The Mundell-Fleming Model

- The money market and the LM* curve
  - The IS-LM model: $M/P = L(r, Y)$.
  - The LM* model with the $r = r^*$ assumption: $M/P = L(r^*, Y)$.
- Putting pieces together
  - The IS* curve: $Y = C(Y - T) + I(r^*) + G + NX(e)$
  - The LM* curve: $M/P = L(r^*, Y)$

The IS* Curve

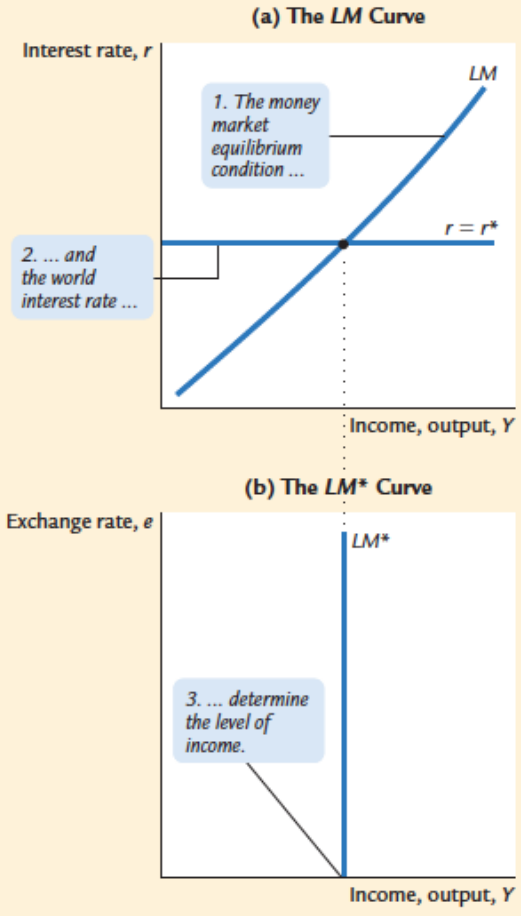
FIGURE 13-1

The *IS Curve** The *IS** curve is derived from the net-exports schedule and the Keynesian cross. Panel (a) shows the net-exports schedule: an increase in the exchange rate from e_1 to e_2 lowers net exports from $NX(e_1)$ to $NX(e_2)$. Panel (b) shows the Keynesian cross: a decrease in net exports from $NX(e_1)$ to $NX(e_2)$ shifts the planned-expenditure schedule downward and reduces income from Y_1 to Y_2. Panel (c) shows the *IS** curve summarizing this relationship between the exchange rate and income: the higher the exchange rate, the lower the level of income.



The LM* Curve

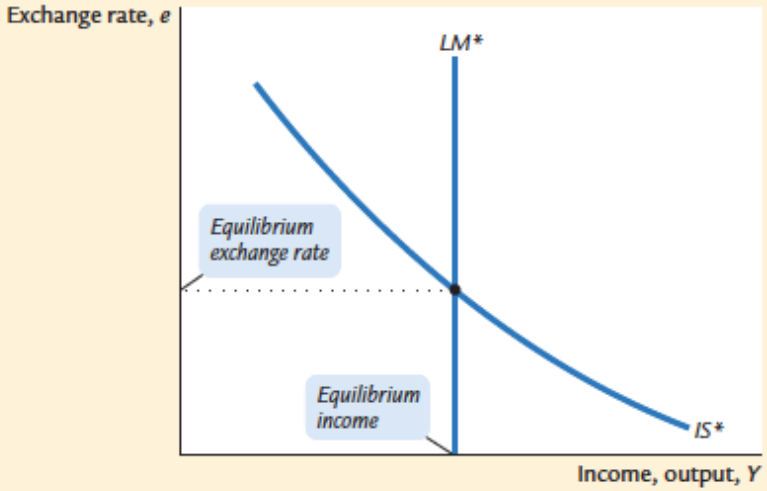
FIGURE 13-2



The *LM Curve** Panel (a) shows the standard *LM* curve [which graphs the equation $M/P = L(r, Y)$] together with a horizontal line representing the world interest rate r^*. The intersection of these two curves determines the level of income, regardless of the exchange rate. Therefore, as panel (b) shows, the *LM** curve is vertical.

The Mundell-Fleming Model

FIGURE 13-3



The Mundell–Fleming Model This graph of the Mundell–Fleming model plots the goods-market equilibrium condition *IS** and the money market equilibrium condition *LM**. Both curves are drawn holding the interest rate constant at the world interest rate. The intersection of these two curves shows the level of income and the exchange rate that satisfy equilibrium both in the goods market and in the money market.

Today's Class: Part I

- The open economy revisited: the Mundell-Fleming Model and the exchange rate regime
  - The small open economy under floating exchange rates
  - The small open economy under fixed exchange rates
  - Interest rate differentials
  - Should exchange rates be floating or fixed?
  - From the short run to the long run

The Small Open Economy Under Floating Exchange Rates

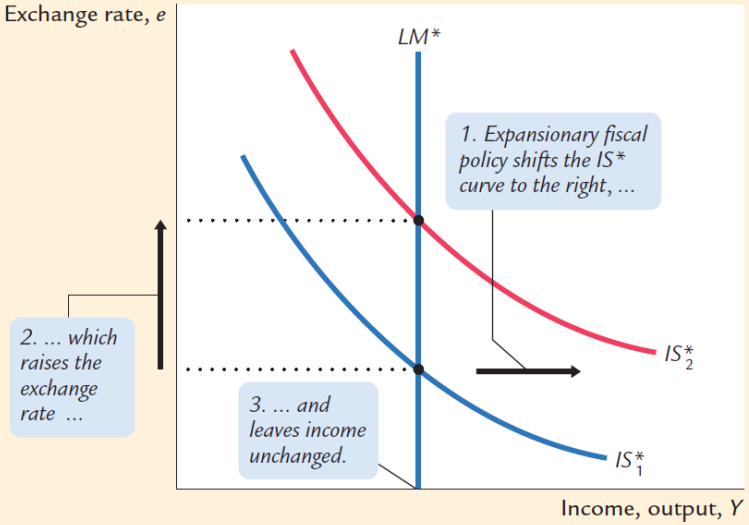
- Floating exchange rates
  - The exchange rate adjusts to achieve simultaneous equilibrium in the goods market and the money market.
- Fiscal policy
  - In the closed-economy, a fiscal expansion raises income.
  - In a small open economy, the income remains the same.
  - As soon as the interest rate starts to rise above the world level, capital quickly flows in from abroad to take advantage of that.
  - This capital inflow pushes the interest rate back and the capital inflow increases the demand for the domestic currency, bidding up the value of the domestic currency.
  - The appreciation of the domestic currency reduces net export, and offsets the effects of the expansionary fiscal policy on income.

The Small Open Economy Under Floating Exchange Rates

- Fiscal policy: mathematical analysis
  - The equation for money market: $M/P = L(r, Y)$.
  - In a closed economy, a fiscal expansion causes the equilibrium interest rate to rise.
  - This increase in the interest rate is accompanied by an increase in equilibrium income.
  - These two effects maintain equilibrium in the money market.
  - In a small open economy, the interest rate is fixed at the world level, so there is only one level of income that can satisfy this equation.
  - The fall in net exports must be large enough to fully offset the expansionary effect of the policy on income.

Fiscal Policy Under Floating Exchange Rates

FIGURE 13-4



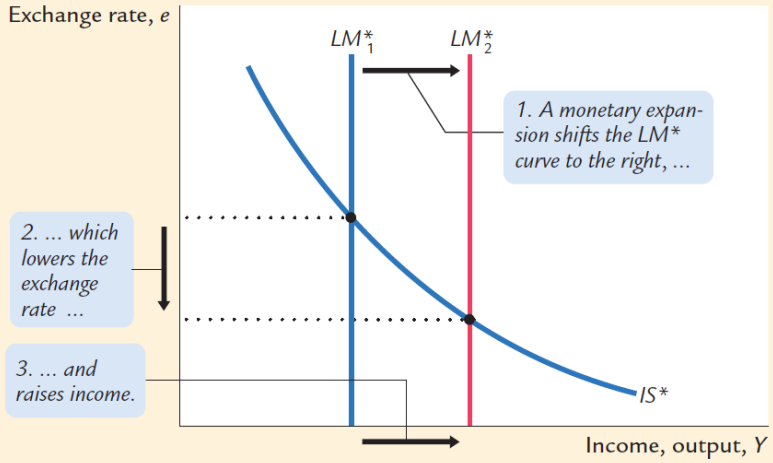
A Fiscal Expansion Under Floating Exchange Rates
An increase in government purchases or a decrease in taxes shifts the *IS** curve to the right. This raises the exchange rate but has no effect on income.

