CHAPTER

32

A Macroeconomic Theory of the Open Economy

Goals

In this chapter you will

- Build a model to explain an open economy's trade balance and exchange rate
- Use the model to analyze the effects of government budget deficits
- Use the model to analyze the macroeconomic effects of trade policies
- Use the model to analyze political instability and capital flight

Outcomes

After accomplishing these goals, you should be able to

- Explain the slope of supply and demand in the market for foreign-currency exchange
- Show why a budget deficit tends to cause a trade deficit
- Demonstrate that a quota on imports fails to have an effect on net exports
- Show why capital flight causes a currency to depreciate

Strive for a Five

Although the vocabulary in this chapter is not new to the text, the models and the interdependence of the concepts displayed are. As with all models presented in the text, a simple understanding of the models is not enough. You should be prepared to create and correctly label the models for the AP test. Topics of specific importance are:

- The market for loanable funds in an open economy
- The foreign exchange market
- The offsetting effects of capital outflow and capital inflow
- Policy changes and their effects on an open economy

Key Terms

- *Twin deficits*—The government budget deficit and the trade deficit
- *Trade policy*—A government policy that directly affects the quantity of a country's imports or exports
- *Tariff*—A tax on imported goods
- *Import quota*—A limit on the quantity of a good that is produced abroad that can be sold domestically
- *Capital flight*—A sudden reduction in the demand for domestic assets coupled with a sudden increase in the demand for foreign assets

Chapter Overview

Context and Purpose

Chapter 32 is the second chapter in a two-chapter sequence on open-economy macroeconomics. Chapter 31 explained the basic concepts and vocabulary associated with an open economy. Chapter 32 ties these concepts together into a theory of the open economy.

The purpose of Chapter 32 is to establish the interdependence of a number of economic variables in an open economy. In particular, Chapter 32 demonstrates the relationships between the prices and quantities in the market for loanable funds and the prices and quantities in the market for foreign-currency exchange. Using these markets, we can analyze the impact of a variety of government policies on an economy's exchange rate and trade balance.

