

Why Labor Productivity Grows

18. India's Economy Hits the Wall

Just six months ago, India was looking good. Annual growth was 9%, consumer demand was huge, and foreign investment was growing. But now most economic forecasts expect growth to slow to 7%—a big drop for a country that needs to accelerate growth. India needs urgently to upgrade its infrastructure and education and healthcare facilities. Agriculture is unproductive and needs better technology. The legal system needs to be strengthened with more judges and courtrooms.

Source: *BusinessWeek*, July 1, 2008

Explain five potential sources for faster economic growth in India suggested in this news clip.

Is Economic Growth Sustainable? Theories, Evidence, and Policies

19. Has The Ideas Machine Broken Down?

According to Robert Gordon, the last two centuries of economic growth might actually amount to just “one big wave” of dramatic change rather than a new era of interrupted progress, and that the world is returning to extensive growth, which is a matter of adding more and/or better labor, capital, and resources.

Source: *The Economist*, January 12, 2013

Which of the growth theories that you studied in this chapter best corresponds to the argument advanced by Mr. Gordon?

20. Is faster economic growth always a good thing? Argue the case for faster growth and the case for slower growth. Then reach a conclusion on whether growth should be increased or slowed.
21. **For Economist Paul Romer, Prosperity Depends on Ideas**

According to Romer, ideas and technological discoveries unlock the mystery of growth. He argues that ideas, especially those that can be contained in a piece of software, codified in a chemical formula, or used to improve organization of an assembly line, don't obey the law of diminishing returns. Ideas and knowledge build on each other and can be reproduced cheaply. Computers, networks, and software serve as his best illustrations of how ideas create prosperity.

Source: *The Wall Street Journal*, January 21, 1997

Explain which growth theory best describes the news clip.

Economics in the News

22. After you have studied *Economics in the News* on pp. 598–599, answer the following questions.

- How do economic growth rates of South Africa and Botswana compare?
- For South Africa to grow faster, how would the percentage of GDP invested in new capital need to change?
- If South Africa is able to achieve a growth rate of 8 percent per year, in how many years will real GDP have doubled?
- Describe the policies proposed by the author of the news article and explain how they might change labor productivity.
- What is the source of Botswana's growth success story and what must South Africa do to replicate that success?
- Draw a *PPF* graph to show what has happened in Botswana and South Africa since 1980.

23. Make Way for India—The Next China

China grows at around 9 percent a year, but its one-child policy will start to reduce the size of China's working-age population within the next 10 years. India, by contrast, will have an increasing working-age population for another generation at least.

Source: *The Independent*, March 1, 2006

- Given the expected population changes, do you think China or India will have the greater economic growth rate? Why?
- Would China's growth rate remain at 9 percent a year without the restriction on its population growth rate?
- India's population growth rate is 1.6 percent a year, and in 2005 its economic growth rate was 8 percent a year. China's population growth rate is 0.6 percent a year, and in 2005 its economic growth rate was 9 percent a year. In what year will real GDP per person double in each country?



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FINANCE, SAVING, AND INVESTMENT

After studying this chapter,
you will be able to:

- ◆ Describe the flows of funds in financial markets
- ◆ Explain how saving and investment decisions interact in financial markets
- ◆ Explain how governments influence financial markets

Interest rates fell during 2014, and by mid-year the U.S. government could borrow at 2.5 percent per year. In 2012, when the economy was still feeling the effects of a financial meltdown in which billions of dollars had been lost, interest rates were even lower.

Behind the drama and headlines that interest rates create, financial markets play a crucial, unseen role funneling funds from savers and lenders to investors and borrowers. This chapter explains how financial markets work, and *Economics in the News* at the end of the chapter looks at the forces at work during 2014 that led to lower interest rates.

Financial Institutions and Financial Markets

The financial institutions and markets that we study in this chapter provide the channels through which saving flows to finance the investment in new capital that makes the economy grow. In studying financial institutions and markets, we distinguish between

- Finance and money
- Capital and financial capital

Finance and Money

We use the term *finance* to describe the activity of providing the funds that finance expenditures on capital. The study of finance looks at how households and firms obtain and use financial resources and how they cope with the risks that arise in this activity.

Money is what we use to pay for goods and services and factors of production and to make financial transactions. The study of money looks at how households and firms use it, how much of it they hold, how banks create and manage it, and how its quantity influences the economy.

Finance and money are closely interrelated and some of the main financial institutions, such as banks, provide both financial services and monetary services. Nevertheless, by distinguishing between *finance* and *money* and studying them separately, we will better understand our financial and monetary markets and institutions.

For the rest of this chapter, we study finance. Money is the topic of the next chapter.

Capital and Financial Capital

Economists distinguish between capital and financial capital. Capital consists of *physical capital*—tools, instruments, machines, buildings, and inventories—and *human capital*. When economists use the term capital, they mean physical capital.

Financial capital consists of the funds that firms use to buy physical capital and that households use to buy a home or to invest in human capital.

You're going to see, in this chapter, how investment, saving, borrowing, and lending decisions influence the quantity of capital and make it grow and, as a consequence, make real GDP grow.

We begin by describing the links between capital and investment and between wealth and saving.

Capital and Investment

The quantity of capital changes because of investment and depreciation. *Investment* increases the quantity of capital and *depreciation* decreases it (see Chapter 21, p. 532). The total amount spent on new capital is called **gross investment**. The change in the value of capital is called **net investment**. Net investment equals gross investment minus depreciation.

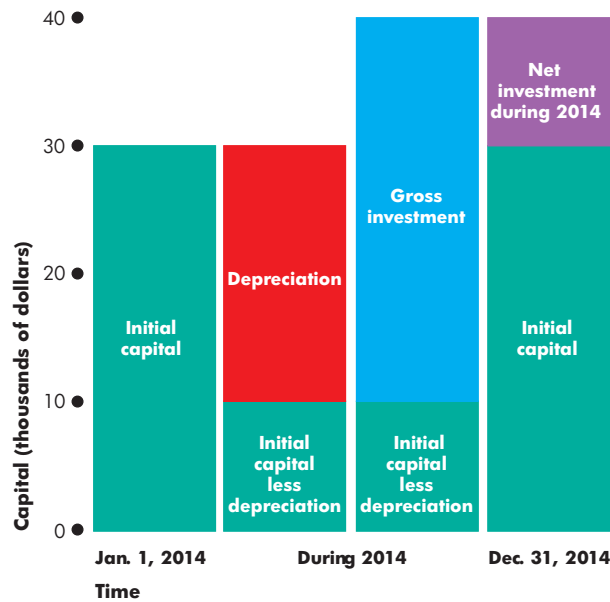
Figure 24.1 illustrates these terms. On January 1, 2014, Ace Bottling Inc. had machines worth \$30,000—Ace's initial capital. During 2014, the market value of Ace's machines fell by 67 percent—\$20,000. After this depreciation, Ace's machines were valued at \$10,000. During 2014, Ace spent \$30,000 on new machines. This amount is Ace's gross investment. By December 31, 2014, Ace Bottling had capital valued at \$40,000, so its capital had increased by \$10,000. This amount is Ace's net investment. Ace's net investment equals its gross investment of \$30,000 minus depreciation of its initial capital of \$20,000.

Wealth and Saving

Wealth is the value of the things that people *own*. It contrasts with *income*, which is what people *earn* during a given time period from supplying the services of the resources they own. **Saving** is the amount of income that is not paid in taxes or spent on consumption goods and services. Saving increases wealth. Wealth also increases when the market value of assets rises—called *capital gains*—and decreases when the market value of assets falls—called *capital losses*.

For example, if at the end of the school year you have \$250 in the bank and a coin collection worth \$300, then your wealth is \$550. During the summer, suppose that you earn \$5,000 (net of taxes) and spend \$1,000 on consumption goods and services, so your saving is \$4,000. Your bank account increases to \$4,250 and your wealth becomes \$4,550. The \$4,000 increase in wealth equals saving. If coins rise in value and your coin collection is now worth \$500, you have a capital gain of \$200, which is also added to your wealth.

National wealth and national saving work like this personal example. The wealth of a nation at the end of a year equals its wealth at the start of the year plus its saving during the year, which equals income minus consumption expenditure.

FIGURE 24.1 Capital and Investment

On January 1, 2014, Ace Bottling had capital worth \$30,000. During the year, the value of Ace's capital fell by \$20,000—depreciation—and Ace spent \$30,000 on new capital—gross investment. Ace's net investment was \$10,000 (\$30,000 gross investment minus \$20,000 depreciation) so that at the end of 2014, Ace had capital worth \$40,000.

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To make real GDP grow, saving and wealth must be transformed into investment and capital. This transformation takes place in the markets for financial capital and through the activities of financial institutions. We're now going to describe these markets and institutions.

Financial Capital Markets

Saving is the source of the funds that are used to finance investment, and these funds are supplied and demanded in three types of financial markets:

- Loan markets
- Bond markets
- Stock markets

Loan Markets Businesses often want short-term finance to buy inventories or to extend credit to their

customers. Sometimes they get this finance in the form of a loan from a bank. Households often want finance to purchase big ticket items, such as automobiles or household furnishings and appliances. They get this finance as bank loans, often in the form of outstanding credit card balances.

Households also get finance to buy new homes. (Expenditure on new homes is counted as part of investment.) These funds are usually obtained as a loan that is secured by a **mortgage**—a legal contract that gives ownership of a home to the lender in the event that the borrower fails to meet the agreed loan payments (repayments and interest).

All of these types of financing take place in loan markets.

Bond Markets When Wal-Mart expands its business and opens new stores, it gets the finance it needs by selling bonds. Governments—federal, state, and municipal—also raise finance by issuing bonds.

A **bond** is a promise to make specified payments on specified dates. For example, you can buy a Wal-Mart bond that promises to pay \$5.00 every year until 2024 and then to make a final payment of \$100 in 2025.

