

## CHAPTER 2

### The Financial System and the Economy

#### TEACHING OBJECTIVES

##### Goals of Part 1: Money and the Financial System

- A. Introduce basic ideas behind bond, stock and other financial markets (Chapter 2), money and the payments system (Chapter 3), the present-value formula (Chapter 4), the structure of interest rates (Chapter 5), real interest rates (Chapter 6), and stocks and other assets (Chapter 7).

##### Goals of Chapter 2

- A. Show how the financial system matches borrowers and lenders.  
 B. Investigate the role of financial securities.  
 C. Describe the basic workings of financial intermediaries.  
 D. Show how supply and demand determine the financial system.  
 E. Discuss the consequences of failures of the financial system.  
 F. Describe the major attributes of financial securities that investors care about.

#### TEACHING NOTES

##### A. Introduction

1. Borrowing and lending is valuable to an individual and to the society as a whole
2. The **financial system** consists of securities, intermediaries, and markets that exist to match savers and borrowers
3. **Figure 2.1** illustrates the components of financial system
4. This chapter introduces the financial system and explains why it is an essential part of a well-functioning economy

##### B. Financial Securities

###### Definition of **Financial Securities**

1. Debt and Equity
  - a) Define a **debt security** and an **equity security (stock)**
  - b) How much debt and equity exist in the U.S.? Use **Figure 2.2**
  - c) Who issues debt and equity? Use **Figure 2.3**
  - d) Who owns debt and equity? Define **investor** and use **Figure 2.4**
2. Differences Between Debt and Equity
  - a) **Maturity**; define **principal**
  - b) Type of payment being made (**interest** versus **dividends**)
  - c) Bankruptcy
  - d) Use **Table 2.1** for the differences between debt and equity
  - e) Differences exist because borrowers and lenders have different needs

##### C. Matching Borrowers with Lenders

1. **Direct** versus **Indirect Finance**
  - a) Definitions

- b) Example; use **Figure 2.5** for the differences between direct and indirect finance
- 2. **Financial Intermediaries**
  - a) Different types
  - b) How average people use them
- 3. Functions of Financial Intermediaries
  - a) Help savers through **diversification**
  - b) Pool funds of many people
  - c) Take short-term deposits and make long-term loans
  - d) Gather information
  - e) Reduce the costs of financial transactions
- D. Financial Markets
  - 1. The Structure of Financial Markets
    - a) What is a **financial market**?
    - b) Do financial markets have a physical location?
    - c) Markets for new securities (**primary market**) and existing securities (**secondary market**); use **Figure 2.6**
  - 2. How Financial Markets Determine Prices of Securities
    - a) Supply and demand determine prices
    - b) Examples of determining equilibrium; use **Figure 2.7**
    - c) Prices of securities affected by changes in supply and demand; use **Figure 2.8**
- E. The Financial System
  - 1. The Financial System and Economic Growth
    - a) Firms need to borrow to grow
    - b) A country with an efficient financial system makes loans available to firms, so they can grow
    - c) The strength of a country's financial system is correlated with its growth rate
  - 2. What Happens When the Financial System Works Poorly?
    - a) The Asian Crisis
      - (1) The poor performance of Asian economies, beginning in 1997, was caused by a number of problems and exacerbated by weak accounting systems
      - (2) Good accounting standards are needed so investors can assess the value of their securities
    - b) The Savings and Loan Crisis
      - (1) U.S. savings and loan (S&L) institutions began failing in large numbers in the 1980s
      - (2) S&L losses were magnified when the government failed to close bankrupt S&Ls
    - c) Mortgages and Housing
      - (1) Home ownership is easy to obtain in the United States because the financial system is well developed
      - (2) In countries with less developed financial systems, homeownership is more difficult, requiring greater savings, so people do not own homes until later in their lives
      - (3) Since 2008, it has become difficult for prospective home buyers to obtain a mortgage loan.
    - d) The Financial Crisis of 2008
      - (1) The expectation of constantly rising housing prices was caused in part by subprime lending
      - (2) When home prices dropped in 2007, the market for mortgage-backed securities crashed
      - (3) A global financial crisis required governments and central banks to provide bailouts
      - (4) Unregulated financial firms need to be prevented from growing so large that they are too big to fail; government regulators need to respond more quickly to risky financial practices
      - (5) Dodd-Frankly Act gave more power to government regulators
- F. Application to Everyday Life: What Do Investors Care About?