The Small Open Economy Under Floating Exchange Rates

- Monetary policy
  - The price level is assumed to be fixed.
  - The increase in the money supply means an increase in real money balances.
  - An increase in the money supply raises income and lowers the exchange rate.
  - In a closed economy, an increase in the money supply increases spending because it lowers the interest rate and stimulates investment.
  - In an open economy, an increase in the money supply starts pushing down the domestic interest rate, and capital flows out of the economy.
  - The capital outflow causes the domestic currency to depreciate.
  - This depreciation stimulates net exports and thus total income.

Monetary Policy Under Floating Exchange Rates

FIGURE 13-5



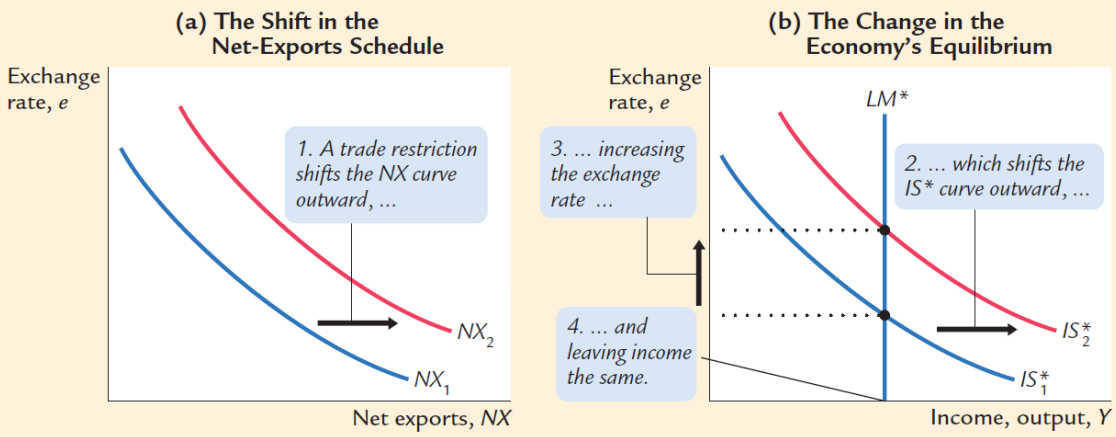
A Monetary Expansion Under Floating Exchange Rates An increase in the money supply shifts the *LM** curve to the right, lowering the exchange rate and raising income.

The Small Open Economy Under Floating Exchange Rates

- Trade policy
  - Suppose that the government reduces the demand for imported goods by imposing an import quota or a tariff.
  - A reduction in imports means an increase in net exports.
  - The trade restriction raises the exchange rate but not income.
  - The increase in the net-exports puts upward pressure on income, which in turn, increases money demand and puts upward pressure on the interest rate.
  - Foreign capital flows in, pushing the interest rate back.
  - The domestic currency appreciates.
  - The appreciation decreases net exports and returns income to its initial level.
  - $NX(e) = Y - C(Y - T) - I(r^*) - G$, and NX remainds the same, but there is less trade.

Trade Policy Under Floating Exchange Rates

FIGURE 13-6



A Trade Restriction Under Floating Exchange Rates A tariff or an import quota shifts the net-exports schedule in panel (a) to the right. As a result, the *IS** curve in panel (b) shifts to the right, raising the exchange rate and leaving income unchanged.

The Small Open Economy: South Korean

- South Korean won
  - The old won was a cognate of the Chinese yuan and Japanese yen.
  - During the Colonial era, the won was replaced at par by the yen, made up of the Korean yen.
  - In 1945 after World War II, Korea became divided, resulting in two separate currencies, both called won.
  - The South Korean won was initially pegged to the U.S. dollar at a rate of 15 won = 1 USD.
  - A series of devaluations followed, and Value of U.S. dollar in won was $6,000$ on April 1, 1951.
  - The first South Korean won was replaced by the hwan on February 15, 1953 at a rate of 1 hwan = 100 won.

The Small Open Economy: South Korean

- South Korean won
  - The won was reintroduced on June 10, 1962 at a rate of 1 won = 10 hwan.
  - At the reintroduction of the won in 1962, its value was pegged at 125 won = 1 USD.
  - Value of U.S. dollar in won was on January 12, 1980.
  - On February 27, 1980, efforts were initiated to lead to a floating exchange rate.
  - The won was finally allowed to float on December 24, 1997 when an agreement was signed with the International Monetary Fund.
  - Shortly after, the won was devalued to almost half of its value, as part of the East Asian financial crisis.

The Small Open Economy: South Korean

- Post Independence- Asian Financial Crisis
  - Throughout the 1950s Korea was underdeveloped and its 60 percent of the population was employed in farming activities.
  - Foreign policy focused on securing maximum foreign aid.
  - There was no formal trade policy then. In 1962, Korea embarked on a massive industrialization based on exports.
  - Financial incentives such as tax- free imports of raw materials encouraged the production of export goods, stimulating the growth in textile and electrical machine industries.
  - Trade grew from US$500 million in 1962 to US$2.8 billion in 1970, and trade grew at 40.8% during the 1960s.
  - In the early 1970s, third five-year plan focused on heavy and chemical industries. Increase in exports was roughly 45 percent a year.
  - The sixth five-year plan witnessed the change in trend from heavy industry toward export- oriented consumer products, including electronics and high tech.

The Small Open Economy: South Korean

- South Korea and the Asian Currency Crisis
  - South Korea borrowed heavily from the foreign banks on a short-term basis.
  - The money was taken to fund investment in the industries at the encouragement of the government.
  - The heavy reliance on the short term foreign loans led the Korean economy to suffer from the currency crisis, as foreign reserves were insufficient to deal with financial stability.
  - There were speculations that more than half of the top 30 Chaebol would file for bankruptcy.
  - In order to protect the won, the Korean central bank raised short-term interest rate to over 12 percent.
  - During that time Korea has accumulated a debt about 100 billion dollars that had to paid within a year while the reserve went down to under 6 billion dollar.

The Small Open Economy: South Korean

- South Korea and the Asian Currency Crisis
  - The Korean Government signed a deal of US $55 billion with IMF.
  - In order to come out of recession Korean government took a series of economic reform measures.
  - Restriction in the financial market was relaxed .
  - On December 24, 1997, free floating exchange rate was adopted to support liberalization of the capital market.
  - Private firms reduced leverage on foreign debts.
  - Korean central bank amassed sufficient foreign exchange reserves to prepare contingencies such as external financial shocks.

The Small Open Economy: South Korean

- Post Asian Financial Crisis to Globalization
  - Following the Global financial crisis of 2007-2008, the Korean economy contracted by 4.6% in fourth quarter as compared to the third quarter.
  - The liberalization of the capital market and the shift to free-floating exchange rate regime made it easier for foreign investor and speculators to withdraw capital from the Korean capital market.
  - Korean government claims that quick recovery from the global financial crisis of 2008 has been possible because of multilateral trade agreements.