The buyer of a bond from Wal-Mart makes a loan to the company and is entitled to the payments promised by the bond. When a person buys a newly issued bond, he or she may hold the bond until the borrower has repaid the amount borrowed or sell it to someone else. Bonds issued by firms and governments are traded in the **bond market**.

The term of a bond might be long (decades) or short (just a month or two). Firms often issue very short-term bonds as a way of getting paid for their sales before the buyer is able to pay. For example, when GM sells \$100 million of railroad locomotives to Union Pacific, GM wants to be paid when the items are shipped. But Union Pacific doesn't want to pay until the locomotives are earning an income. In this situation, Union Pacific might promise to pay GM \$101 million three months in the future. A bank would be willing to buy this promise for (say) \$100 million. GM gets \$100 million immediately and the bank gets \$101 million in three months when Union Pacific honors its promise. The U.S. Treasury issues promises of this type, called Treasury bills.

Another type of bond is a **mortgage-backed security**, which entitles its holder to the income from a package of mortgages. Mortgage lenders create

mortgage-backed securities. They make mortgage loans to homebuyers and then create securities that they sell to obtain more funds to make more mortgage loans. The holder of a mortgage-backed security is entitled to receive payments that derive from the payments received by the mortgage lender from the home-buyer–borrower.

Mortgage-backed securities were at the center of the storm in the financial markets in 2007–2008.

Stock Markets When Boeing wants finance to expand its airplane building business, it issues stock. A **stock** is a certificate of ownership and claim to the firm's profits. Boeing has issued about 900 million shares of its stock. So if you owned 900 Boeing shares, you would own one millionth of Boeing and be entitled to receive one millionth of its profits.

Unlike a stockholder, a bondholder does not own part of the firm that issued the bond.

A **stock market** is a financial market in which shares of stocks of corporations are traded. The New York Stock Exchange, the London Stock Exchange (in England), the Tokyo Stock Exchange (in Japan), and the Frankfurt Stock Exchange (in Germany) are all examples of stock markets.

Financial Institutions

Financial markets are highly competitive because of the role played by financial institutions in those markets. A **financial institution** is a firm that operates on both sides of the markets for financial capital. A financial institution is a borrower in one market and a lender in another.

Financial institutions also stand ready to trade so that households with funds to lend and firms or households seeking funds can always find someone on the other side of the market with whom to trade. The key financial institutions are

- Commercial banks
- Government-sponsored mortgage lenders
- Pension funds
- Insurance companies
- The Federal Reserve

Commercial Banks Commercial banks are financial institutions that accept deposits, provide payment services, and make loans to firms and households. The bank that you use for your own banking services and that issues your credit card is a commercial bank.

These institutions play a central role in the monetary system. We study commercial banks, along with the Federal Reserve that regulates them, in detail in Chapter 25.

Government-Sponsored Mortgage Lenders Two large financial institutions, the Federal National Mortgage Association, or Fannie Mae, and the Federal Home Loan Mortgage Corporation, or Freddie Mac, are enterprises that buy mortgages from banks, package them into mortgage-backed securities, and sell them. In September 2008, Fannie and Freddie owned or guaranteed \$6 trillion worth of mortgages (half of the U.S. \$12 trillion of mortgages) and were taken over by the federal government.

Pension Funds Pension funds are financial institutions that use the pension contributions of firms and workers to buy bonds and stocks. The mortgage-backed securities of Fannie Mae and Freddie Mac are among the assets of pension funds. Some pension funds are very large, and they play an active role in the firms whose stock they hold.

Insurance Companies Insurance companies enable households and firms to cope with risks such

ECONOMICS IN ACTION

The Financial Crisis and the Fix

Bear Stearns: absorbed by JPMorgan Chase with help from the Federal Reserve. Lehman Brothers: gone. Fannie Mae and Freddie Mac: taken into government oversight. Merrill Lynch: absorbed by Bank of America. AIG: given an \$85 billion lifeline by the Federal Reserve and sold off in parcels to financial institutions around the world. Wachovia: taken over by Wells Fargo. Washington Mutual: taken over by JPMorgan Chase. Morgan Stanley: 20 percent bought by Mitsubishi, a large Japanese bank. These are some of the events in the financial crisis of 2008. What was going on and how can a replay be avoided?

What Was Going On?

Between 2002 and 2006, mortgage borrowing to buy a home exploded and home prices rocketed. You can see the rise in mortgage borrowing in Fig. 1. Mortgages increased from 65 percent of income in 2000 to more than 100 percent in 2006. And you can see the rocketing home prices in Fig. 2. Between 2000 and 2006, home prices doubled. Then, in 2007 they crashed.

Banks and other financial institutions that had made

mortgage loans to home buyers sold the loans to Fannie Mae, Freddie Mac, and other large banks that bundled these loans into *mortgage-backed securities* and sold them to eager buyers around the world.

When home prices began to fall in 2007, many home owners found themselves with a mortgage that was bigger than the value of their home. The mortgage default rate jumped and the prices of mortgage-backed securities, and more widely of other assets, fell sharply. Financial institutions took big losses. Some losses were too big to bear and some big-name institutions failed.

Avoiding a Replay

In the hope of avoiding a replay, Congress enacted the *Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010*. The main points of the Act are

- A Consumer Financial Protection Bureau to enforce consumer-oriented regulation, ensure that the fine print on financial services contracts is clear and accurate, and maintain a toll-free hotline for consumers to report alleged deception.
- A Financial Stability Oversight Council to anticipate financial market weakness.
- Authority for the Federal Deposit Insurance



Corporation to seize, liquidate, and reconstruct troubled financial firms.

- Tight restrictions to stop banks gambling for their own profit and limit their risky investments.
- Mortgage reforms that require lenders to review the income and credit histories of applicants and ensure that they can afford payments.
- A requirement that the firms that create mortgage-backed securities keep at least 5 percent of them.

The 2010 Act does nothing to solve the problem that arises from government oversight of Fannie Mae and Freddie Mac. Many people believe that the measures are too timid and leave the financial system fragile.

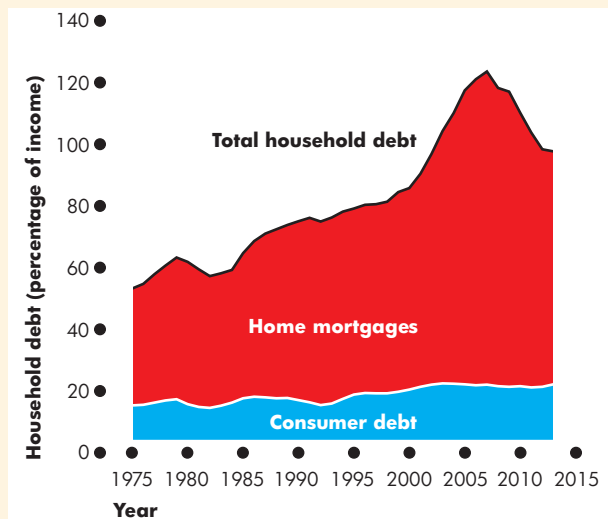


Figure 1 Household Debt

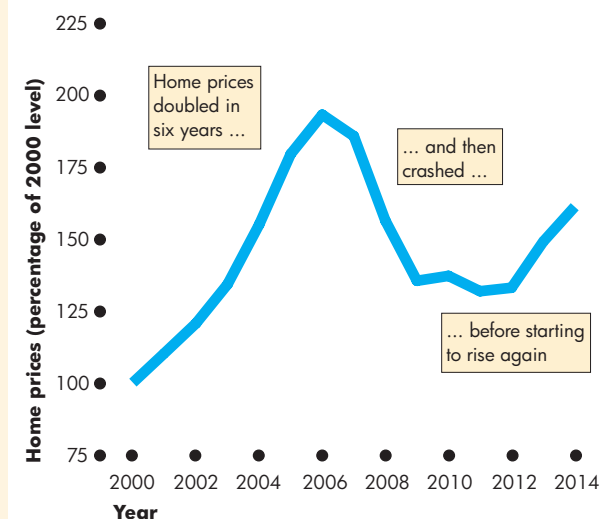


Figure 2 Home Prices

as accident, theft, fire, ill-health, and a host of other misfortunes. They receive premiums from their customers and pay claims. Insurance companies use the funds they have received but not paid out as claims to buy bonds and stocks on which they earn interest income.

In normal times, insurance companies have a steady flow of funds coming in from premiums and interest on the financial assets they hold and a steady, but smaller, flow of funds paying claims. Their profit is the gap between the two flows. But in unusual times, when large and widespread losses are being incurred, insurance companies can run into difficulty in meeting their obligations. Such a situation arose in 2008 for one of the biggest insurers, AIG, and the firm was taken into public ownership.

The Federal Reserve The **Federal Reserve System** (usually called the **Fed**) is the central bank of the United States, a public authority whose main role is the regulation of banks and money. In recent years, in response to a financial crisis in 2007 and 2008, the Fed has played a big role in the markets for bonds and mortgage-backed securities buying these items in large quantities. We study the Fed in detail in Chapter 25 but you need to keep in mind its presence in financial markets.

Insolvency and Illiquidity

A financial institution's **net worth** is the market value of what it has lent minus the market value of what it has borrowed. If net worth is positive, the institution is *solvent*. But if net worth is negative, the institution is *insolvent* and must go out of business. The owners of an insolvent financial institution—usually its stockholders—bear the loss.

A financial institution both borrows and lends, so it is exposed to the risk that its net worth might become negative. To limit that risk, financial institutions are regulated and a minimum amount of their lending must be backed by their net worth.

Sometimes, a financial institution is solvent but illiquid. A firm is *illiquid* if it has made long-term loans with borrowed funds and is faced with a sudden demand to repay more of what it has borrowed than its available cash. In normal times, a financial institution that is illiquid can borrow from another institution. But if all the financial institutions are short of cash, the market for loans among financial institutions dries up.