1. Five Determinants of Investors' Decisions
    - a) Expected Return
      - (1) Definition of **expected return**
      - (2) Define **return**
      - (3) Return equals current yield plus capital-gains yield; define **current yield, capital gain, and capital-gains yield**
      - (4) Numerical examples of return, current yield, and capital-gains yield
      - (5) General formula for expected return
    - b) **Risk**
      - (1) Causes of uncertainty about return
        - (a) **Default** by issuer of debt security; use Data Bank: Default Risk on Debt
        - (b) Unexpected change in dividend paid on equity
        - (c) Change in the price of the security
        - (d) Unexpected change in the inflation rate; use Data Bank: How Much Risk Do Investors Face from Inflation?
      - (2) Quantify risk by **standard deviation**
        - (a) General formula for standard deviation
        - (b) Numerical examples
    - c) **Liquidity**
      - (1) Definition: ease of buying or selling securities at low transaction cost
      - (2) **Marketable** versus **nonmarketable securities**
    - d) Taxes
      - (1) Define **after-tax expected return**
      - (2) Investors seek to reduce tax burden
    - e) Maturity
      - (1) Many investors favor securities with shorter times to maturity
      - (2) Long-term securities must usually offer a higher expected return than short-term securities
  2. Choosing a Financial Investment Portfolio
    - a) Definition of **portfolio**
    - b) Need to examine risk of entire portfolio, taken together, not just individual security
    - c) **Idiosyncratic risk (unsystematic risk)**: risk that can be eliminated by diversification
    - d) **Market risk (systematic risk)**: risk that cannot be eliminated by diversification
    - e) No portfolio is right for everyone; a person who is less risk-averse should hold a riskier portfolio than someone who is very risk-averse
- G. Data Bank: Default Risk on Debt
1. Debt ratings indicate the riskiness of different debt securities
  2. Lower rated debt pays higher interest rates in the market; use **Figure 2.A**
  3. The difference in interest rates between debts with different ratings gets larger in recessions; use **Figure 2.B**
- H. Data Bank: How Much Risk Do Investors Face from Inflation?
1. Inflation is sometimes difficult to predict
  2. Data on economists' expectations of inflation shows that their forecasts are often far from the forecasted mark, especially when inflation rises or falls sharply; use **Figure 2.C**
  3. For the past decade, the forecasts have been fairly accurate

## ADDITIONAL ISSUES FOR CLASSROOM DISCUSSION

1. Add a more detailed discussion of diversification. You could start by asking this question: Why is it usually better for an investor to own 100 different stocks rather than one? Then you could cite research that suggests that having about twenty stocks from different industries reduces most of the idiosyncratic risk to a portfolio.
2. To expand on the discussion of risk and return, you can draw bell-shaped curves that describe the distribution of returns to a stock. After drawing the basic curve, you can illustrate a variety of concepts. Show a mean-preserving spread by drawing two distributions with the same expected return but different risks, and ask which one an investor would prefer. Then show that if the security with more risk has a higher expected return; some investors will prefer one and other investors will prefer the other.
3. You can introduce the idea of a portfolio-possibilities line by drawing a diagram showing risk on the horizontal axis and expected return on the vertical axis. The upward sloping portfolio-possibilities line shows the trade-off that investors face between risk and expected return. Some investors will prefer to be on the left side of the line, with low risk and low expected return; other investors will prefer to be further to the right on the line, accepting greater risk in return for increased expected return. No spot on the line is correct for everyone; a person's preference towards risk determines her or his optimal position.

## SOLUTIONS TO TEXTBOOK NUMERICAL EXERCISES AND ANALYTICAL PROBLEMS

### Numerical Exercises

11. a. The expected return to Uninvest is

$$\begin{aligned}
 E &= p_1X_1 + p_2X_2 \\
 &= (0.10 \times 0.20) + (0.90 \times 0.07) \\
 &= 0.02 + 0.063 \\
 &= 0.083 \\
 &= 8.3\%.
 \end{aligned}$$

The expected return to Speculate is

$$\begin{aligned}
 E &= p_1X_1 + p_2X_2 \\
 &= (0.50 \times 0.00) + (0.50 \times 0.50) \\
 &= 0.00 + 0.25 \\
 &= 0.25 \\
 &= 25\%
 \end{aligned}$$