Today's Class: Part I

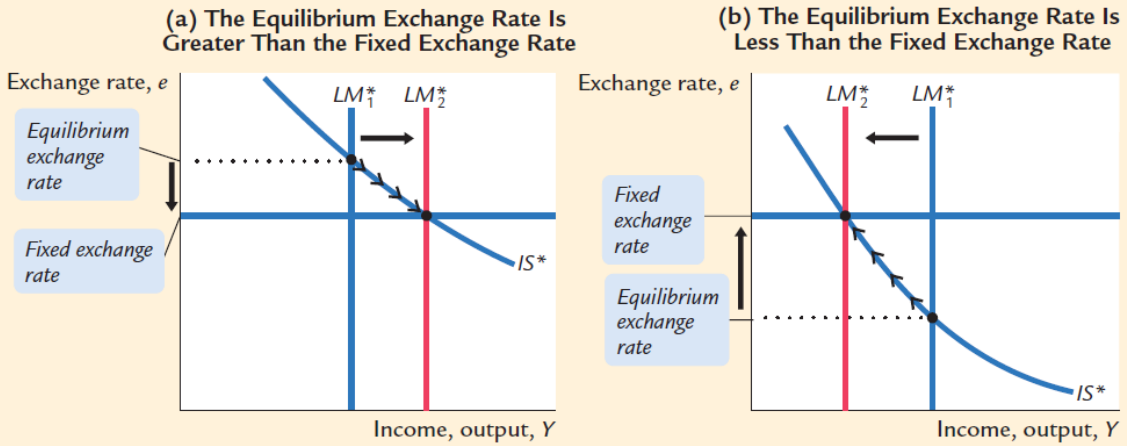
- The open economy revisited: the Mundell-Fleming Model and the exchange rate regime
  - The small open economy under fixed exchange rates
  - Interest rate differentials
  - Should exchange rates be floating or fixed?
  - From the short run to the long run

The Small Open Economy Under Fixed Exchange Rates

- Bretton Woods system
  - An international monetary system under which most governments agreed to fix exchange rates.
- How a fixed-exchange-rate system works
  - A fixed exchange rate dedicates a country's monetary policy to the single goal of keeping the exchange rate at the announced level.
- Example
  - Suppose the Fed decides to fix the exchange rate at 100 yen per dollar, but the market exchange rate is 150 yen per dollar.
  - An arbitrageur could buy yen in the foreign-exchange market and then sell the yen to the Fed.
  - When the Fed buys these yen from the arbitrageur, the dollars it pays for them automatically increase the money supply.
  - The money supply continues to rise until the equilibrium exchange rate falls to the level the Fed has announced.

The Small Open Economy Under Fixed Exchange Rates

FIGURE 13-7



How a Fixed Exchange Rate Governs the Money Supply In panel (a), the equilibrium exchange rate initially exceeds the fixed level. Arbitrageurs will buy foreign currency in foreign-exchange markets and sell it to the Fed for a profit. This process automatically increases the money supply, shifting the *LM** curve to the right and lowering the exchange rate. In panel (b), the equilibrium exchange rate is initially below the fixed level. Arbitrageurs will buy foreign currency from the Fed and sell it in foreign-exchange markets for a profit. This process automatically reduces the money supply, shifting the *LM** curve to the left and raising the exchange rate.

The Small Open Economy Under Fixed Exchange Rates

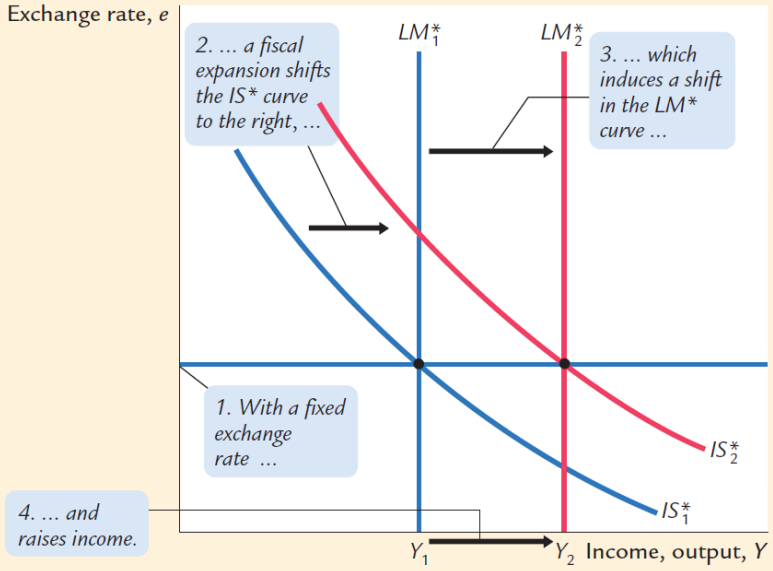
- Remark
  - This exchange-rate system fixes the nominal exchange rate.
  - If prices are flexible, as in the long run, then the real exchange rate can change even while the nominal exchange rate is fixed.
  - In Chapter 6, a policy to fix the nominal exchange rate would not influence any real variable, including the real exchange rate.
  - Yet in the short run described by the Mundell-Fleming model, prices are fixed, so a fixed nominal exchange rate implies a fixed real exchange rate as well.
- Reading: International gold standard.
  - Each country maintained a reserve of gold and agreed to exchange one unit of its currency for a specified amount of gold.
  - Yet the international gold standard did keep the exchange rate within a range dictated by transportation costs.

The Small Open Economy Under Fixed Exchange Rates

- Fiscal policy
  - Suppose that the government stimulates domestic spending by increasing government purchases or by cutting taxes.
  - It puts upward pressure on the market exchange rate.
  - Arbitrageurs quickly respond to the rising exchange rate by selling foreign currency to the central bank, leading to an automatic monetary expansion.
  - The rise in the money supply raises aggregate income.
- Monetary policy
  - A central bank operating with a fixed exchange rate tries to increase the money supply.
  - Arbitrageurs quickly respond by selling the domestic currency to the central bank.
  - The money supply returns to its initial position.

Fiscal Policy Under Fixed Exchange Rates

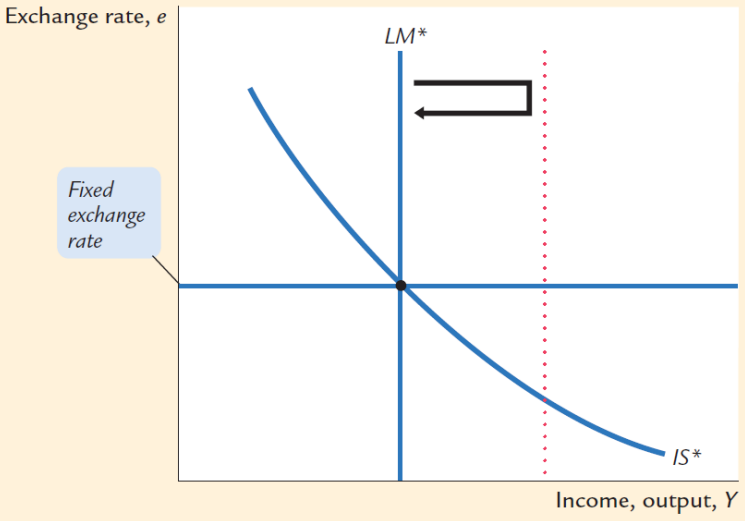
FIGURE 13-8



A Fiscal Expansion Under Fixed Exchange Rates A fiscal expansion shifts the *IS** curve to the right. To maintain the fixed exchange rate, the Fed must increase the money supply, thereby shifting the *LM** curve to the right. Hence, in contrast to the case of floating exchange rates, under fixed exchange rates a fiscal expansion raises income.

Monetary Policy Under Fixed Exchange Rates

FIGURE 13-9



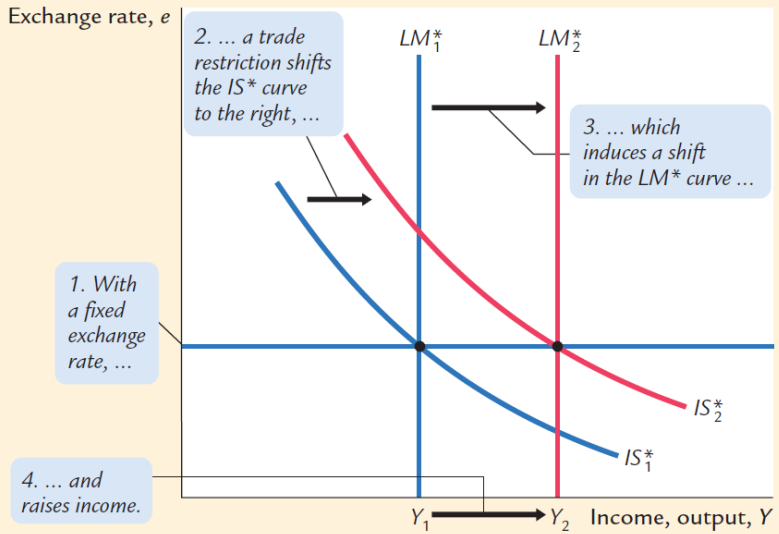
A Monetary Expansion Under Fixed Exchange Rates If the Fed tries to increase the money supply—for example, by buying bonds from the public—it will put downward pressure on the exchange rate. To maintain the fixed exchange rate, the money supply and the *LM** curve must return to their initial positions. Hence, under fixed exchange rates, normal monetary policy is ineffectual.