Both insolvency and illiquidity were at the core of the financial meltdown of 2007–2008.

Interest Rates and Asset Prices

Stocks, bonds, short-term securities, and loans are collectively called *financial assets*. The interest rate on a financial asset is the interest received expressed as a percentage of the price of the asset.

Because the interest rate is a percentage of the price of an asset, if the asset price rises, other things remaining the same, the interest rate falls. Conversely, if the asset price falls, other things remaining the same, the interest rate rises.

To see this inverse relationship between an asset price and the interest rate, let's look at an example. We'll consider a bond that promises to pay its holder \$5 a year forever. What is the rate of return—the interest rate—on this bond? The answer depends on the price of the bond. If you could buy this bond for \$50, the interest rate would be 10 percent per year:

$$\text{Interest rate} = (\$5 \div \$50) \times 100 = 10 \text{ percent.}$$

But if the price of this bond increased to \$200, its rate of return or interest rate would be only 2.5 percent per year. That is,

$$\text{Interest rate} = (\$5 \div \$200) \times 100 = 2.5 \text{ percent.}$$

This relationship means that the price of an asset and the interest rate on that asset are determined simultaneously—one implies the other.

This relationship also means that if the interest rate on the asset rises, the price of the asset falls, debts become harder to pay, and the net worth of the financial institution falls. Insolvency can arise from a previously unexpected large rise in the interest rate.

In the next part of this chapter, we learn how interest rates and asset prices are determined in the financial markets.

REVIEW QUIZ

- 1 Distinguish between physical capital and financial capital and give two examples of each.
- 2 What is the distinction between gross investment and net investment?
- 3 What are the three main types of markets for financial capital?
- 4 Explain the connection between the price of a financial asset and its interest rate.

Work these questions in Study Plan 24.1 and get instant feedback. Do a Key Terms Quiz.

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The Loanable Funds Market

In macroeconomics, we group all the financial markets that we described in the previous section into a single loanable funds market. The **loanable funds market** is the aggregate of all the individual financial markets.

The circular flow model of Chapter 21 (see p. 531) can be extended to include flows in the loanable funds market that finance investment.

Funds that Finance Investment

Figure 24.2 shows the flows of funds that finance investment. They come from three sources:

1. Household saving
2. Government budget surplus
3. Borrowing from the rest of the world

Households' income, Y , is spent on consumption goods and services, C , saved, S , or paid in net taxes, T . **Net taxes** are the taxes paid to governments minus the cash transfers received from governments (such as Social Security and unemployment benefits). So income is equal to the sum of consumption

expenditure, saving, and net taxes:

$$Y = C + S + T.$$

You saw in Chapter 21 (p. 532) that Y also equals the sum of the items of aggregate expenditure: consumption expenditure, C , investment, I , government expenditure, G , and exports, X , minus imports, M . That is:

$$Y = C + I + G + X - M.$$

By using these two equations, you can see that

$$I + G + X = M + S + T.$$

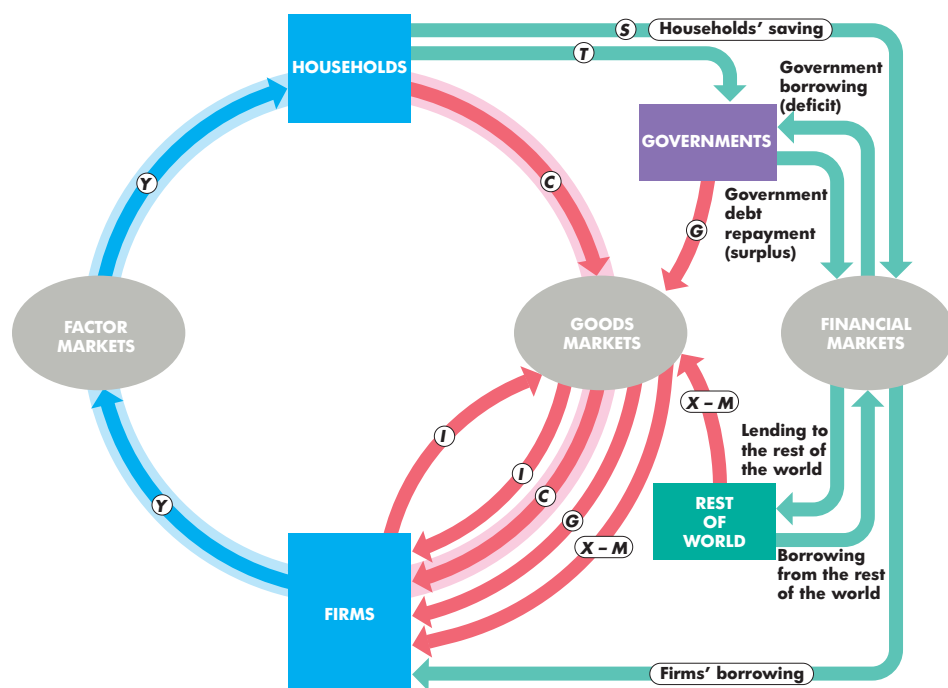
Subtract G and X from both sides of the last equation to obtain

$$I = S + (T - G) + (M - X).$$

This equation tells us that investment, I , is financed by household saving, S , the government budget surplus, $(T - G)$, and borrowing from the rest of the world, $(M - X)$.

The sum of private saving, S , and government saving, $(T - G)$, is called **national saving**. National saving

FIGURE 24.2 Financial Flows and the Circular Flow of Expenditure and Income



Households use their income for consumption expenditure (C), saving (S), and net taxes (T). Firms borrow to finance their investment expenditure. Governments borrow to finance a budget deficit or repay debt if they have a budget surplus. The rest of the world borrows to finance its deficit or lends its surplus.

and foreign borrowing finance investment.

In 2014, U.S. investment was \$2.8 trillion. Governments (federal, state, and local combined) had a deficit of \$0.8 trillion. This total of \$3.6 trillion was financed by private saving of \$3.0 trillion and borrowing from the rest of the world (negative net exports) of \$0.6 trillion.

In the rest of this chapter, we focus on the influences on national saving and the effects of a government budget deficit (or surplus) in the loanable funds market. We broaden our view to examine the influences on and the effects of borrowing from the rest of the world in Chapter 26. You can think of this chapter as an account of the U.S. loanable funds market when exports equal imports, ($X = M$) or as an account of the global loanable funds market.

You're going to see how investment and saving and the flows of loanable funds—all measured in constant 2009 dollars—are determined. The price in the loanable funds market that achieves equilibrium is an interest rate, which we also measure in real terms as the *real* interest rate. In the loanable funds market, there is just one interest rate, which is an average of the interest rates on all the different types of financial securities that we described earlier. Let's see what we mean by the real interest rate.

The Real Interest Rate

The **nominal interest rate** is the number of dollars that a borrower pays and a lender receives in interest in a year expressed as a percentage of the number of dollars borrowed and lent. For example, if the annual interest paid on a \$500 loan is \$25, the nominal interest rate is 5 percent per year: $\$25 \div \500×100 or 5 percent.

The **real interest rate** is the nominal interest rate adjusted to remove the effects of inflation on the buying power of money. The real interest rate is approximately equal to the nominal interest rate minus the inflation rate.

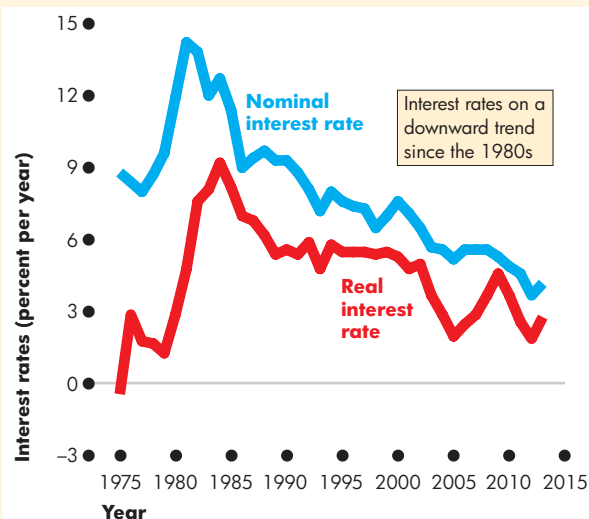
You can see why if you suppose that you have put \$500 in a savings account that earns 5 percent a year. At the end of a year, you have \$525 in your savings account. Suppose that the inflation rate is 2 percent per year—during the year, all prices increased by 2

¹The *exact* real interest rate formula, which allows for the change in the purchasing power of both the interest and the loan is: $\text{Real interest rate} = (\text{Nominal interest rate} - \text{Inflation rate}) \div (1 + \text{Inflation rate}/100)$. If the nominal interest rate is 5 percent a year and the inflation rate is 2 percent a year, the real interest rate is $(5 - 2) \div (1 + 0.02) = 2.94$ percent a year.

ECONOMICS IN ACTION

Nominal and Real Interest Rates

Nominal and real interest rates were extremely high during the 1970s and 1980s. They have trended downward for the past 30 years. Where will they go next? See *Economics in the News* on pp. 620–621.



Nominal and Real Interest Rates History

percent. Now, at the end of the year, it costs \$510 to buy what \$500 would have bought one year ago. Your money in the bank has really only increased by \$15, from \$510 to \$525. That \$15 is equivalent to a real interest rate of 3 percent a year on your original \$500. So the real interest rate is the 5 percent nominal interest rate minus the 2 percent inflation rate¹.

The real interest rate is the opportunity cost of loanable funds. The real interest *paid* on borrowed funds is the opportunity cost of borrowing. And the real interest rate *forgone* when funds are used either to buy consumption goods and services or to invest in new capital goods is the opportunity cost of not saving or not lending those funds.