- b. The standard deviation of the return to Uninvest is

$$\begin{aligned}
 S &= [p_1(X_1 - E)^2 + p_2(X_2 - E)^2]^{1/2} \\
 &= \{[0.10 \times (0.20 - 0.083)^2] + [0.90 \times (0.07 - 0.083)^2]\}^{1/2} \\
 &= (0.001369 + 0.000152)^{1/2} \\
 &= 0.001521^{1/2} \\
 &= 0.039
 \end{aligned}$$

$$= 3.9\%$$

The standard deviation of the return to Speculate is

$$\begin{aligned} S &= [p_1(X_1 - E)^2 + p_2(X_2 - E)^2]^{1/2} \\ &= \{[0.50 \times (0.00 - 0.25)^2] + [0.50 \times (0.50 - 0.25)^2]\}^{1/2} \\ &= (0.03125 + 0.03125)^{1/2} \\ &= 0.0625^{1/2} \\ &= 0.25 \\ &= 25\% \end{aligned}$$

Thus, Speculate has a much higher expected return but also much higher risk.

- c. If Julia is very risk-averse, she will not want to buy Speculate because it is too risky; she will buy Uninvest.
- d. If Julia is risk-neutral, she will buy the stock with the highest expected return, which is Speculate in this case.

$$12. B_D = 250 - 0.15b - 20W_t - 10W_{t+1}$$

$$B_S = 50 + 0.05b + 40W_t + 20W_{t+1}$$

a. Recession today and next year:

$$B_D = 250 - 0.15b$$

$$B_S = 50 + 0.05b$$

$$B_D = B_S: 250 - 0.15b = 50 + 0.05b, \text{ so } 200 = 0.2b, \text{ so } b = 1000$$

$$\text{Then } B_D = 250 - 0.15b = 250 - (0.15 \times 1000) = 250 - 150 = 100$$

$$\text{Check using other equation: } B_S = 50 + 0.05b = 50 + (0.05 \times 1000) = 50 + 50 = 100$$

b. Expansion today; recession next year:

$$B_D = 250 - 0.15b - 20 = 230 - 0.15b$$

$$B_S = 50 + 0.05b + 40 = 90 + 0.05b$$

$$B_D = B_S: 230 - 0.15b = 90 + 0.05b, \text{ so } 140 = 0.2b, \text{ so } b = 700$$

$$\text{Then } B_D = 230 - 0.15b = 230 - (0.15 \times 700) = 230 - 105 = 125$$

$$\text{Check: } B_S = 90 + 0.05b = 90 + (0.05 \times 700) = 90 + 35 = 125$$

c. Recession today; expansion next year:

$$B_D = 250 - 0.15b - 10 = 240 - 0.15b$$

$$B_S = 50 + 0.05b + 20 = 70 + 0.05b$$

$$B_D = B_S: 240 - 0.15b = 70 + 0.05b, \text{ so } 170 = 0.2b, \text{ so } b = 850$$

$$\text{Then } B_D = 240 - 0.15b = 240 - (0.15 \times 850) = 240 - 127.5 = 112.5$$

$$\text{Check: } B_S = 70 + 0.05b = 70 + (0.05 \times 850) = 70 + 42.5 = 112.5$$

d. Expansion today; expansion next year:

$$B_D = 250 - 0.15b - 20 - 10 = 220 - 0.15b$$

$$B_S = 50 + 0.05b + 40 + 20 = 110 + 0.05b$$

$$B_D = B_S: 220 - 0.15b = 110 + 0.05b, \text{ so } 110 = 0.2b, \text{ so } b = 550$$

$$\text{Then } B_D = 220 - 0.15b = 220 - (0.15 \times 550) = 220 - 82.5 = 137.5$$

$$\text{Check: } B_S = 110 + 0.05b = 110 + (0.05 \times 550) = 110 + 27.5 = 137.5$$

13. a.