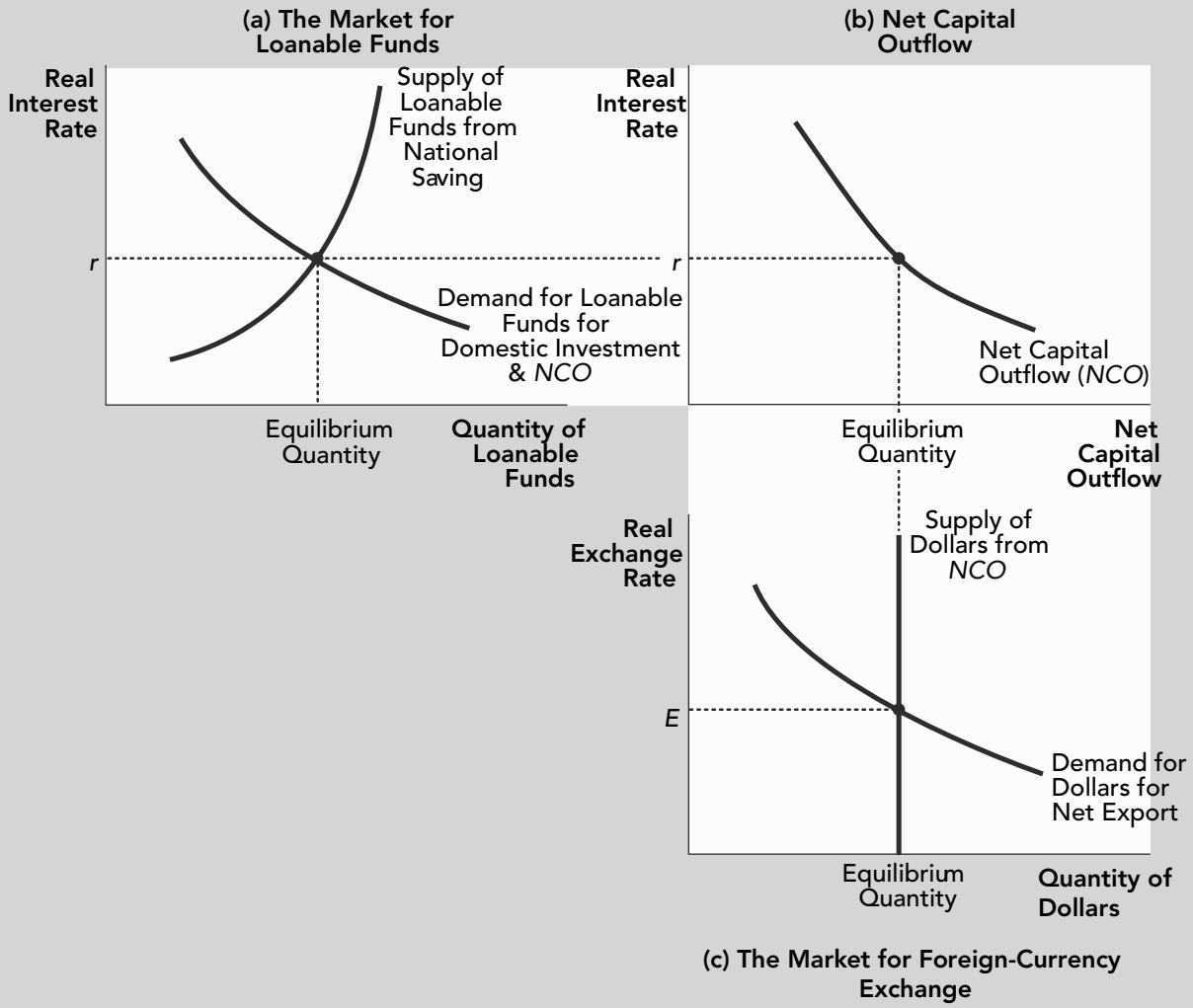
Chapter Review

Introduction This chapter constructs a model of the open economy that allows us to analyze the impact of government policies on net exports, net capital outflow, and exchange rates. This model is based on our previous long-run analysis in two ways: (1) We assume that output is determined by technology and factor supplies so output is fixed or given, and (2) prices are determined by the quantity of money so prices are fixed or given. The model constructed in this chapter is composed of two markets—the market for loanable funds and the market for foreign-currency exchange. These markets simultaneously determine the interest rate and the exchange rate (and also the level of overall investment and the trade balance).

Supply and Demand for Loanable Funds and for Foreign-Currency Exchange

In this section, we address two markets—the market for loanable funds and the market for foreign-currency exchange.

EXHIBIT 1



The *market for loanable funds* in an open economy is just an extension of the domestic loanable-funds market. Loanable funds are the domestically generated flow of resources available for capital accumulation. We assume that there is one financial market where savers lend and investors borrow. However, in an open economy, $S = I + NCO$. Therefore, as before, the supply of loanable funds comes from national saving (S). The supply of loanable funds (desire to lend) is positively related to the real interest rate. The demand for loanable funds, however, now comes from two sources—domestic investment (I) and net capital outflow (NCO). The demand for capital assets, both domestic and foreign, is negatively related to the real interest rate. That is, a higher real interest rate reduces the desire of domestic residents to borrow to buy U.S. capital assets, and a higher domestic real interest rate reduces the desire of U.S. residents to buy foreign assets (and increases foreigners' desire to buy U.S. assets) thus reducing NCO. If NCO is positive, it adds to the demand for funds. If NCO is negative, it subtracts from it. Both the supply and demand for loanable funds are shown in panel (a) of Exhibit 1. At equilibrium, the amount people save is balanced by the amount people want to invest in domestic and foreign assets.

The second market in our model is the market for foreign-currency exchange. Recall, net capital outflow = net exports, or $NCO = NX$ because if NX are positive, Americans must be using the dollars earned from net exports to increase their holdings of foreign assets, which makes NCO positive by the same amount. In the market for foreign-currency

exchange, *NCO* represents the quantity of dollars supplied to buy net foreign assets. *NX* represents the quantity of dollars demanded for the purpose of buying U.S. net exports. The demand for dollars is negatively related to the real exchange rate because a rise in the real exchange rate means that U.S. goods are relatively more expensive and less attractive to foreign and domestic buyers causing *NX* to fall. The supply of dollars on the foreign-exchange market is vertical because *NCO* (the source of the supply of dollars) does not depend on the real exchange rate but instead depends on the real interest rate. *NCO* does not depend on the real exchange rate because although a high value of the dollar increases the attractiveness of a foreign investment by allowing Americans to buy more foreign stock, this benefit is offset when the profits earned are converted back into fewer dollars (due to the high value of the dollar). We assume that the real interest rate is given while addressing the foreign-exchange market. The supply and demand for dollars in the foreign-exchange market is shown in panel (c) of Exhibit 1. The supply and demand for dollars in this market determine the exchange rate. At equilibrium, the quantity of dollars demanded to buy net exports is balanced by the quantity of dollars supplied to buy net foreign assets.