We're now going to see how the loanable funds market determines the real interest rate, the quantity of funds loaned, saving, and investment. In the rest of this section, we will ignore the government and the rest of the world and focus on households and firms in the loanable funds market. We will study

- The demand for loanable funds
- The supply of loanable funds
- Equilibrium in the loanable funds market

ECONOMICS IN ACTION

The Total Quantities Supplied and Demanded

Around \$80 trillion of loanable funds have been supplied and demanded. The figure shows who supplies the funds and who demands them. Almost one third of the funds are supplied to banks and similar financial institutions.

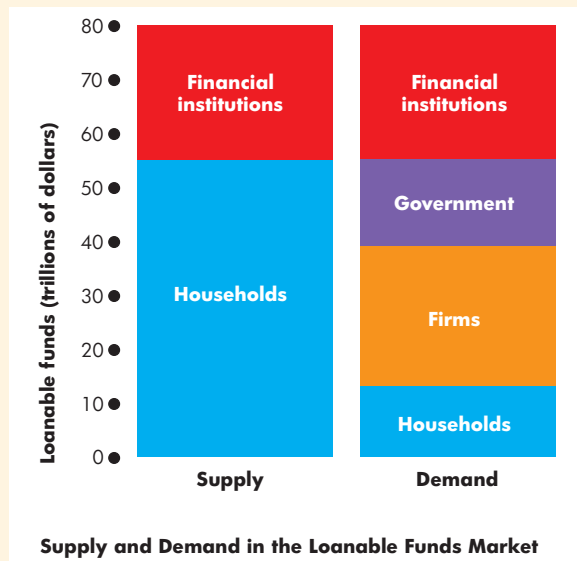
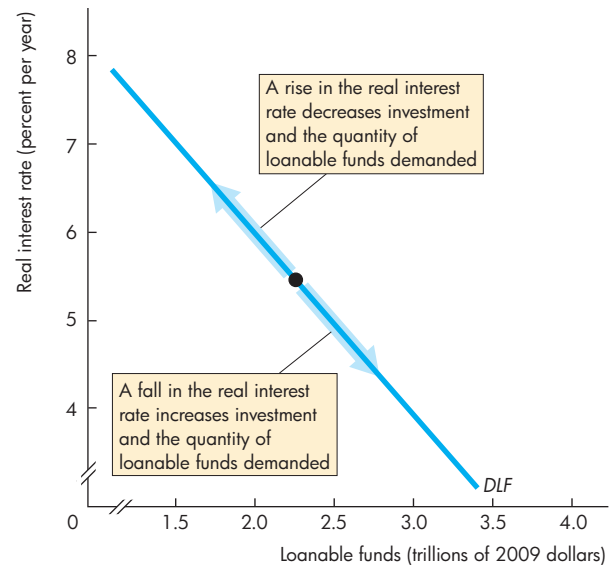


FIGURE 24.3 The Demand for Loanable Funds



A change in the real interest rate changes the quantity of loanable funds demanded and brings a movement along the demand for loanable funds curve.

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The Demand for Loanable Funds

The *quantity of loanable funds demanded* is the total quantity of funds demanded to finance investment, the government budget deficit, and international investment or lending during a given period. Our focus here is on investment. We'll bring the government budget deficit into the picture later in this chapter.

What determines investment and the demand for loanable funds to finance it? Many details influence this decision, but we can summarize them in two factors:

1. The real interest rate
2. Expected profit

Firms invest in capital only if they expect to earn a profit and fewer projects are profitable at a high real interest rate than at a low real interest rate, so

Other things remaining the same, the higher the real interest rate, the smaller is the quantity of loanable funds demanded; and the lower the real interest rate, the greater the quantity of loanable funds demanded.

Demand for Loanable Funds Curve The **demand for loanable funds** is the relationship between the quantity of loanable funds demanded and the real interest rate, when all other influences on borrowing plans remain the same. The demand curve *DLF* in Fig. 24.3 is a demand for loanable funds curve.

To understand the demand for loanable funds, think about Amazon.com's decision to borrow \$100 million to build some new warehouses. If Amazon expects to get a return of \$5 million a year from this investment before paying interest costs and the interest rate is less than 5 percent a year, Amazon would make a profit, so it builds the warehouses. But if the interest rate is more than 5 percent a year, Amazon would incur a loss, so it doesn't build the warehouses. The quantity of loanable funds demanded is greater the lower is the real interest rate.

Changes in the Demand for Loanable Funds When the expected profit changes, the demand for loanable funds changes. Other things remaining the same, the greater the expected profit from new capital, the greater is the amount of investment and the greater the demand for loanable funds.

Expected profit rises during a business cycle expansion and falls during a recession; rises when technological change creates profitable new products; rises as a growing population brings increased demand for goods and services; and fluctuates with contagious swings of optimism and pessimism, called “animal spirits” by Keynes and “irrational exuberance” by Alan Greenspan.

When expected profit changes, the demand for loanable funds curve shifts.

The Supply of Loanable Funds

The *quantity of loanable funds supplied* is the total funds available from private saving, the government budget surplus, and supplied by the Fed, during a given period. Our focus here is on saving. We’ll bring the government budget and the Fed into the picture in the next part of the chapter.

How do you decide how much of your income to save and supply in the loanable funds market? Your decision is influenced by many factors, but chief among them are

1. The real interest rate
2. Disposable income
3. Expected future income
4. Wealth
5. Default risk

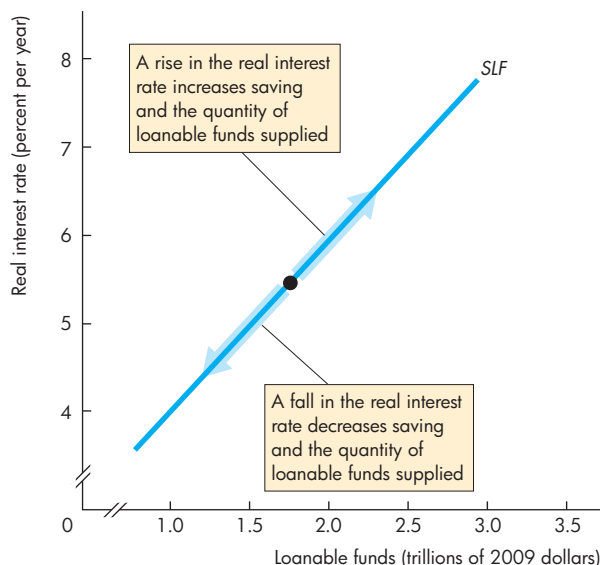
We begin by focusing on the real interest rate.

Other things remaining the same, the higher the real interest rate, the greater is the quantity of loanable funds supplied; and the lower the real interest rate, the smaller is the quantity of loanable funds supplied.

The Supply of Loanable Funds Curve The **supply of loanable funds** is the relationship between the quantity of loanable funds supplied and the real interest rate when all other influences on lending plans remain the same. The curve *SLF* in Fig. 24.4 is a supply of loanable funds curve.

Think about a student’s decision to save some of what she earns from her summer job. With a real interest rate of 2 percent a year, she decides that it is not worth saving much—better to spend the income and take a student loan if funds run out during the semester. But if the real interest rate jumped to 10 percent a year, the payoff from saving would be high enough to encourage her to cut back on spending and increase the amount she saves.

FIGURE 24.4 The Supply of Loanable Funds



A change in the real interest rate changes the quantity of loanable funds supplied and brings a movement along the supply of loanable funds curve.

[MyEconLab Animation](#)

Changes in the Supply of Loanable Funds A change in disposable income, expected future income, wealth, or default risk changes the supply of loanable funds.

Disposable Income A household’s *disposable income* is the income earned minus net taxes. When disposable income increases, other things remaining the same, consumption expenditure increases but by less than the increase in income. Some of the increase in income is saved. So the greater a household’s disposable income, other things remaining the same, the greater is its saving.

Expected Future Income The higher a household’s expected future income, other things remaining the same, the smaller is its saving today.

Wealth The higher a household’s wealth, other things remaining the same, the smaller is its saving. If a person’s wealth increases because of a capital gain, the person sees less need to save. For example, from 2002 through 2006, when house prices were rising rapidly, wealth increased despite the fact that personal saving dropped close to zero.

Default Risk The risk that a loan will not be repaid is called **default risk**. The greater that risk, the higher is the interest rate needed to induce a person to lend and the smaller is the supply of loanable funds.

Shifts of the Supply of Loanable Funds Curve

When any of the four influences on the supply of loanable funds changes, the supply of loanable funds changes and the supply curve shifts. An increase in disposable income, a decrease in expected future income, a decrease in wealth, or a fall in default risk increases saving and increases the supply of loanable funds.

Equilibrium in the Loanable Funds Market

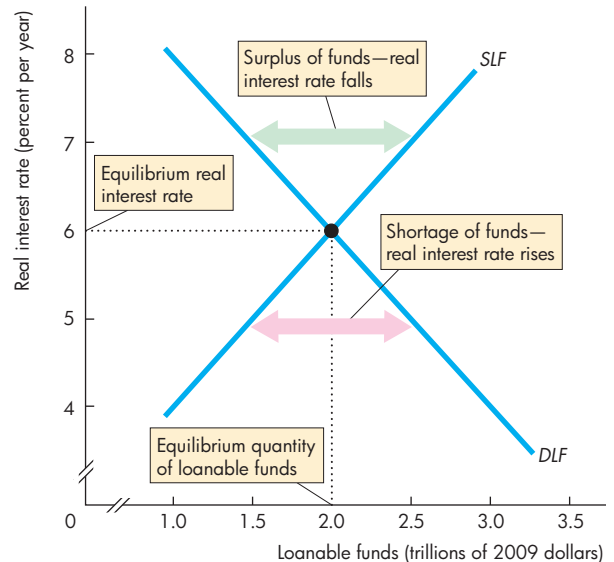
You've seen that other things remaining the same, the higher the real interest rate, the greater is the quantity of loanable funds supplied and the smaller is the quantity of loanable funds demanded. There is one real interest rate at which the quantities of loanable funds demanded and supplied are equal, and that interest rate is the equilibrium real interest rate.