$$\text{\$1,000: } \frac{\text{\$1,000} - \text{\$1,500}}{\text{\$1,500}} = -\frac{\text{\$500}}{\text{\$1,500}} = -0.333 = -33.3\%$$

$$\text{\$1,500: } \frac{\text{\$1,500} - \text{\$1,500}}{\text{\$1,500}} = \frac{\text{\$0}}{\text{\$1,500}} = 0 = 0\%$$

$$\text{\$2,000: } \frac{\text{\$2,000} - \text{\$1,500}}{\text{\$1,500}} = \frac{\text{\$500}}{\text{\$1,500}} = 0.333 = 33.3\%$$

$$\text{\$2,500: } \frac{\text{\$2,500} - \text{\$1,500}}{\text{\$1,500}} = \frac{\text{\$1,000}}{\text{\$1,500}} = 0.667 = 66.7\%$$

Payoff	Percentage Return
\\$1,000	-33.3%
\\$1,500	0%
\\$2,000	33.3%
\\$2,500	66.7%

$$\begin{aligned} \text{b. } E &= p_1X_1 + p_2X_2 + p_3X_3 + p_4X_4 \\ &= [0.25 \times (-0.333)] + (0.25 \times 0) + (0.25 \times 0.333) + (0.25 \times 0.667) \\ &= -0.083 + 0.0 + 0.083 + 0.167 \\ &= 0.167 \\ &= 16.7\% \end{aligned}$$

$$\begin{aligned} \text{c. } S &= [p_1(X_1 - E)^2 + p_2(X_2 - E)^2 + p_3(X_3 - E)^2 + p_4(X_4 - E)^2]^{1/2} \\ &= \{[0.25 \times (-0.333 - 0.167)^2] + [0.25 \times (0 - 0.167)^2] + [0.25 \times (0.333 - 0.167)^2] + [0.25 \times (0.667 - 0.167)^2]\}^{1/2} \\ &= (0.0625 + 0.00697 + 0.00689 + 0.0625)^{1/2} \\ &= 0.139^{1/2} \\ &= 0.373 \end{aligned}$$

$$= 37.3\%$$

14. a.

$b$	Probability	Return
\$3,000	0.1	$\frac{\$3,000 - \$3,000}{\$3,000} = \frac{\$0}{\$3,000} = 0.00 = 0\%$
\$3,300	0.2	$\frac{\$3,300 - \$3,000}{\$3,000} = \frac{\$300}{\$3,000} = 0.10 = 10\%$
\$3,600	0.3	$\frac{\$3,600 - \$3,000}{\$3,000} = \frac{\$600}{\$3,000} = 0.20 = 20\%$
\$3,900	0.2	$\frac{\$3,900 - \$3,000}{\$3,000} = \frac{\$900}{\$3,000} = 0.30 = 30\%$
\$4,200	0.2	$\frac{\$4,200 - \$3,000}{\$3,000} = \frac{\$1,200}{\$3,000} = 0.40 = 40\%$

$$\begin{aligned} \text{b. } E &= p_1X_1 + p_2X_2 + \dots + p_NX_N \\ &= (0.1 \times 0.00) + (0.2 \times 0.10) + (0.3 \times 0.20) + (0.2 \times 0.30) + (0.2 \times 0.40) \\ &= 0 + 0.02 + 0.06 + 0.06 + 0.08 \\ &= 0.22 \\ &= 22\% \end{aligned}$$

$$\begin{aligned} \text{c. } S &= [p_1(X_1 - E)^2 + p_2(X_2 - E)^2 + \dots + p_N(X_N - E)^2]^{1/2} \\ &= \{[0.1 \times (0.00 - 0.22)^2] + [0.2 \times (0.10 - 0.22)^2] + [0.3 \times (0.20 - 0.22)^2] + [0.2 \times (0.30 - 0.22)^2] \\ &\quad + [0.2 \times (0.40 - 0.22)^2]\}^{1/2} \\ &= (0.00484 + 0.00288 + 0.00012 + 0.00128 + 0.00648)^{1/2} \\ &= 0.0156^{1/2} \\ &= 0.125 \\ &= 12.5\% \end{aligned}$$

d. The alternative security has a return (which equals its expected return) of

$$E = \frac{\$3,300 - \$3,000}{\$3,000} = \frac{\$300}{\$3,000} = 0.10 = 10\%.$$

This security is riskless, so  $S = 0$ . This compares with a 22 percent expected return with a standard deviation of 12.5 percent on the risky security. If a person is extremely risk-averse, he will accept the lower return on the riskless security. Someone who is not too risk-averse will choose the riskier security. Note that there is only a 10 percent chance that the risky security would have a lower payoff than the riskless security.