Equilibrium in the Open Economy

The market for loanable funds is linked to the market for foreign-currency exchange by net capital outflow (*NCO*). In the market for loanable funds, *NCO* is a portion of demand along with private investment. In the market for foreign-currency exchange, *NCO* is the source of supply. The quantity of net capital outflow is negatively related to the real interest rate because when the U.S. real interest rate is high, U.S. assets are more attractive and U.S. *NCO* is low. This is shown in panel (b) of the previous graph.

Rather than viewing each panel in Exhibit 1 individually, we can view them as a group and see how these two markets determine simultaneously the equilibrium values of the real interest rate, the real exchange rate, *NCO, NX* (the trade balance), saving, and domestic investment.

The supply and demand for loanable funds in panel (a) determine the real interest rate. The real interest rate from panel (a) determines the quantity of *NCO* in panel (b). The quantity of *NCO* is the supply of dollars in the foreign-currency exchange market in panel (c). This supply curve in conjunction with the demand for dollars (determined by *NX*) in the foreign-currency exchange market determines the real exchange rate in panel (c). It is arbitrary whether we consider an increase in *NCO* as an addition to the demand for loanable funds or a reduction in the supply of loanable funds. Similarly, it is arbitrary whether we consider a decrease in *NX* (an increase in imports) as a decrease in the demand for dollars on the foreign-exchange market or as an increase in the supply of dollars on the foreign-exchange market.

How Policies and Events Affect an Open Economy

We can use this model to see how various government policies and other events affect the equilibrium values of the variables in the model.

- *Government budget deficits:* An increase in the government's budget deficit reduces national saving and, thus, shifts the supply of loanable funds to the left in panel (a) of Exhibit 1. The decrease in the supply of loanable funds increases the domestic real interest rate and crowds out domestic investment. This is no different from the closed economy case. However, in an open economy, the rise in the domestic real interest rate makes foreign investments less attractive (and domestic investments more attractive to foreigners), so the quantity of net capital outflow decreases in panel (b). This reduces the supply of dollars in the foreign-currency exchange market in panel (c) because fewer people are supplying dollars to buy foreign assets. This raises the real exchange rate of the dollar and reduces net exports (to equal the reduction in *NCO*). Hence, an increase in the budget deficit reduces national saving, raises the real interest rate, crowds out investment, reduces *NCO,* raises the real exchange rate, and moves the trade balance toward deficit.

  Note that our model suggests that government budget deficits cause trade deficits. Thus, budget and trade deficits are often referred to as the *twin deficits* because they are closely related.

- *Trade policy:* A trade policy is a government policy that directly affects the quantity of a country's imports or exports. A *tariff* is a tax on imported goods. An *import quota* is a limit on the quantity of a good that is produced abroad that can be sold domestically.

  Suppose the government places an import quota on autos produced in Japan for the purpose of moving the U.S. trade balance toward surplus. The import restriction reduces imports at each exchange rate and, thus, increases net exports at each exchange rate. It follows that foreigners need more dollars at each exchange rate, so the demand for dollars in the foreign-currency exchange market shifts to the right in panel (c) of Exhibit 1 and raises the real exchange rate for the dollar. Since there has been no change in the loanable-funds market in panel (a) and no change in *NCO* in panel (b), the final net exports must remain unchanged because $S - I = NCO = NX$. Thus, the import quota reduces imports, but the rise in the exchange value of the dollar offsets this effect by reducing exports, leaving the trade balance unchanged. As a result, the United States imports fewer autos (which benefits U.S. auto manufacturers) but sells fewer airplanes abroad (which harms U.S. aircraft producers), but there are no significant macroeconomic effects beyond the increase in the exchange rate. The impact of trade policy is more microeconomic than macroeconomic.

- *Political instability and capital flight:* Capital flight is a sudden reduction in the demand for domestic assets coupled with a sudden increase in the demand for foreign assets. It may occur due to domestic political instability

  Suppose the United States becomes politically unstable. Investors might decide to sell U.S. assets and buy foreign assets. This act increases net capital outflow and shifts the demand for loanable funds to be used for foreign investment at each real interest rate to the right in panel (a) of Exhibit 1. It simultaneously shifts the *NCO* curve to the right in panel (b). The increase in net capital outflow increases the supply of dollars in the foreign-currency exchange market in panel (c), reducing the real exchange rate. Thus, capital flight increases the domestic real interest rate, increases net capital outflow and net exports, and reduces the value of the dollar in the foreign-currency exchange market. Note that the increase in the interest rate reduces domestic investment, which slows capital accumulation and growth. It has the opposite effect on the country to which the capital is flowing.