Figure 24.5 shows how the demand for and supply of loanable funds determine the real interest rate. The *DLF* curve is the demand curve and the *SLF* curve is the supply curve. If the real interest rate exceeds 6 percent a year, the quantity of loanable funds supplied exceeds the quantity demanded—a surplus of funds. Borrowers find it easy to get funds, but lenders are unable to lend all the funds they have available. The real interest rate falls and continues to fall until the quantity of funds supplied equals the quantity of funds demanded.

If the real interest rate is less than 6 percent a year, the quantity of loanable funds supplied is less than the quantity demanded—a shortage of funds. Borrowers can't get the funds they want, but lenders are able to lend all the funds they have. So the real interest rate rises and continues to rise until the quantity of funds supplied equals the quantity demanded.

Regardless of whether there is a surplus or a shortage of loanable funds, the real interest rate changes and is pulled toward an equilibrium level. In Fig. 24.5, the equilibrium real interest rate is 6 percent a year. At this interest rate, there is neither a surplus nor a shortage of loanable funds. Borrowers can get the funds they want, and lenders can lend all the funds they have available. The investment plans of borrowers and the saving plans of lenders are consistent with each other.

FIGURE 24.5 Equilibrium in the Loanable Funds Market



A surplus of funds lowers the real interest rate and a shortage of funds raises it. At an interest rate of 6 percent a year, the quantity of funds demanded equals the quantity supplied and the market is in equilibrium.

MyEconLab Animation and Draw Graph

Changes in Demand and Supply

Financial markets are highly volatile in the short run but remarkably stable in the long run. Volatility in the market comes from fluctuations in either the demand for loanable funds or the supply of loanable funds. These fluctuations bring fluctuations in the real interest rate and in the equilibrium quantity of funds lent and borrowed. They also bring fluctuations in asset prices.

Here we'll illustrate the effects of *increases* in demand and supply in the loanable funds market.

An Increase in Demand If the profits that firms expect to earn increase, they increase their planned investment and increase their demand for loanable funds to finance that investment. With an increase in the demand for loanable funds, but no change in the supply of loanable funds, there is a shortage of funds. As borrowers compete for funds, the interest rate rises and lenders increase the quantity of funds supplied.

Figure 24.6(a) illustrates these changes. An increase in the demand for loanable funds shifts the demand curve rightward from DLF_0 to DLF_1 . With

ECONOMICS IN ACTION

Loanable Funds Fuel Home Price Bubble

The financial crisis that gripped the U.S. and global economies in 2007 and cascaded through the financial markets in 2008 had its origins much earlier in events taking place in the loanable funds market.

Between 2001 and 2005, a massive injection of loanable funds occurred. Some funds came from the rest of the world, but that source of supply has been stable. The Federal Reserve provided funds to keep interest rates low and that was a major source of the increase in the supply of funds. (The next chapter explains how the Fed does this.)

Figure 1 illustrates the loanable funds market starting in 2001. In that year, the demand for loanable funds was DLF_{01} and the supply of loanable funds was SLF_{01} . The equilibrium real interest rate was 4 percent a year and the equilibrium quantity of loanable funds was \$29 trillion (in 2009 dollars).

During the ensuing four years, a massive increase in the supply of loanable funds shifted the supply curve rightward to SLF_{05} . A smaller increase in demand shifted the demand for loanable funds curve to DLF_{05} . The real interest rate fell to 1 percent a year and the quantity of loanable funds increased to \$36 trillion—a 24 percent increase in just four years.

With this large increase in available funds, much of it in the form of mortgage loans to home buyers, the demand for homes increased by more than the increase in the supply of homes. Home prices rose and the expectation of further increases fueled the demand for loanable funds.

By 2006, the expectation of continued rapidly rising home prices brought a very large increase in the demand for loanable funds. At the same time, the Federal Reserve began to tighten credit. (Again, you'll learn how this is done in the next chapter). The result of the Fed's tighter credit policy was a slowdown in the pace of increase in the supply of loanable funds.

Figure 2 illustrates these events. In 2006, the demand for loanable funds increased from DLF_{05} to DLF_{06} and the supply of loanable funds increased by a smaller amount from SLF_{05} to SLF_{06} . The real interest rate increased to 3 percent a year.

The rise in the real interest rate (and a much higher rise in the nominal interest rate) put many homeowners in financial difficulty. Mortgage payments increased and some borrowers stopped repaying their loans.

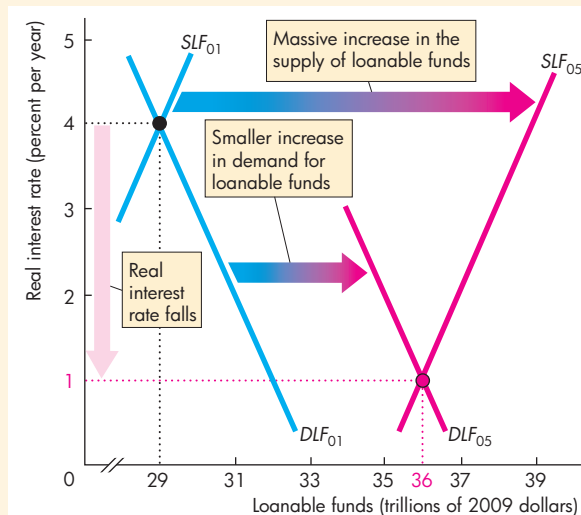


Figure 1 The Foundation of the Crisis: 2001–2005

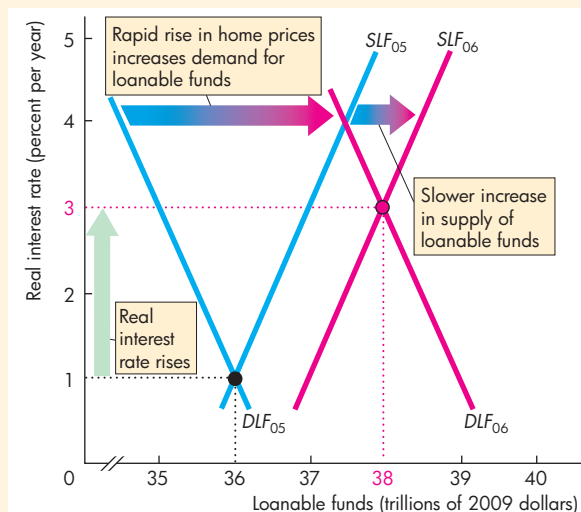
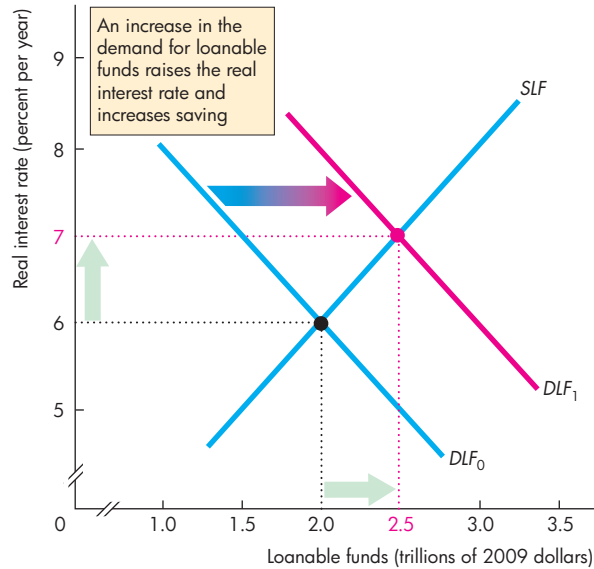
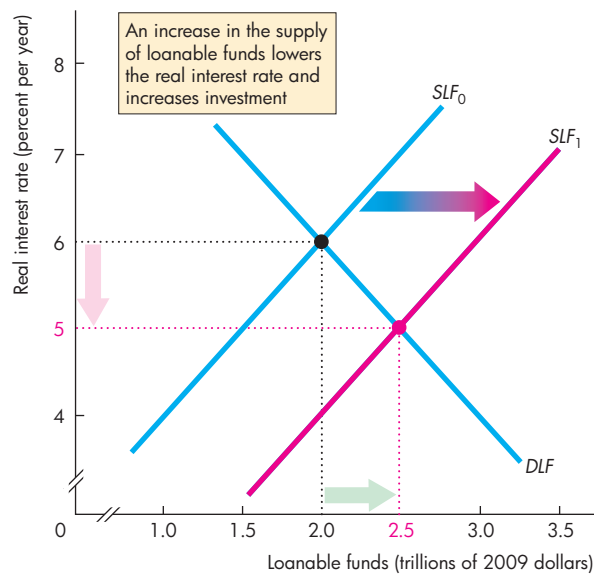


Figure 2 The Start of the Crisis: 2005–2006

By August 2007, the damage from mortgage default and foreclosure was so large that the credit market began to dry up. A large decrease in both demand and supply kept interest rates roughly constant but decreased the quantity of new business.

The total quantity of loanable funds didn't decrease, but the rate of increase slowed to a snail's pace and financial institutions most exposed to the bad mortgage debts and the securities that they backed (described on pp. 607–608) began to fail.

These events illustrate the crucial role played by the loanable funds market in our economy.

FIGURE 24.6 Changes in Demand and Supply**(a) An increase in demand****(b) An increase in supply**

In part (a), the demand for loanable funds increases and supply doesn't change. The real interest rate rises (financial asset prices fall) and the quantity of funds increases. In part (b), the supply of loanable funds increases and demand doesn't change. The real interest rate falls (financial asset prices rise) and the quantity of funds increases.

no change in the supply of loanable funds, there is a shortage of funds at a real interest rate of 6 percent a year. The real interest rate rises until it is 7 percent a year. Equilibrium is restored and the equilibrium quantity of funds has increased.