The Small Open Economy Under Fixed Exchange Rates

- Trade policy
  - Suppose that the government reduces imports by imposing an import quota or a tariff.
  - This policy shifts the net-exports schedule to the right.
  - The shift in the IS* curve tends to raise the exchange rate.
  - To keep the exchange rate at the fixed level, the money supply must rise.
  - A trade restriction under a fixed exchange rate induces monetary expansion rather than an appreciation of the currency.
  - The monetary expansion, in turn, raises aggregate income.
  - When income rises, saving also rises, and this implies an increase in net exports.

Trade Policy Under Fixed Exchange Rates

FIGURE 13-10



A Trade Restriction Under Fixed Exchange Rates A tariff or an import quota shifts the *IS** curve to the right. This induces an increase in the money supply to maintain the fixed exchange rate. Hence, aggregate income increases.

Policy in the Mundell-Fleming Model: A Summary

TABLE 13-1

The Mundell–Fleming Model: Summary of Policy Effects

	EXCHANGE-RATE REGIME					
	FLOATING			FIXED		
	IMPACT ON:					
Policy	***Y***	***e***	***NX***	***Y***	***e***	***NX***
Fiscal expansion	0	↑	↓	↑	0	0
Monetary expansion	↑	↓	↑	0	0	0
Import restriction	0	↑	0	↑	0	↑

Note: This table shows the direction of impact of various economic policies on income *Y*, the exchange rate *e*, and the trade balance *NX*. A "↑" indicates that the variable increases; a "↓" indicates that it decreases; a "0" indicates no effect. Remember that the exchange rate is defined as the amount of foreign currency per unit of domestic currency (for example, 100 yen per dollar).

Example: European Monetary Unification

- The Economic and Monetary Union (EMU) is an umbrella term for the group of policies aimed at converging the economies of member states of the European Union at three stages.
- History
  - Luxembourg's Prime Minister and Finance Minister, Pierre Werner, presented in October 1970 the first commonly agreed blueprint to create an economic and monetary union in three stages.
  - The President of the European Commission, Jacques Delors introduced the EMU in three stages including the creation of the European System of Central Banks in his 1989 report.

Example: European Monetary Unification

- Stage One: 1 July 1990 to 31 December 1993
  - On 1 July 1990, exchange controls are abolished, thus capital movements are completely liberalised.
  - The Treaty of Maastricht in 1992 establishes the completion of the EMU as a formal objective and sets a number of economic convergence criteria, concerning the inflation rate, public finances, interest rates and exchange rate stability.
- Stage Two: 1 January 1994 to 31 December 1998
  - On 1 June 1998, the European Central Bank (ECB) is created, and on 31 December 1998, the conversion rates between the 11 participating national currencies and the euro are established.
- Stage Three: 1 January 1999 and continuing
  - From the start of 1999, the euro is now a real currency, and a single monetary policy is introduced under the authority of the ECB.

Today's Class: Part I

- The open economy revisited: the Mundell-Fleming Model and the exchange rate regime
  - Interest rate differentials
  - Should exchange rates be floating or fixed?
  - From the short run to the long run

Interest Rate Differentials

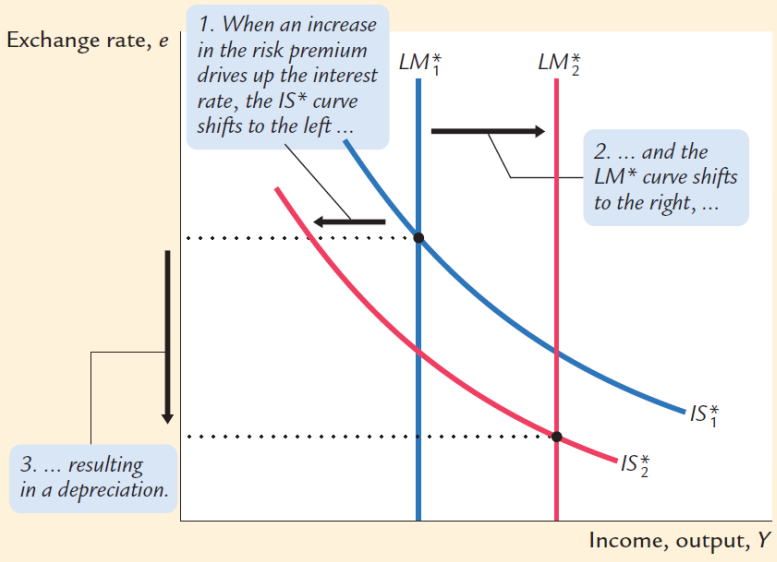
- Country risk and exchange-rate expectations
  - In some less-developed countries, a revolution or other political upheaval might lead to a default on loan repayments.
  - Borrowers in such countries often have to pay higher interest rates to compensate lenders for this risk.
  - There is expected changes in the exchange rate.
  - For example, suppose that people expect the Mexican peso to fall in value relative to the U.S. dollar.
  - To compensate for this expected fall, the interest rate in Mexico will be higher than the one in the United States.

Interest Rate Differentials

- Differentials in the Mundell-Fleming Model
  - The Mundell-Fleming model with a floating exchange rate.
  - The interest rate in our small open economy is determined by the world interest rate plus a risk premium: $r = r^* + \theta$.
  - Rewrite the IS* curve: $Y = C(Y - T) + I(r^* + \theta) + G + NX(e)$
  - Rewrite the LM* curve: $M/P = L(r^* + \theta, Y)$
- Differentials in the Mundell-Fleming Model: example
  - Now suppose that political turmoil causes the country's risk premium to rise.
  - The most direct effect is that the domestic interest rate rises.
  - The IS* curve shifts to the left because the higher interest rate reduces investment.
  - The LM* curve shifts to the right because the higher interest rate reduces the demand for money, which implies a higher income.
  - These two shifts cause income to rise and the currency to depreciate.

Differentials in the Mundell-Fleming Model

FIGURE 13-11



An Increase in the Risk Premium An increase in the risk premium associated with a country drives up its interest rate. Because the higher interest rate reduces investment, the *IS** curve shifts to the left. Because it also reduces money demand, the *LM** curve shifts to the right. Income rises, and the currency depreciates.

Interest Rate Differentials

- Differentials in the Mundell-Fleming Model: implication
  - Expectations about the exchange rate are partially self-fulfilling.
  - The expectation that a currency will lose value in the future causes it to lose value today.
  - Aggregate income rises.
  - Although higher interest rates depress investment, the depreciation of the currency stimulates net exports even more.
  - In practice, such a boom in income does not occur.
    - The central bank might want to avoid the large depreciation and, therefore, may respond by decreasing the money supply.
    - The depreciation of the domestic currency may suddenly increase the price of imported goods, causing an increase in the price level.
    - Third, when some event increases the country risk premium, residents might respond by increasing their demand for money.
    - All these changes would shift the LM* curve toward the left, which mitigates the fall in the exchange rate but also depresses income.

Interest Rate Differentials

- International Financial Crisis: Mexico 1994-1995
  - The North American Free Trade Agreement (NAFTA), which reduced trade barriers among the United States, Canada, and Mexico, made many people confident about the future of Mexico.
  - Political developments soon changed that perception.
  - Investors started placing a larger risk premium on Mexican assets.
  - At first, the rising risk premium did not affect the value of the peso because Mexico was operating with a fixed exchange rate.
  - Yet Mexico's foreign-currency reserves were too small to maintain its fixed exchange rate.
  - The country risk premium rose once again, adding to the upward pressure on interest rates and the downward pressure on the peso.
  - The Mexican government cannot repay the debt and default.
  - The United States provided loan guarantees for Mexican government debt.