Helpful Hints

1. A change in national saving generates the same result regardless of whether the change was from private saving or public saving. In your text, there is a demonstration of the impact of an increase in a government budget deficit on an open economy. It is shown that a budget deficit causes a reduction in the public saving component of national saving and shifts the supply of loanable funds to the left. Note that a reduction in the private saving component of national saving also shifts the supply of loanable funds to the left. Thus, the example given in your text can be utilized for cases when there is a change in private saving. (The source of the change in saving will generate differences in the amount of output purchased by consumers versus government, but it will not alter any of the international analysis.)

2. To find the change in *NX* (net exports), remember that $NX = NCO$ (net capital outflow). When we use our model to discover the impact of a government policy or an economic event on the economic variables in an open economy, there is no way to directly read net exports (the trade balance) from any of the graphs. However, the quantity of *NCO* is always directly measurable from panel (b) of Exhibit 1. Since $NCO = NX$, whenever there is an increase in *NCO,* there is an equivalent increase in *NX* (which is an improvement in the trade balance). Whenever *NCO* declines, there is an equivalent decline in *NX*.

3. Capital flight reduces domestic investment. The discussion of capital flight in the text and in the chapter review above notes that capital flight increases net capital outflow and the supply of the domestic currency on the foreign-currency exchange market,

which lowers the exchange value of the domestic currency. Since these activities raise net exports (improve the trade balance), why is capital flight considered bad for the economy rather than good? Look at panel (a) of Figure 7 of your text. The increase in net capital outflow within the demand for loanable funds absorbs a greater amount of national saving than the tiny increase in national saving induced by the rise in the real interest rate. Thus, domestic investment is reduced an amount similar to the increase in net exports. As a result, the prospect for long-term growth in a country exhibiting capital flight is reduced due to the reduction in domestic investment.

4. Work the examples in the text backward. The three policy problems demonstrated in your text require a significant degree of concentration to understand. Once you have mastered them, you should feel comfortable enough that you can follow someone else's demonstration. The next step is to work those same problems backward, alone. That is, address the effect of a reduction in the budget deficit, the lowering of a trade restriction, and the effect of capital inflow. So that you may check your work, the first practice problem below is composed of the chapter examples where the source of the change has been reversed.

Self-Test

Multiple-Choice Questions

1. In the open-economy macroeconomic model, the supply of loanable funds comes from
   a. national saving.
   b. private saving.
   c. domestic investment.
   d. the sum of domestic investment and net capital outflow.
   e. foreign saving.

2. Other things the same, people in the United States would want to save more if the real interest rate in the United States
   a. fell. The increased saving would increase the quantity of loanable funds demanded.
   b. fell. The increased saving would increase the quantity of loanable funds supplied.
   c. rose. The increased saving would increase the quantity of loanable funds demanded.
   d. rose. The increased saving would increase the quantity of loanable funds supplied.
   e. rose. The increased saving would increase the quantity of loanable funds supplied and would increase the quantity of loanable funds demanded.

3. An increase in the U.S. real interest rate induces
   a. Americans to buy more foreign assets, which increases U.S. net capital outflow.
   b. Americans to buy more foreign assets, which reduces U.S. net capital outflow.
   c. foreigners to buy more U.S. assets, which reduces U.S. net capital outflow.
   d. foreigners to buy more U.S. assets, which increases U.S. net capital outflow.
   e. foreigners to buy less U.S. assets, which increases U.S. net capital outflow.

4. Other things the same, if the interest rate falls,
   a. firms will want to borrow more, which increases the quantity of loanable funds demanded.
   b. firms will want to borrow less, which decreases the quantity of loanable funds demanded.
   c. firms will want to borrow more, which increase the quantity of loanable funds supplied.
   d. firms will want to borrow less, which decreases the quantity of loanable funds supplied.
   e. firms will want to borrow more, but the quantity of loanable funds is not changed.

5. If there is a surplus of loanable funds, the quantity demanded is
   a. greater than the quantity supplied and the interest rate will rise.
   b. greater than the quantity supplied and the interest rate will fall.
   c. less than the quantity supplied and the interest rate will rise.
   d. less than the quantity supplied and the interest rate will fall.
   e. less than the quantity supplied and the interest rate will remain high.