An Increase in Supply If one of the influences on saving plans changes and increases saving, the supply of loanable funds increases. With no change in the demand for loanable funds, the market is flush with loanable funds. Borrowers find bargains and lenders find themselves accepting a lower interest rate. At the lower interest rate, borrowers find additional investment projects profitable and increase the quantity of loanable funds that they borrow.

Figure 24.6(b) illustrates these changes. An increase in supply shifts the supply curve rightward from SLF_0 to SLF_1 . With no change in demand, there is a surplus of funds at a real interest rate of 6 percent a year. The real interest rate falls until it is 5 percent a year. Equilibrium is restored and the equilibrium quantity of funds has increased.

Long-Run Growth of Demand and Supply Over time, both demand and supply in the loanable funds market fluctuate and the real interest rate rises and falls. Both the supply of loanable funds and the demand for loanable funds tend to increase over time. On the average, they increase at a similar pace, so although demand and supply trend upward, the real interest rate has no trend. It fluctuates around a constant average level.

REVIEW QUIZ

- 1 What is the loanable funds market?
- 2 Explain why the real interest rate is the opportunity cost of loanable funds.
- 3 How do firms make investment decisions?
- 4 What determines the demand for loanable funds and what makes it change?
- 5 How do households make saving decisions?
- 6 What determines the supply of loanable funds and what makes it change?
- 7 How do changes in the demand for and supply of loanable funds change the real interest rate and quantity of loanable funds?

Work these questions in Study Plan 24.2 and get instant feedback. Do a Key Terms Quiz.

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Government in the Loanable Funds Market

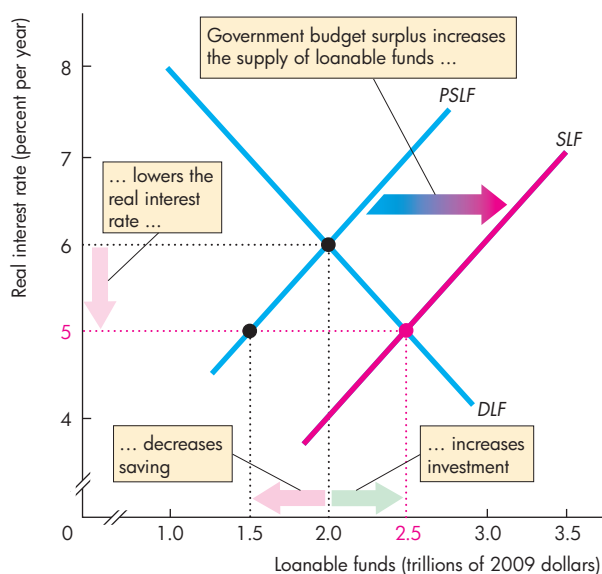
Government enters the loanable funds market when it has a budget surplus or budget deficit. A budget surplus increases the supply of loanable funds and contributes to financing investment; a budget deficit increases the demand for loanable funds and competes with businesses for funds.

Let's study the effects of government on the loanable funds market.

A Government Budget Surplus

A government budget surplus increases the supply of loanable funds. The real interest rate falls, which decreases household saving and decreases the quantity of private funds supplied. The lower real interest rate increases the quantity of loanable funds demanded, and increases investment.

FIGURE 24.7 A Government Budget Surplus



A government budget surplus of \$1 trillion adds to private saving and the private supply of loanable funds curve, *PSLF*, to determine the supply of loanable funds curve, *SLF*. The real interest rate falls to 5 percent a year. Private saving decreases to \$1.5 trillion, but investment increases to \$2.5 trillion.

Figure 24.7 shows these effects of a government budget surplus. The private supply of loanable funds curve is *PSLF*. The supply of loanable funds curve, *SLF*, shows the sum of private supply and the government budget surplus. Here, the government budget surplus is \$1 trillion, so at each real interest rate the *SLF* curve lies \$1 trillion to the right of the *PSLF* curve. That is, the horizontal distance between the *PSLF* curve and the *SLF* curve equals the government budget surplus.

With no government surplus, the real interest rate is 6 percent a year, the quantity of loanable funds is \$2 trillion a year, and investment is \$2 trillion a year. But with the government surplus of \$1 trillion a year, the equilibrium real interest rate falls to 5 percent a year and the equilibrium quantity of loanable funds increases to \$2.5 trillion a year.

The fall in the interest rate decreases private saving to \$1.5 trillion, but investment increases to \$2.5 trillion, which is financed by private saving plus the government budget surplus (government saving).

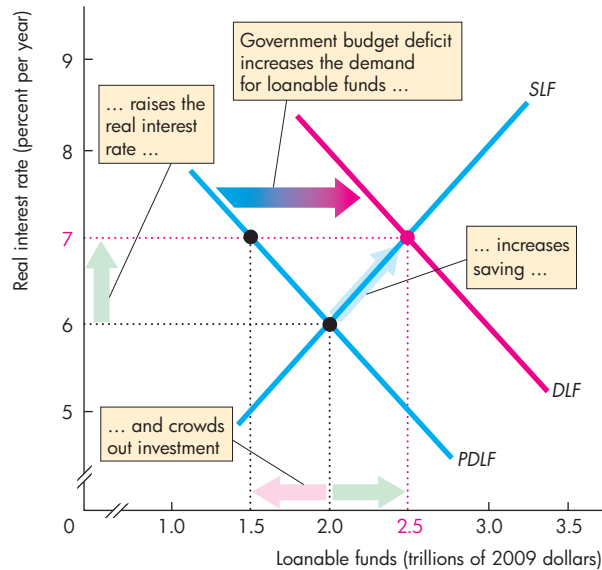
A Government Budget Deficit

A government budget deficit increases the demand for loanable funds. The real interest rate rises, which increases household saving and increases the quantity of private funds supplied. But the higher real interest rate decreases investment and the quantity of loanable funds demanded by firms to finance investment.

Figure 24.8 shows these effects of a government budget deficit. The private demand for loanable funds curve is *PDLF*. The demand for loanable funds curve, *DLF*, shows the sum of private demand and the government budget deficit. Here, the government budget deficit is \$1 trillion, so at each real interest rate the *DLF* curve lies \$1 trillion to the right of the *PDLF* curve. That is, the horizontal distance between the *PDLF* curve and the *DLF* curve equals the government budget deficit.

With no government deficit, the real interest rate is 6 percent a year, the quantity of loanable funds is \$2 trillion a year and investment is \$2 trillion a year. But with the government budget deficit of \$1 trillion a year, the equilibrium real interest rate rises to 7 percent a year and the equilibrium quantity of loanable funds increases to \$2.5 trillion a year.

The rise in the real interest rate increases private saving to \$2.5 trillion, but investment decreases to \$1.5 trillion because \$1 trillion of private saving must finance the government budget deficit.

FIGURE 24.8 A Government Budget Deficit

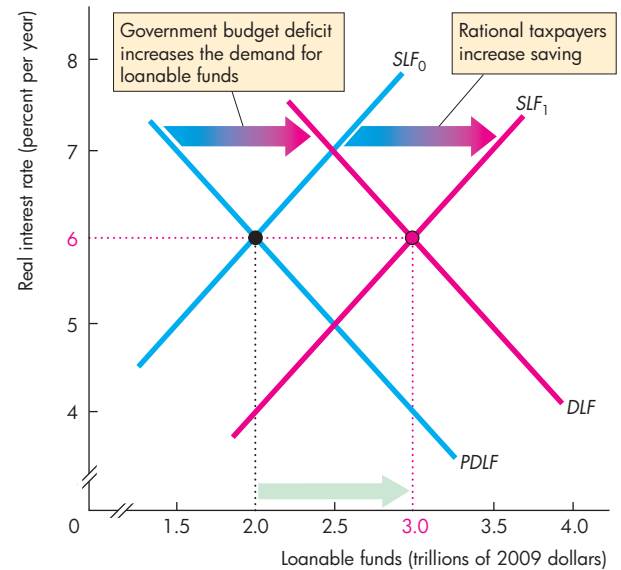
A government budget deficit adds to the private demand for loanable funds curve, *PDLF*, to determine the demand for loanable funds curve, *DLF*. The real interest rate rises, saving increases, but investment decreases—a crowding-out effect.

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The Crowding-Out Effect The tendency for a government budget deficit to raise the real interest rate and decrease investment is called the **crowding-out effect**. The crowding-out effect does not decrease investment by the full amount of the government budget deficit because a higher real interest rate induces an increase in private saving that partly contributes toward financing the deficit.

The Ricardo-Barro Effect First suggested by the English economist David Ricardo in the eighteenth century and refined by Robert J. Barro of Harvard University, the Ricardo-Barro effect holds that both of the effects we've just shown are wrong and the government budget has no effect on either the real interest rate or investment.

Barro says that taxpayers are rational and can see that a budget deficit today means that future taxes must be higher and future disposable incomes smaller. With smaller expected future disposable incomes, saving increases today. The private supply of loanable funds increases to match the quantity of loanable funds demanded by the government. So the budget deficit has no effect on either the real interest

FIGURE 24.9 The Ricardo-Barro Effect

A budget deficit increases the demand for loanable funds. Rational taxpayers increase saving, which shifts the supply of loanable funds curve from *SLF*₀ to *SLF*₁. Crowding out is avoided: Increased saving finances the budget deficit.

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rate or investment. Figure 24.9 shows this outcome.

Most economists regard the Ricardo-Barro view as extreme. But there might be some change in private saving that goes in the direction suggested by the Ricardo-Barro effect that lessens the crowding-out effect.

REVIEW QUIZ

- 1 How does a government budget surplus or deficit influence the loanable funds market?
- 2 What is the crowding-out effect and how does it work?
- 3 What is the Ricardo-Barro effect and how does it modify the crowding-out effect?