15. a. Buy security A because its expected return is higher and there is no other difference between the two securities.

b. Buy security D because it gives a higher return after taxes. After-tax return to C is  $10\% - (10\% \times 0.4) = 6\%$ , which is less than the 7%, that an investor gets from security D.

c. Buy security F because it has a lower chance of default, everything else being the same.

- d. Buy security H because it has no transactions cost, and its return is higher. If you buy security G, your return is:

$$\frac{(\$1,000 \times 0.08) - \$50}{\$1,000} = 0.03 = 3\%$$

which is less than the return of 5% that you get from security H.

### Analytical Problems

16. a. Ford bonds would have a higher interest rate than U.S. government bonds because Ford's bond market is not as liquid as the government bonds.  
 b. IBM bonds would have a higher interest rate than U.S. government bonds because bond owners must pay more taxes on IBM bonds.  
 c. Microsmart bonds would have a higher interest rate than Microsoft bonds because Microsmart has higher risk of default.  
 d. Thirty-year bonds would have a higher interest rate than three-month government bonds because investors must be compensated more for holding long-term bonds as they prefer short-term bonds.
17. If the risk to all your securities increases, you are now holding securities that are too risky for you relative to their return. Therefore, you should sell some of your securities to obtain some that are less risky, thus rebalancing your portfolio.
18. Investors pay attention to economic data releases because the data tell investors about the overall state of the economy. A strong economy helps most industries grow and become more profitable; a weak economy reduces the profits of most companies. If investors think that the probability of recession has risen, they will reduce their demand for stocks because firms' profits will be low and thus stock prices will decline.

## ADDITIONAL TEACHING NOTES

### Current Yield versus Dividend Yield

Some people use the term current yield when they are referring to a debt security and they use the term dividend yield when they are referring to an equity security. In both cases, the definition is the same— income divided by initial value. We will use the term current yield for both debt and equity.

### Additional Example of Calculating Expected Return

To illustrate how to calculate the expected return, we look at two examples. First, consider a bond (debt security) issued by Safetyco, which pays \$600 in interest in one year on a \$10,000 bond. If the bond pays the promised interest and repays the principal amount of \$10,000 so there is no capital gain, it has a return of:



*Return = current yield + capital-gains yield*

$$\begin{aligned}
 &= \frac{\text{income}}{\text{initial value}} + \frac{\text{capital gain}}{\text{initial value}} \\
 &= \frac{\$600}{\$10,000} + \frac{\$0}{\$10,000} \\
 &= 0.06 \\
 &= 6 \text{ percent.}
 \end{aligned}$$

But, suppose there is a one percent chance that Safetyco will go bankrupt during the year. When a company declares bankruptcy, the debt holders often get back some portion, but not all, of their principal and the interest that is owed to them. In this case, suppose an investor in a \$10,000 Safetyco bond gets only \$3,000 of her principal back and loses the rest of her principal and the interest due. The return to the investor is negative:

*Return = current yield + capital gains yield*

$$\begin{aligned}
 &= \frac{\text{income}}{\text{initial value}} + \frac{\text{capital gain}}{\text{initial value}} \\
 &= \frac{\$0}{\$10,000} + \frac{\$3,000 - \$10,000}{\$10,000} \\
 &= \frac{-\$7,000}{\$10,000} \\
 &= -0.70 \\
 &= -70 \text{ percent.}
 \end{aligned}$$

So, if an investor buys a \$10,000 Safetyco bond, there is a 99 percent chance she will have a return of 0.06 (or 6 percent) during the year, and a 1 percent chance she will have a return of  $-0.70$  (or  $-70$  percent). The expected return to an investment in the Safetyco bond can be found by multiplying each return by its probability and adding up the results. (Note that the return and the probability should both be expressed in decimal form.) The expected return to a Safetyco bond is:

*Expected return*

$$\begin{aligned}
 &= (\text{probability of high return} \times \text{high return}) + (\text{probability of low return} \times \text{low return}) \\
 &= (0.99 \times 0.06) + (0.01 \times -0.70) \\
 &= 0.0594 - 0.007 \\
 &= 0.0524 \\
 &= 5.24 \text{ percent.}
 \end{aligned}$$

Because there is a 1 percent chance that Safetyco will not pay the interest and principal on its bonds, the expected return is below the 6 percent promised return by about three quarters of one percentage point.