Interest Rate Differentials

- International Financial Crisis: Mexico 1994-1995
  - The North American Free Trade Agreement (NAFTA), which reduced trade barriers among the United States, Canada, and Mexico, made many people confident about the future of Mexico.
  - Political developments soon changed that perception.
  - Investors started placing a larger risk premium on Mexican assets.
  - At first, the rising risk premium did not affect the value of the peso because Mexico was operating with a fixed exchange rate.
  - Yet Mexico's foreign-currency reserves were too small to maintain its fixed exchange rate.
  - The country risk premium rose once again, adding to the upward pressure on interest rates and the downward pressure on the peso.
  - The Mexican government cannot repay the debt and default.
  - The United States provided loan guarantees for Mexican government debt.

Interest Rate Differentials

- International Financial Crisis: Asia 1997-1998
  - For many years, the governments in the Asian nations had been more involved in managing the allocation of resources.
  - Many Asian banks had been extending loans to those with the most political clout rather than to those with the most profitable projects.
  - Problems in the banking system eroded international confidence in these economies.
  - Loss of confidence raised risk premiums and interest rates.
  - Rising interest rates, together with the loss of confidence, depressed the prices of stock and other assets.
  - Falling asset prices reduced the value of collateral being used for bank loans.
  - Reduced collateral increased default rates on bank loans.
  - Greater defaults exacerbated problems in the banking system.
  - The IMF made loans to the Asian countries to help them.

Today's Class: Part I

- The open economy revisited: the Mundell-Fleming Model and the exchange rate regime
  - Should exchange rates be floating or fixed?
  - From the short run to the long run

Should Exchange Rates Be Floating or Fixed

- Pros and Cons of different exchange-rate systems
  - Under fixed rates, monetary policy is committed to the single goal of maintaining the exchange rate.
  - The floating exchange rates leaves monetary policymakers free to pursue other goals, such as stabilizing employment or prices.
  - Exchange-rate uncertainty makes international trade more difficult.
  - A commitment to a fixed exchange rate is one way to discipline a nation's monetary authority and prevent excessive growth in the money supply.
  - We rarely observe exchange rates that are completely fixed or completely floating.

Should Exchange Rates Be Floating or Fixed

- The Debate Over the Euro
  - Many European countries have given up their own currencies and have formed a monetary union that uses a common currency.
  - The introduction of a common currency has its costs.
  - The nations of Europe are no longer able to conduct their own monetary policies.
  - When a recession hits one country but not others, that country does not have the tool of monetary policy to combat the downturn.
  - This encourages more international trade and have the political advantage of making Europeans feel more connected to one another.
  - In 2011, Greece ran into severe financial difficulties.
  - The government then had little choice but to alter its fiscal policy.

Should Exchange Rates Be Floating or Fixed

- Bretton Woods system: Beginning
  - The Bretton Woods system of monetary management established the rules among the United States, Canada, Western Europe, Australia and Japan in the mid-20th century.
  - The chief obligation was to adopt a monetary policy that maintained the exchange rate by tying its currency to gold and the ability of the IMF to bridge temporary imbalances of payments.
  - 730 delegates from all 44 Allied nations gathered at the Mount Washington Hotel in Bretton Woods, New Hampshire, United States.
  - Setting up a system of rules, institutions, and procedures to regulate the international monetary system, these accords established the International Monetary Fund (IMF) and the International Bank for Reconstruction and Development (IBRD), which today is part of the World Bank Group.

Should Exchange Rates Be Floating or Fixed

- Bretton Woods system: End
  - On 15 August 1971, the United States unilaterally terminated convertibility of the US dollar to gold, effectively bringing the Bretton Woods system to an end and rendering the dollar a fiat currency.
  - This action, referred to as the Nixon shock, created the situation in which the USD became a reserve currency used by many states.
  - At the same time, many fixed currencies became free-floating.
- Bretton Woods system: Interwar period
  - Failure to coordinate exchange rates during the interwar period had exacerbated political tensions.
  - The planners at Bretton Woods hoped to avoid a repeat of the Treaty of Versailles after World War I.
  - After World War I, Britain owed the US substantial sums, which Britain could not repay because it had used the funds to support allies such as France during the War.

Should Exchange Rates Be Floating or Fixed

- Bretton Woods system: Post war negotiations
  - The US was concerned about a sudden drop-off in war spending which might return the nation to unemployment levels of the 1930s, and so wanted others to import from the US.
  - The US supported free trade and international convertibility of currencies into gold or dollars.
  - John Maynard Keynes was behind Britain's proposal that surplus nations be forced to either import from debtor nations, build factories in debtor nations or donate to debtor nations.
  - The US opposed Keynes' plan, in favor of an International Monetary Fund which would have enough resources to counteract destabilizing flows of speculative finance.
  - At Bretton Woods, a system of fixed exchange rates was favored.
  - Flows of speculative international finance were curtailed by shunting them through and limiting them via central banks.

Should Exchange Rates Be Floating or Fixed

- Bretton Woods system: Dollar shortages and the Marshall Plan
  - Postwar world capitalism suffered from a huge dollar shortage.
  - The United States was running huge balance of trade surpluses, and the U.S. reserves were immense and growing.
  - Even though all nations wanted to buy US exports, dollars had to leave the United States and become available for international use in order for them to do so.
  - The United States set up the European Recovery Program (Marshall Plan) to provide large-scale financial and economic aid for rebuilding Europe largely through grants rather than loans.
  - From 1948 to 1954 the United States provided 16 Western European countries $17 billion in grants.
  - The U.S. promoted European and Japanese trade competitiveness, which would benefit the United States by widening markets for U.S. exports, and providing locations for U.S. capital expansion.

Should Exchange Rates Be Floating or Fixed

- Bretton Woods system: Paralysis
  - By 1968, the attempt to defend the dollar at a fixed peg of $35/ounce had become increasingly untenable.
  - Gold outflows from the U.S. accelerated, and despite gaining assurances from other nations to hold gold, the unbalanced fiscal spending of the Johnson administration had transformed the dollar shortage of the 1940s and 1950s into a dollar glut by the 1960s.
  - A negative balance of payments, growing public debt incurred by the Vietnam War and Great Society programs, and monetary inflation by the Federal Reserve caused the dollar to become increasingly overvalued.
  - By 1970, the gold coverage of the U.S. dropped from 55% to 22%.
  - Nixon shock: a series of economic measures undertaken by U.S. President Richard Nixon in 1971, including the unilateral cancellation of the direct international convertibility of the USD to gold.

Should Exchange Rates Be Floating or Fixed

- Speculative attacks, currency boards, and dollarization
  - You and your fellow policymakers decide to fix your currency: one peso for one dollar.
  - You now have to be ready to buy and sell pesos for a dollar each.
  - It raises the possibility of a speculative attack-a change in investors' perceptions that makes the fi xed exchange rate untenable.
  - A currency board is an arrangement by which the central bank holds enough foreign currency to back each unit of the domestic currency.
  - Dollarization: it can abandon the peso altogether and let its country use the U.S. dollar.

Should Exchange Rates Be Floating or Fixed

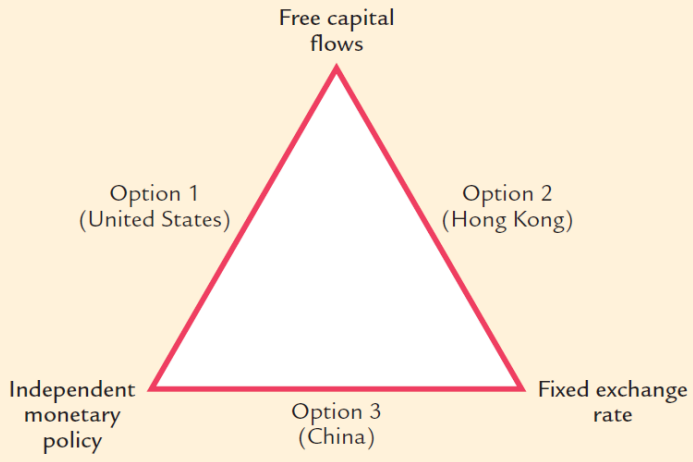
- The impossible trinity
  - Definition: it is impossible for a nation to have free capital flows, a fixed exchange rate, and independent monetary policy.
  - Option I: allow free flows of capital and to conduct an independent monetary policy, and it is impossible to have a fixed exchange rate.
  - Option II: allow free flows of capital and to fix the exchange rate, and the nation loses the ability to conduct an independent monetary policy.
  - Option III: restrict the international flow of capital in and out of the country, and the interest rate is no longer fixed by world interest rates but is determined by domestic forces.