Work these questions in Study Plan 24.3 and get instant feedback. Do a Key Terms Quiz.

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◆ To complete your study of financial markets, take a look at *Economics in the News* on pp. 620–621 and see how you can use the model of the loanable funds market to understand why interest rates fell in 2014.

Interest Rates Low but Fall

Top-Rated Government Bonds Defy Gravity

The Financial Times,
June 20, 2014

When you hit rock bottom, the only way is up. One day that might apply to yields on the world's safest and most liquid government bonds—U.S. Treasuries, U.K. gilts, German Bunds, and Japanese government bonds.

One day—but maybe not yet. Ten-year yields on core government bonds, which move inversely with prices, have edged lower in 2014—defying a near-universal start-of-the-year consensus that the only way was up.

German Bund 10-year yields this week hit a record low of just 1.12 percent. Ten-year U.S. Treasuries yields rose back above 2.5 percent on Wednesday on strong economic data but were 3 percent at the start of 2014.

Such historically meagre rates worry some investors. Low yields can already translate into negative real interest rates after taking account of inflation. If prices are in bubble territory, a correction could inflict heavy capital losses on bond portfolios.

Yields have already risen this year on two-year U.S. Treasuries and U.K. gilts, which track closely expectations about central bank interest rate moves.

Among strategists and analysts, it is hard to sense a bubble about to burst, however. “For there to be a bubble, there has to be irrational behavior,” says Steven Major, global head of fixed income research at HSBC. “I don’t see people borrowing to buy bonds—and I don’t think values are far from fundamentals.”

Instead, core government bonds offer havens in still-uncertain times—Russia’s tensions with the west are escalating—while yields are held in check by ultra-loose central bank monetary policies and a global glut in savings.

Low yields also reflect global economic prospects. From Japan to the eurozone, growth remains weak. While U.K. gilts in particular may be vulnerable to sudden changes in interest rate expectations, it is arguably too early to claim the U.S. and U.K. recoveries will be sustained.

“We are unlikely to see U.S. bond yields rise in isolation; we should expect a synchronised move higher once the global economy is fully recovering,” says Zach Pandl, portfolio manager at Columbia Management. ...

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ESSENCE OF THE STORY

- Interest rates on government bonds fell during the first half of 2014.
- The interest rate on a German government 10-year bond was at a record low of 1.12 percent and the rate on a 10-year U.S. government bond fell from 3 percent to 2.5 percent during the first half of 2014.
- Real interest rates could become negative.
- When interest rates rise, bond prices will fall.
- Economic growth is weak in Japan and Europe, and it is uncertain whether the U.S. and U.K. expansions will be sustained.

ECONOMIC ANALYSIS

- The news article reports that the interest rates on government bonds fell during 2014 from an already low level and bond prices increased.
- Government bonds, called Treasuries in the United States, gilts in the United Kingdom, and bunds in Germany, are the safest securities in the loanable funds market.
- They are also easily traded, so they can be sold at a moment's notice, which makes them highly liquid.
- Because they are safe and liquid, government bonds have a lower interest rate than corporate bonds—bonds issued by corporations.
- Although the level of an interest rate depends on the safety and liquidity of the security, interest rates, on average, move up and down together and are influenced by common forces that change the supply of and demand for loanable funds.
- Figure 1 shows the interest rate on U.S. government 10-year bonds from 2010 to mid-2014 (both the nominal rate and the real rate.)
- The striking feature of this graph is that although the interest rate was low in 2014, it was not as low as it had been in 2012, when the real interest rate was close to zero for two years and briefly negative at the end of 2012.
- The news article says that the falling rate in 2014 risks making the real rate negative again, but that would require a full 1 percentage point fall in the nominal interest rate or a 1 percentage point rise in the inflation rate.
- The news article says that the interest rate on U.S. government bonds fell from 3 percent to 2.5 percent per year. With inflation constant at 1.4 percent per year, these numbers translate to a fall in the real interest rate from 1.6 percent to 1.1 percent per year.
- Figure 2 illustrates why the real interest rate fell. In January 2014, the demand for loanable funds was DLF_{Jan} and the supply of loanable funds was SLF_{Jan} . The equilibrium interest rate was 1.6 percent per year.
- During 2014, the factors described in the news article increased the supply of loanable funds to SLF_{Jun} .
- A key influence on the interest rate is missing from the news article: In 2014, the German, U.S., and U.K. government budget deficits shrank, which decreased the demand for loanable funds to DLF_{Jun} .

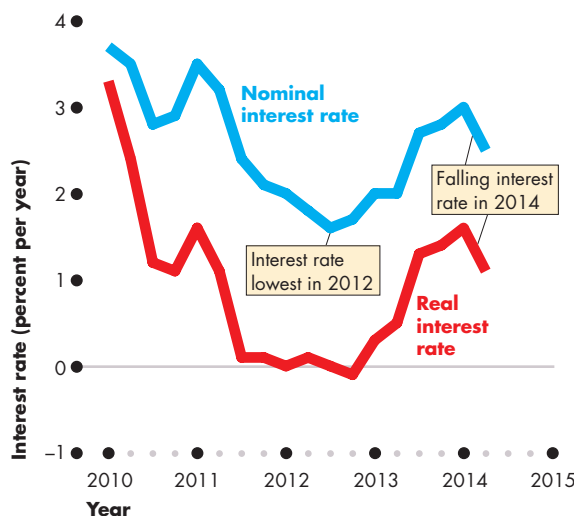


Figure 1 Interest Rates 2010 to 2014

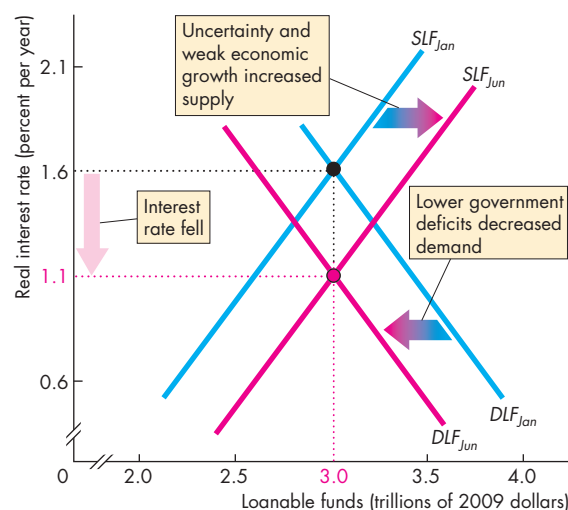


Figure 2 The Loanable Funds Market in 2014

- With an increase in supply and a decrease in demand, the equilibrium real interest rate fell from 1.6 percent to 1.1 percent per year.
- The news article speculates that bond prices will fall and interest rates will rise as economic expansion increases the demand for loanable funds.

SUMMARY

Key Points

Financial Institutions and Financial Markets

(pp. 606–610)

- Capital (*physical* and *human capital*) is a real productive resource; financial capital is the funds used to buy capital.
- Gross investment increases the quantity of capital and depreciation decreases it. Saving increases wealth.
- The markets for financial capital are the markets for loans, bonds, and stocks.
- Financial institutions ensure that borrowers and lenders can always find someone with whom to trade.

Working Problems 1 to 4 will give you a better understanding of financial institutions and financial markets.

The Loanable Funds Market (pp. 611–617)

- Investment in capital is financed by household saving, a government budget surplus, and funds from the rest of the world.
- The quantity of loanable funds demanded depends negatively on the real interest rate and the demand for loanable funds changes when profit expectations change.

- The quantity of loanable funds supplied depends positively on the real interest rate and the supply of loanable funds changes when disposable income, expected future income, wealth, and default risk change.
- Equilibrium in the loanable funds market determines the real interest rate and quantity of funds.

Working Problems 5 to 7 will give you a better understanding of the loanable funds market.

Government in the Loanable Funds Market

(pp. 618–619)

- A government budget surplus increases the supply of loanable funds, lowers the real interest rate, and increases investment and the equilibrium quantity of loanable funds.
- A government budget deficit increases the demand for loanable funds, raises the real interest rate, and increases the equilibrium quantity of loanable funds, but decreases investment in a crowding-out effect.
- The Ricardo-Barro effect is the response of rational taxpayers to a budget deficit: private saving increases to finance the budget deficit. The real interest rate remains constant and the crowding-out effect is avoided.

Working Problems 8 to 11 will give you a better understanding of government in the loanable funds market.

Key Terms

Bond, 607
Bond market, 607
Crowding-out effect, 619
Default risk, 615
Demand for loanable funds, 613
Federal Reserve System, 610
Financial capital, 606
Financial institution, 608

Gross investment, 606
Loanable funds market, 611
Mortgage, 607
Mortgage-backed security, 607
National saving, 611
Net investment, 606
Net taxes, 611
Net worth, 610

MyEconLab Key Terms Quiz

Nominal interest rate, 612
Real interest rate, 612
Saving, 606
Stock, 608
Stock market, 608
Supply of loanable funds, 614
Wealth, 606

WORKED PROBLEM

MyEconLab You can work this problem in Chapter 24 Study Plan.

The following items are (approximate) facts about the U.S. economy:

- In 2005, the nominal interest rate on bonds was 5 percent a year and the real interest rate was 2 percent a year. Investment was \$2.7 trillion and the government budget deficit was \$0.5 trillion.
- By 2009, the real interest rate had increased to 5 percent a year, but the nominal interest rate was unchanged at 5 percent a year. Investment had crashed to \$1.8 trillion and the government budget deficit had climbed to \$1.8 trillion.

Assume that the private demand for and private supply of loanable funds did not change between 2005 and 2009.

Questions

1. What was the inflation rate in 2005 and 2009? How do you know?
2. What happened to the price of a bond between 2005 and 2009? How do you know?
3. What happened to the demand for loanable funds between 2005 and 2009? How do you know?
4. Did the change in the government budget deficit crowd out some investment?
5. What happened to the quantity of saving and investment?