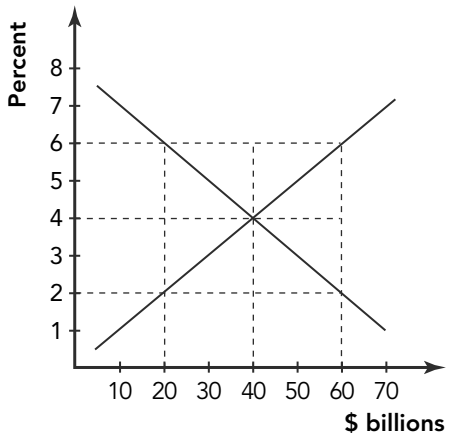
6. If the demand for loanable funds shifts right,
   a. the real interest rate and the equilibrium quantity of loanable funds both fall.
   b. the real interest rate falls and the equilibrium quantity of loanable funds rises.
   c. the real interest rate and the equilibrium quantity of loanable funds both rise.
   d. the real interest rate rises and the equilibrium quantity of loanable funds falls.
   e. the real interest rate rises and the equilibrium quantity of loanable funds is indeterminate.

7. An increase in the budget deficit makes domestic interest rates
   a. rise and the national debt rise.
   b. fall and the national debt rise.
   c. rise and the national debt fall.
   d. fall and the national debt fall.
   e. not change, but the national debt will rise.

8. An increase in the budget deficit
   a. raises net exports and domestic investment.
   b. raises net exports and reduces domestic investment.
   c. reduces net exports and raises domestic investment.
   d. reduces net exports and domestic investment.
   e. reduces net exports and has an indeterminate effect on domestic investment.

9. If the government of a country with a zero trade balance increases its budget deficit, then interest rates
   a. rise and the trade balance moves to a surplus.
   b. rise and the trade balance moves to a deficit.
   c. fall and the trade balance moves to a surplus.
   d. fall and the trade balance moves to a deficit.
   e. rise and the trade balance will be balanced.

Figure 32-1



10. **Refer to Figure 32-1**. The loanable funds market is in equilibrium at
    a. 2 percent, $20 billion.
    b. 4 percent, $40 billion.
    c. 6 percent, $60 billion.
    d. 2 percent, $60 billion.
    e. 6 percent, $20 billion.

11. **Refer to Figure 32-1**. If the real interest rate is 6 percent, the quantity of loanable funds demanded is
    a. $20 billion, and the quantity supplied is $40 billion.
    b. $20 billion, and the quantity supplied is $60 billion.
    c. $60 billion, and the quantity supplied is $20 billion.
    d. $60 billion, and the quantity supplied is $40 billion.
    e. $20 billion, and the quantity supplied is $20 billion.

12. **Refer to Figure 32-1**. If the real interest rate is 2 percent, there will be a
    a. surplus of $20 billion.
    b. surplus of $40 billion.
    c. shortage of $20 billion.
    d. shortage of $40 billion.
    e. shortage of $60 billion.

Free Response Questions

1. Suppose that U.S. citizens start saving more. What does this imply about the supply of loanable funds and the equilibrium real interest rate? What happens to the real exchange rate?

2. Fill in the following table with the direction of the variables that change in response to the events in the first column.

	U.S. real interest rate	U.S. domestic investment	U.S. net capital outflow	U.S. real exchange rate of domestic currency	U.S. trade balance
U.S. government budget deficit increases					
Capital flight from the United States					

Solutions

Multiple-Choice Questions

1. a TOP: Supply of loanable funds
2. d TOP: Supply of loanable funds
3. c TOP: Net capital outflow
4. a TOP: Demand for loanable funds | Domestic investment
5. d TOP: Market for loanable funds
6. c TOP: Market for loanable funds
7. a TOP: Budget deficits | Market for loanable funds
8. d TOP: Budget deficits | Net exports
9. b TOP: Budget deficits | Interest rate | Net exports
10. b TOP: Market for loanable funds
11. b TOP: Market for loanable funds
12. d TOP: Market for loanable funds

Free Response Questions

1. The supply of loanable funds increases, and the equilibrium real interest rate falls. Because of the lower interest rate, U.S. net capital outflow rises. This increase makes the supply of dollars shift to the right, and the real exchange rate of the dollar depreciates.

TOP: Saving policy

2.

	U.S. real interest rate	U.S. domestic investment	U.S. net capital outflow	U.S. real exchange rate of domestic currency	U.S. trade balance
U.S. government budget deficit increases	rises	falls	falls	appreciates	falls
Capital flight from the United States	rises	falls	rises	depreciates	rises

TOP: Open-economy macroeconomic model