Today's Class: Part I

- The open economy revisited: the Mundell-Fleming Model and the exchange rate regime
  - From the short run to the long run

The Impossible Trinity

FIGURE 13-12



The Impossible Trinity It is impossible for a nation to have free capital flows, a fixed exchange rate, and independent monetary policy. A nation must choose one side of this triangle, giving up the opposite corner.

Should Exchange Rates Be Floating or Fixed

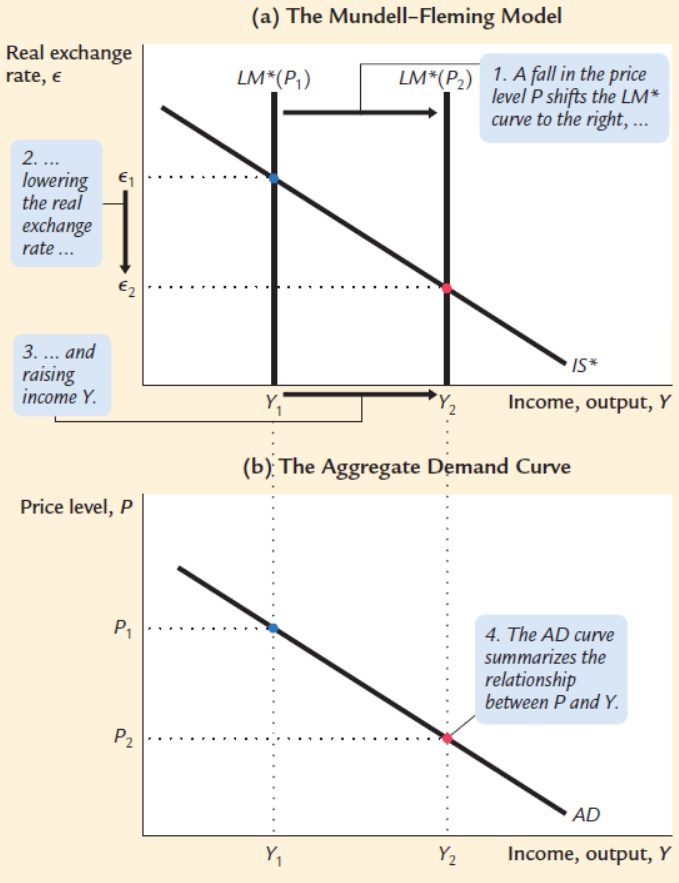
- The Chinese Currency Controversy
  - From 1995 to 2005 the Chinese currency, the yuan, was pegged to the dollar at an exchange rate of 8.28 yuan per U.S. dollar.
  - This policy of fixing the exchange rate was combined with a policy of restricting international capital flows.
  - China was accumulating large dollar reserves in its efforts to maintain the fixed exchange rate.
  - The Chinese central bank had to supply yuan and demand dollars in foreign-exchange markets to keep the yuan at the pegged level.
  - U.S. producers complained that the undervalued yuan made Chinese goods cheaper, putting the U.S. producers at a disadvantage.
  - Several senators proposed a steep tariff on Chinese imports until China adjusted the value of its currency.
  - China no longer completely fixes the exchange rate.

The Mundell-Fleming Model With a Changing Price Level

- From the shortrun to the long run
  - Write the Mundell-Fleming model with the real exchange rate.
  - The IS* curve: $Y = C(Y - T) + I(r^*) + G + NX(\epsilon)$.
  - The LM* curve: $M/P = L(r^*, Y)$.
  - A lower price level raises the level of real money balances, and the LM* curve shifts to the right.
  - The real exchange rate falls, and the equilibrium level of income rises.
  - The aggregate demand curve summarizes this negative relationship between the price level and the level of income.

The Mundell-Fleming Model With a Changing Price Level

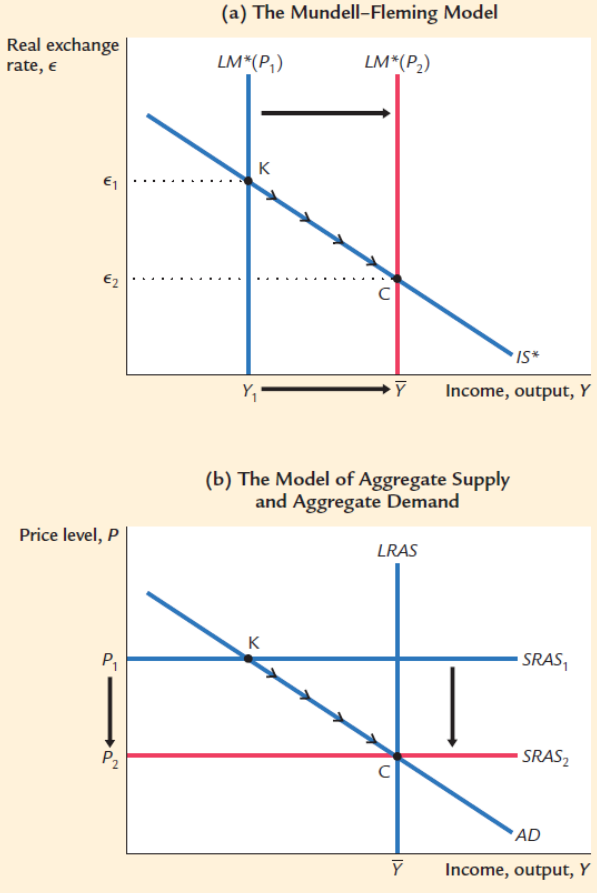
FIGURE 13-13



Mundell–Fleming as a Theory of Aggregate Demand Panel (a) shows that when the price level falls, the *LM** curve shifts to the right. The equilibrium level of income rises. Panel (b) shows that this negative relationship between *P* and *Y* is summarized by the aggregate demand curve.

The Mundell-Fleming Model With a Changing Price Level

FIGURE 13-14



The Short-Run and Long-Run Equilibria in a Small Open Economy Point K in both panels shows the equilibrium under the Keynesian assumption that the price level is fixed at P_1. Point C in both panels shows the equilibrium under the classical assumption that the price level adjusts to maintain income at its natural level $\bar{Y}$.

Today's Class: Part II

- The short run tradeoff between inflation and unemployment
  - The basic theory of aggregate supply
  - Inflation, unemployment, and the Phillips curve

The Basic Theory of Aggregate Supply

- The short-run aggregate supply curve is upward sloping rather than vertical due to market imperfection
  - $Y = \bar{Y} + \alpha(P - EP)$ with $\alpha > 0$
  - Y is the output, and $\bar{Y}$ is the natural level of output.
  - P is the price level, and EP is the expected price level.
  - α indicates how much output responds to unexpected changes in the price level.
  - $1/\alpha$ is the slope of the aggregate supply curve.
- The sticky-price model
  - This model emphasizes that firms do not instantly adjust the prices they charge in response to changes in demand.
  - We have to depart from the assumption of perfect competition.
  - Assume that these firms have at least some monopolistic control over the prices

The Sticky-Price Model

- The firms with flexible prices
  - $p = P + a(Y - \bar{Y})$
  - The firm's desired price p depends on the overall level of prices P and the level of aggregate income Y.
  - The parameter a measures how much the firm's desired price responds to the level of aggregate output.
- The firms with sticky prices
  - $p = EP + a(EY - E\bar{Y})$
  - For simplicity assume $EY = E\bar{Y}$, and then $p = EP$.
- Derive the relationship
  - s is the fraction of firms with sticky prices and $1 - s$ is the fraction with flexible prices.
  - $P = sEP + (1 - s)[P + a(Y - \bar{Y})]$.
  - Rewrite the equation $P = EP + [(1 - s)a/s](Y - \bar{Y})$

The Sticky-Price Model

- Remark:
  - When firms expect a high price level, they expect high costs.
  - When output is high, the demand for goods is high.
  - $Y = \bar{Y} + \alpha(P - EP)$ and $\alpha = s/[(1-s)a]$.
  - The sticky-price model says that the deviation of output from the natural level is positively associated with the deviation of the price level from the expected price level.