Solutions

1. The real interest rate equals the nominal interest rate minus the inflation rate. So the inflation rate equals the nominal interest rate minus the real interest rate. In 2005, the inflation rate was 3 percent a year and in 2009 the inflation rate was zero.

Key Point: The nominal interest rate minus the real interest rate equals the inflation rate.

2. The price of a bond is inversely related to the nominal interest rate. Between 2005 and 2009, the nominal interest rate did not change—it remained at 5 percent a year. With the nominal interest rate unchanged, the price of a bond was also unchanged.

Key Point: The price of a bond is inversely related to the nominal interest rate.

3. The demand for loanable funds is the relationship between the quantity of loanable funds demanded and the real interest rate.

An increase in the government budget deficit increases the demand for loanable funds.

Between 2005 and 2009, the government budget deficit increased from \$0.5 trillion to \$1.8 trillion, so the demand for loanable funds increased.

Key Point: An increase in the government budget deficit increases the demand for loanable funds.

4. The increase in the government budget deficit increased the demand for loanable funds. With no change in the supply of loanable funds, the real interest rate increases.

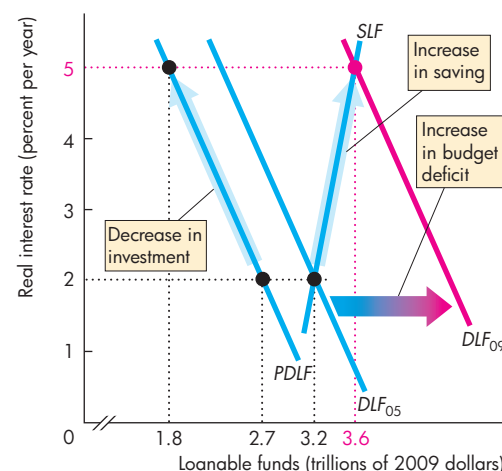
Between 2005 and 2009, the real interest rate increased from 2 percent a year to 5 percent a year. As the real interest rate increased, the quantity of loanable funds demanded by firms decreased from \$2.7 trillion to \$1.8 trillion. Crowding out occurred.

Key Point: With no change in the supply of loanable funds, an increase in the government budget deficit increases the real interest rate and crowds out investment.

5. Saving and investment plans depend on the real interest rate. Between 2005 and 2009, the real interest rate increased, which increased saving and decreased investment. The increase in saving increased the quantity supplied of loanable funds. The decrease in investment decreased the quantity demanded of loanable funds.

Key Point: A change in the real interest rate does not change the supply of or demand for loanable funds: It changes the quantities supplied and demanded.

Key Figure



MyEconLab Interactive Animation

STUDY PLAN PROBLEMS AND APPLICATIONS

MyEconLab You can work Problems 1 to 11 in Chapter 24 Study Plan and get instant feedback.

Financial Institutions and Financial Markets

(Study Plan 24.1)

Use the following data to work Problems 1 and 2.

Michael is an Internet service provider. On December 31, 2014, he bought an existing business with servers and a building worth \$400,000. During 2015, his business grew and he bought new servers for \$500,000. The market value of some of his older servers fell by \$100,000.

1. What was Michael's gross investment, depreciation, and net investment during 2015?
2. What is the value of Michael's capital at the end of 2015?
3. Lori is a student who teaches golf on Saturdays. In a year, she earns \$20,000 after paying her taxes. At the beginning of 2014, Lori owned \$1,000 worth of books, DVDs, and golf clubs and she had \$5,000 in a savings account at the bank. During 2014, the interest on her savings account was \$300 and she spent a total of \$15,300 on consumption goods and services. There was no change in the market values of her books, DVDs, and golf clubs.
 - a. How much did Lori save in 2014?
 - b. What was her wealth at the end of 2014?
4. **Treasury Yields Fall to Two-Week Low**
Treasury bond prices rose on Monday, pushing interest rates down. The interest rate on 10-year bonds fell 4 basis points to 1.65%.
Source: *The Wall Street Journal*, August 27, 2012

What is the relationship between the price of a treasury bond and its interest rate? Why does the interest rate move inversely to price?

The Loanable Funds Market (Study Plan 24.2)

Use the following data to work Problems 5 and 6.

First Call, Inc., a smartphone company, plans to build an assembly plant that costs \$10 million if the real interest rate is 6 percent a year or a larger plant that costs \$12 million if the real interest rate is 5 percent a year or a smaller plant that costs \$8 million if the real interest rate is 7 percent a year.

5. Draw a graph of First Call's demand for loanable funds curve.
6. First Call expects its profit to double next year.

Explain how this increase in expected profit influences First Call's demand for loanable funds.

7. The table sets out the data for an economy when the government's budget is balanced.

Real interest rate (percent per year)	Loanable funds demanded	Loanable funds supplied
(trillions of 2009 dollars)		
4	8.5	5.5
5	8.0	6.0
6	7.5	6.5
7	7.0	7.0
8	6.5	7.5
9	6.0	8.0
10	5.5	8.5

- a. Calculate the equilibrium real interest rate, investment, and private saving.
- b. If planned saving increases by \$0.5 trillion at each real interest rate, explain the change in the real interest rate.
- c. If planned investment increases by \$1 trillion at each real interest rate, explain the change in saving and the real interest rate.

Government in the Loanable Funds Market

(Study Plan 24.3)

Use the data in Problem 7 to work Problems 8 and 9.

8. If the government's budget becomes a deficit of \$1 trillion, what are the real interest rate and investment? Does crowding out occur?
9. If the government's budget becomes a deficit of \$1 trillion and the Ricardo-Barro effect occurs, what are the real interest rate and investment?

Use the table in Problem 7 and the following data to work Problems 10 and 11.

Suppose that the quantity of loanable funds demanded increases by \$1 trillion at each real interest rate and the quantity of loanable funds supplied increases by \$2 trillion at each interest rate.

10. If the government budget remains balanced, what are the real interest rate, investment, and private saving? Does any crowding out occur?
11. If the government's budget becomes a deficit of \$1 trillion, what are the real interest rate, investment, and private saving? Does any crowding out occur?

ADDITIONAL PROBLEMS AND APPLICATIONS

MyEconLab You can work these problems in MyEconLab if assigned by your instructor.

Financial Institutions and Financial Markets

12. On January 1 2014, the London Taxi Company owned 5 cabs valued at £150,000. During 2014, the London Taxi Company bought 4 new cabs for a total of £200,000. At the end of 2014, the market value of all of the cabs was £300,000. Calculate the London Taxi Company's gross investment, depreciation, and net investment.

Use the following information to work Problems 13 and 14.

The Bureau of Economic Analysis reported that the U.S. capital stock was \$46.3 trillion at the end of 2010, \$46.6 trillion at the end of 2011, and \$47.0 trillion at the end of 2012. Depreciation in 2011 was \$2.4 trillion, and gross investment during 2012 was \$2.8 trillion (all in 2009 dollars).

13. Calculate U.S. net investment and gross investment during 2011.
14. Calculate U.S. depreciation and net investment during 2012.
15. Annie runs a fitness center. On December 31, 2014, she bought an existing business with exercise equipment and a building worth \$300,000. During 2015, business improved and she bought some new equipment for \$50,000. At the end of 2015, her equipment and buildings were worth \$325,000. Calculate Annie's gross investment, depreciation, and net investment during 2015.
16. John is a researcher at a university, and after he paid taxes, his income and interest from financial assets was \$55,000 in 2013. At the beginning of 2013, he owned \$3,000 worth of financial assets. At the end of 2013, John's financial assets were worth \$5,000.
- How much did John save during 2013?
 - How much did John spend on consumption goods and services?
17. In a speech at the CFA Society of Nebraska in February 2007, William Poole (former Chairman of the St. Louis Federal Reserve Bank) said: Over most of the post-World War II period, the personal saving rate averaged about 6 percent, with some higher rates from the mid-1970s to mid-1980s. The negative trend in the saving rate started in the mid-1990s, about the same time the stock market boom started. Thus it is hard to dismiss the hypothesis that the decline in the

measured saving rate in the late 1990s reflected the response of consumption to large capital gains from corporate equity [stock]. Evidence from panel data of households also supports the conclusion that the decline in the personal saving rate since 1984 is largely a consequence of capital gains on corporate equities.

- Is the purchase of corporate equities part of household consumption or saving? Explain your answer.
- Equities reap a capital gain in the same way that houses reap a capital gain. Does this mean that the purchase of equities is investment? If not, explain why it is not.

The Loanable Funds Market

18. Draw a graph to illustrate the effect of an increase in the demand for loanable funds and an even larger increase in the supply of loanable funds on the real interest rate and the equilibrium quantity of loanable funds.
19. Draw a graph to illustrate how an increase in the supply of loanable funds and a decrease in the demand for loanable funds can lower the real interest rate and leave the equilibrium quantity of loanable funds unchanged.

Use the following data to work Problems 20 and 21.

In 2012, the Lee family had disposable income of \$80,000, wealth of \$140,000, and an expected future income of \$80,000 a year. At a real interest rate of 4 percent a year, the Lee family saves \$15,000 a year; at a real interest rate of 6 percent a year, they save \$20,000 a year; and at a real interest rate of 8 percent, they save \$25,000 a year.

- Draw a graph of the Lee family's supply of loanable funds curve.
- In 2013, suppose that the stock market crashes and the default risk increases. Explain how this increase in default risk influences the Lee family's supply of loanable funds curve.
- Gunvor Becomes Major Winner in Rosneft Oil Tender**

Trading house Gunvor is among the winners of a large Rosneft tender. Gunvor would lift up to 400,000 tonnes of Russian Urals crude per month from the Baltic Sea port of Primorsk in April-September.

Source: *Reuters*, March 17, 2015