An Alternative Theory: The Imperfect-Information Model

- What is the imperfect-information model
  - This one assumes that markets clear.
  - The short-run and long-run aggregate supply curves differ because of temporary misperceptions about prices.
- Derive the imperfect-information model
  - It assumes that each supplier in the economy produces a single good and consumes many goods.
  - The suppliers cannot observe all prices at all times.
  - They monitor closely the prices of what they produce but less closely the prices of all the goods they consume.
  - Because of imperfect information, they sometimes confuse changes in the overall level of prices with changes in relative prices.
  - When all suppliers in the economy observe increases in the prices of the goods they produce, they work harder and produce more.

International Differences in the Aggregate Supply Curve

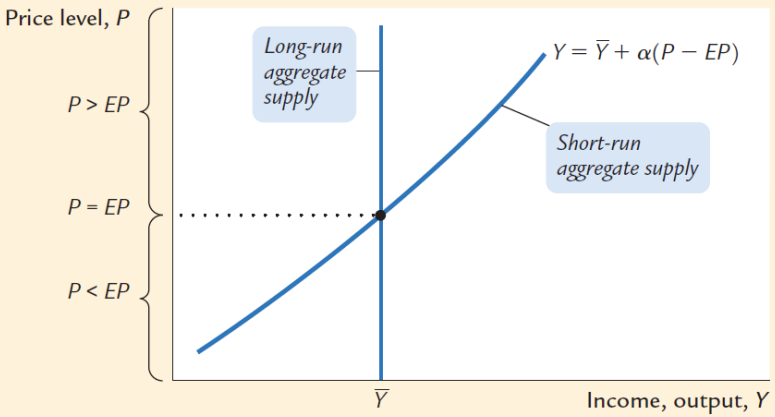
- Lucas' findings on output and prices
  - The slope of the aggregate supply curve should depend on the volatility of aggregate demand.
  - In countries where aggregate demand fluctuates widely, the aggregate price level fluctuates widely as well.
  - Empirical evidence: He found that changes in aggregate demand have the biggest effect on output in those countries where aggregate demand and prices are most stable.
- Findings on the slope of the short-run aggregate supply curve.
  - In particular, it predicts that the average rate of inflation should influence the slope of the short-run aggregate supply curve.
  - A high rate of inflation should make the short-run aggregate supply curve steeper.
  - Empirical evidence: High-inflation countries have steep short-run aggregate supply curves.

Implications

- We have seen two models of aggregate supply and the market imperfection
  - One model assumes the prices of some goods are sticky; the second assumes information about prices is imperfect.
  - The two models of differ in their assumptions and emphases, but their implications for aggregate output are similar.
  - If the price level is higher than the expected price level, output exceeds its natural level.
  - If the price level is lower than the expected price level, output falls short of its natural level.
- Put aggregate supply and aggregate demand back together.
  - Long-run monetary neutrality and short-run monetary nonneutrality are perfectly compatible.

The Short-Run Aggregate Supply Curve

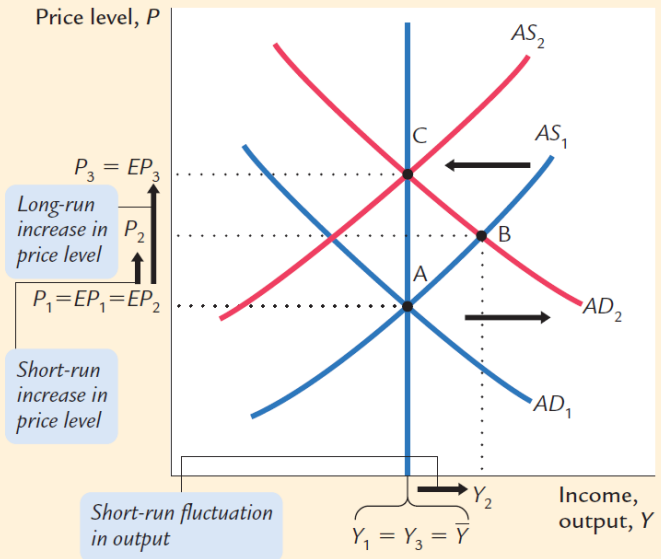
FIGURE 14-1



The Short-Run Aggregate Supply Curve Output deviates from its natural level $\bar{Y}$ if the price level P deviates from the expected price level EP.

Shifts in Aggregate Demand Lead to Short-Run Fluctuation

FIGURE 14-2



How Shifts in Aggregate Demand Lead to Short-Run Fluctuations Here the economy begins in a long-run equilibrium, point A. When aggregate demand increases unexpectedly, the price level rises from P_1 to P_2. Because the price level P_2 is above the expected price level EP_2, output rises temporarily above the natural level, as the economy moves along the short-run aggregate supply curve from point A to point B. In the long run, the expected price level rises to EP_3, causing the short-run aggregate supply curve to shift upward. The economy returns to a new long-run equilibrium, point C, where output is back at its natural level.

Today's Class: Part II

- The short run tradeoff between inflation and unemployment
  - Inflation, unemployment, and the Phillips curve

Inflation, Unemployment, and the Phillips Curve

- The Phillips curve: the tradeoff between inflation and unemployment.
  - Suppose that policymakers were to use monetary or fiscal policy to expand aggregate demand.
  - This policy would move the economy along the short-run aggregate supply curve to a point of higher output and a higher price.
  - Higher output means lower unemployment.
  - A higher price level means higher inflation.
  - When they contract aggregate demand and move the economy down the short-run aggregate supply curve, unemployment rises and inflation falls.
  - As policymakers move the economy along the short-run aggregate supply curve, unemployment and inflation move in opposite directions.

Deriving the Phillips Curve

- The Phillips curve states that the inflation rate depends on three forces
  - Expected inflation
  - The deviation of unemployment from the natural rate, called cyclical unemployment.
  - Supply shocks.
  - $\pi = E\pi - \beta(u - u^n) + v$
  - π is the inflation and $E\pi$ is expected one.
  - β is a parameter measuring the response of inflation to cyclical unemployment.
  - $u - u^n$ is the cyclical unemployment.
  - v is the supply shock.

Deriving the Phillips Curve

- Here are the three steps to derive the Phillips curve.
  - First, add to the right-hand side of the equation a supply shock v to represent exogenous events.
  - $P = EP + (1/\alpha)(Y - \bar{Y}) + v$
  - Next, to go from the price level to inflation rates, subtract last year's price level P_{-1} from both sides of the equation.
  - $(P - P_{-1}) = (EP - P_{-1}) + (1/\alpha)(Y - \bar{Y}) + v$
  - Interpret P as the log of price level: $\pi = E\pi + (1/\alpha)(Y - \bar{Y}) + v$
  - Use the Okun's law: $(1/\alpha)(Y - \bar{Y}) = -\beta(u - u^n)$.
  - Thus, we can derive the Phillips curve: $\pi = E\pi - \beta(u - u^n) + v$
- Remark
  - The Phillips curve equation and the short-run aggregate supply equation represent essentially the same macroeconomic ideas.
  - Unemployment is related to unexpected movements in the inflation rate.

Adaptive Expectations and Inflation Inertia

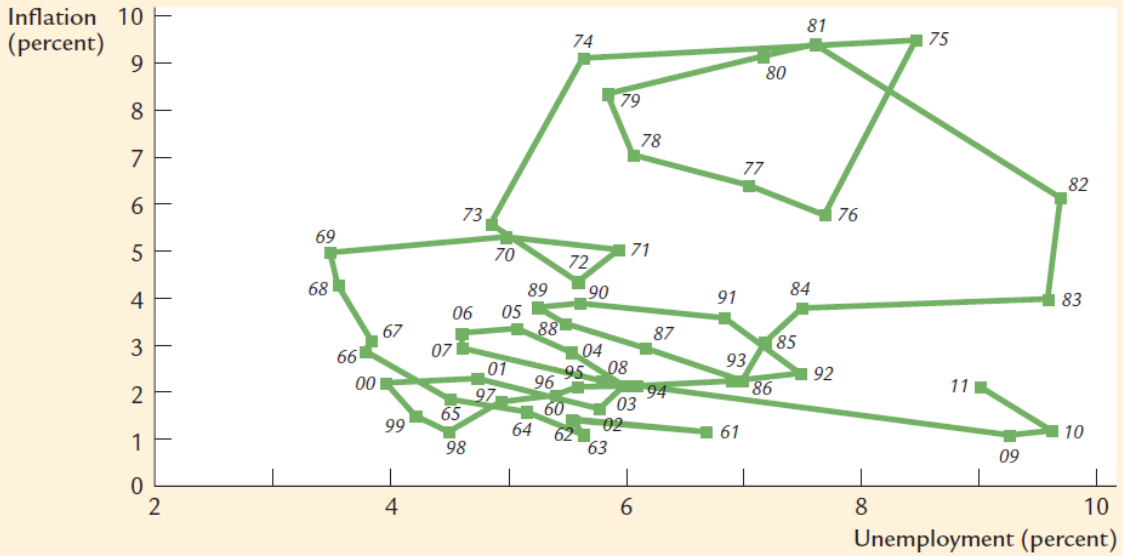
- Adaptive expectations
  - People form their expectations of inflation based on recently observed inflation.
  - Expected inflation $E\pi$ equals last year's inflation π_{-1}: $E\pi = \pi_{-1}$.
  - We can write the Phillips curve as $\pi = \pi_{-1} - \beta(u - u^n) + v$.
  - Inflation depends on past inflation, cyclical unemployment, and a supply shock.
  - The natural rate of unemployment is sometimes called the non-accelerating inflation rate of unemployment, or NAIRU.
- Remark
  - The first term in this form of the Phillips curve, π_{-1}, implies that inflation has inertia.
  - That is inflation keeps going unless something acts to stop it.

Two Causes of Rising and Falling Inflation

- $\beta(u - u^n)$ shows that cyclical unemployment exerts upward or downward pressure on inflation.
  - Low unemployment pulls the inflation rate up.
  - This is called demand-pull inflation because high aggregate demand is responsible for this type of inflation.
  - High unemployment pulls the inflation rate down.
  - The parameter β measures how responsive infl ation is to cyclical unemployment.
- The third term v shows that inflation also rises and falls because of supply shocks.
  - An adverse supply shock, such as the rise in world oil prices in the 1970s, implies a positive value of v and causes inflation to rise.
  - This is called cost-push inflation because adverse supply shocks are typically events that push up the costs of production.

Inflation and Unemployment in the United States

FIGURE 14-3



Inflation and Unemployment in the United States, 1960–2011 This figure uses annual data on the unemployment rate and the inflation rate (percentage change in the GDP deflator) to illustrate macroeconomic developments spanning half a century of U.S. history.

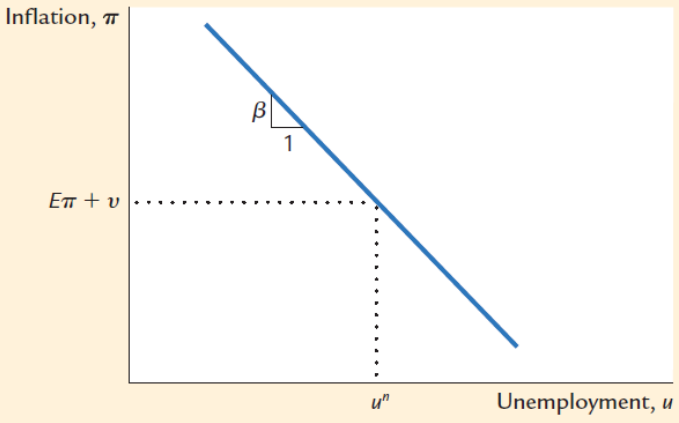
Sources: U.S. Department of Commerce and U.S. Department of Labor.

The Short-Run Tradeoff

- The short-run tradeoff between inflation and unemployment
  - When unemployment is at its natural rate, inflation depends on expected inflation and the supply shock.
  - The parameter β determines the slope of the tradeoff between inflation and unemployment.
  - In the short run, for a given level of expected inflation, policymakers can manipulate aggregate demand to choose any combination of inflation and unemployment on this curve, called the shortrun Phillips curve.
  - If expected inflation rises, the curve shifts upward, and the policymaker's tradeoff becomes less favorable.
- The long run and the short run
  - Because people adjust their expectations of inflation, the tradeoff between inflation and unemployment holds only in the short run.

The Short-Run Tradeoff

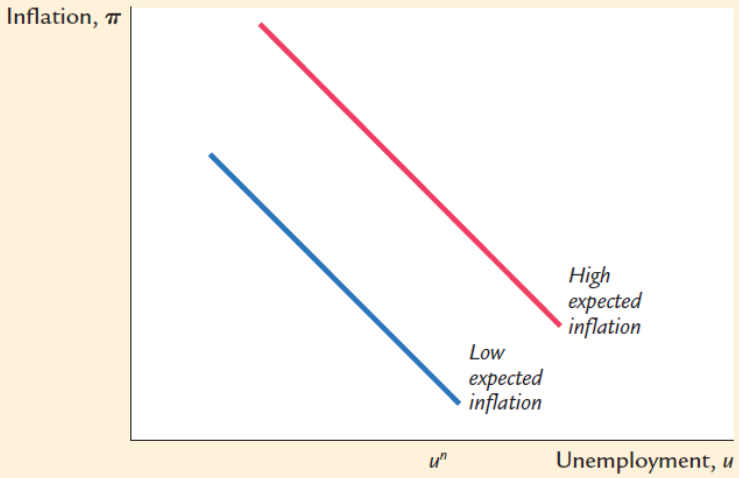
FIGURE 14-4



The Short-Run Tradeoff Between Inflation and Unemployment In the short run, inflation and unemployment are negatively related. At any point in time, a policymaker who controls aggregate demand can choose a combination of inflation and unemployment on this short-run Phillips curve.

The Short-Run Tradeoff

FIGURE 14-5



Shifts in the Short-Run Tradeoff The short-run tradeoff between inflation and unemployment depends on expected inflation. The curve is higher when expected inflation is higher.

Disinflation and the Sacrifice Ratio

- What would happen to unemployment and output if the central bank pursued a policy to reduce inflation.
  - In the absence of a beneficial supply shock, lowering inflation requires a period of high unemployment and reduced output.
  - the sacrifice ratio: the percentage of a year's real GDP that must be forgone to reduce inflation by 1 percentage point.
  - For every percentage point that inflation is to fall, 5 percent of one year's GDP must be sacrificed.
  - Reducing inflation by 1 percentage point requires about 2.5 percentage points of cyclical unemployment.

Rational Expectations

- What is rational expectation
  - We have been assuming that expected inflation depends on recently observed inflation.
  - We assume that people optimally use all the available information, including current government policies, to forecast the future.
  - Expected inflation should also depend on the monetary and fiscal policies in effect
- Implication
  - The short-run Phillips curve does not accurately represent the options that policymakers have available.
  - If policymakers are credibly committed to reducing inflation, rational people will understand and quickly lower their expectations.
  - Inflation can then come down without a rise in unemployment and fall in output.

The Sacrifice Ratio in Practice

TABLE 14-1

Unemployment During the Volcker Disinflation

Year	Unemployment Rate u	Natural Rate u^n	Cyclical Unemployment $u - u^n$
1982	9.5%	6.0%	3.5%
1983	9.5	6.0	3.5
1984	7.4	6.0	1.4
1985	7.1	6.0	1.1
			Total 9.5%

The Challenge to the Natural-Rate Hypothesis

- The natural-rate hypothesis
  - Fluctuations in aggregate demand affect output and employment only in the short run.
  - In the long run, the economy returns to the levels of output, employment, and unemployment described by the classical model.
- Hysteresis
  - Recessions might leave permanent scars on the economy by altering the natural rate of unemployment.
  - A recession can have permanent effects if it changes the people who become unemployed.
  - Another way in which a recession can permanently affect the economy is by changing the process that determines wages.
  - The rise in European unemployment starting in the early 1980s coincided with disinflation but continued after inflation stabilized.