For the second example, consider stock (an equity security) issued by Riskco. Suppose that the Riskco stock pays no dividend (so, its current yield is zero) and its stock price is \$100 per share today. Consider an investor who purchases 100 shares at \$100 per share, for a total investment of \$10,000. If Riskco's main product is successful over the coming year, which has a probability of 0.75 (75 percent), Riskco's stock price will rise to \$140 per share. In this case, the return to 100 shares of Riskco's stock is:

*Return = current yield + capital-gains yield*

$$\begin{aligned}
 &= 0 + \frac{\text{capital gain}}{\text{initial value}} \\
 &= \frac{\text{final value} - \text{initial value}}{\text{initial value}} \\
 &= \frac{(\$140 \times 100) - \$10,000}{\$10,000} \\
 &= \frac{\$14,000 - \$10,000}{\$10,000} \\
 &= \frac{\$4,000}{\$10,000} \\
 &= 0.40 \\
 &= 40 \text{ percent.}
 \end{aligned}$$

If Riskco's main project is unsuccessful, which has a probability of 0.25 (or 25 percent), the stock price falls to \$10 per share, a loss of \$90 per share. The return to a share of Riskco's stock is then:

*Return = current yield + capital gains yield*

$$\begin{aligned}
 &= 0 + \frac{\text{capital gain}}{\text{initial value}} \\
 &= \frac{\text{final value} - \text{initial value}}{\text{initial value}} \\
 &= \frac{(\$10 \times 100) - \$10,000}{\$10,000} \\
 &= \frac{\$1,000 - \$10,000}{\$10,000} \\
 &= \frac{-\$9,000}{\$10,000} \\
 &= -0.90 \\
 &= -90 \text{ percent.}
 \end{aligned}$$

The expected return on a Riskco stock can be calculated as before:

$$\begin{aligned}
 \text{Expected return} &= (\text{probability of high return} \times \text{high return}) + (\text{probability of low return} \times \text{low return}) \\
 &= (0.75 \times 0.40) + (0.25 \times -0.90) \\
 &= 0.300 - 0.225 \\
 &= 0.075 \\
 &= 7.5 \text{ percent.}
 \end{aligned}$$

Because the expected return on a Safetyco bond is 5.24 percent and the expected return on a Riskco stock is 7.5 percent, an investor might prefer to invest in Riskco.

### **Profiting from a Change in the Price of a Security**

Suppose Sue buys a security today from Bill that promises to pay her \$1,500 in one year and costs her \$1,200 today. Sue made the transaction because she thought that the equilibrium between supply and

demand in the market for such debt would occur at a price of \$1,200. But suppose business firms turn suddenly pessimistic because they fear that the economy will weaken. As a result, the supply of debt securities declines. This change drives up the price of the security today, and the bond price rises to \$1,400.

In this example, Sue is very happy that she bought the security when she did. She bought it for \$1,200, but had she waited to buy it, the price would have been \$1,400. Now, if Sue wanted to, she could sell her security in the market to make a quick profit of \$200.

### Additional Example of Calculating Standard Deviation

Let's return to our example of the Safetyco bond to calculate the standard deviation of its return. There was a 99 percent chance (0.99) that a Safetyco bond would return 6 percent (0.06), and a 1 percent chance (0.01) that it would return -70 percent (-0.70), and we calculated that the expected return was 5.24 percent (0.0524). The standard deviation of the return to a Safetyco bond is:

*Standard deviation*

$$\begin{aligned} &= \{[probability\ of\ outcome\ 1 \times (deviation\ of\ outcome\ 1)^2] + [probability\ of\ outcome\ 2 \times (deviation\ of\ outcome\ 2)^2]\}^{1/2} \\ &= \{[0.99 \times (0.06 - 0.0524)^2] + [0.01 \times (-0.70 - 0.0524)^2]\}^{1/2} \\ &= 0.0756 \\ &= 7.56\ percent. \end{aligned}$$

For a stock in Riskco, we calculate the standard deviation in the same manner. In this case, the probability of a poor return is higher and the poor return is worse than with the Safetyco bond, so we would expect our measure of risk to be higher. Let's see if that is true. There is a 0.75 percent chance of a return of 0.40, and a 0.25 percent chance of a return of -0.90, so the expected return is 0.075, as we calculated earlier. So, the standard deviation of the return to the Riskco stock is:

*Standard deviation*

$$\begin{aligned} &= \{[probability\ of\ outcome\ 1 \times (deviation\ of\ outcome\ 1)^2] + [probability\ of\ outcome\ 2 \times (deviation\ of\ outcome\ 2)^2]\}^{1/2} \\ &= \{[0.75 \times (0.40 - 0.075)^2] + [0.25 \times (-0.90 - 0.075)^2]\}^{1/2} \\ &= 0.5629 \\ &= 56.29\ percent. \end{aligned}$$

As expected, the standard deviation for a Riskco stock is significantly higher than the standard deviation for a Safetyco bond.

The standard deviation of the return to a security is a useful measure of risk. When the standard deviation of one security's return is higher than the standard deviation of another, the first security is riskier. Thus, a Riskco stock is a riskier investment than a Safetyco debt.

### Investors' Decisions Affect Supply and Demand

These portfolio decisions are not one-time choices because the return, risk, liquidity, taxation, and maturity of securities change over time. So, an investor may have decided to buy a particular stock in 1999, thus adding to the market demand for that stock. Then the investor may decide to sell the stock in 2003, thus adding to the market supply of the stock. So, investors' decisions affect both demand and supply in financial markets.

### **ADDITIONAL POLICY ISSUE: SHOULD GOVERNMENT DEBTS EXIST TO PROVIDE A LIQUID SECURITY?**

“It is a well known fact, that in countries in which the national debt is properly funded, and an object of established confidence, it answers most of the purposes of money.”

—Alexander Hamilton, U.S. Secretary of the Treasury, 1790

In the late 1990s, the U.S. government began running budget surpluses and projected large future surpluses totaling trillions of dollars. In 2000, the government began buying back some of its debt in financial markets, reducing the amount available to the public. The ratio of U.S. government debt to the economy’s output (GDP), which measures a country’s debt relative to its ability to repay the debt, fell sharply and was projected to fall even more. Investors in financial markets had been using U.S. government bonds for two decades as a benchmark security, which is a security whose returns are used for comparison to other financial securities. But, in 2000, as the supply of U.S. government bonds in the secondary market became smaller and smaller, investors began looking for other securities to use as their benchmark.

Is there value to society of the government having some debt? Alexander Hamilton thought so, as suggested by the quote above. In the late 1700s, Hamilton, then U.S. Secretary of the Treasury, argued that government debt was not a sign of financial weakness, but rather was beneficial because it provided a convenient financial security that paid interest, in the same way that currency was a convenient financial security that paid no interest. Hamilton thought that government debt enhanced international trade by providing interest on a merchant’s money balances and reduced the interest rate because it provided liquidity. That is why Hamilton suggested that government debt “answers most of the purposes of money” in the opening quote. In Chapter 3, “Money and Payments,” we will learn much more about the role of money in the economy.

Hamilton’s ideas were noteworthy, but the U.S. government has run up such a big debt over time that his argument was not debated seriously. But in the early 2000s, it was worth thinking about, because government debt was shrinking and could have even disappeared.

The government debt increases the most during wartime, when large expenditures must be financed and the government usually does not want to raise tax rates dramatically. The ratio of government debt to GDP rose sharply in the 1940s as a result of World War II. After that, the debt-GDP ratio declined fairly steadily until the 1970s. Government debt rose a bit in the 1970s, then increased sharply in the early 1980s as tax rates were reduced but government spending was not reduced as much as taxes. But the mid- to late-1990s brought faster economic growth and the amount of debt began to decline relative to the size of the economy. And in 1999 and 2000, the debt shrank dramatically.

Is there an optimal size of government debt? And is that optimal size positive? To answer these questions, consider four reasons why government debt may be good or bad. First, government debt may be good because the government provides a safe, liquid security to investors. Second, government debt may be good when the government borrows in bad times, which, as we will see shortly, may help to stabilize the economy. Third, government debt may be bad because it allows the government to be financially irresponsible. Fourth, government debt may be bad because its existence might reduce the economy’s long-term growth rate.

The first argument in favor of government debt is that it gives people a liquid security that is free from default risk, thus making it a natural benchmark security. In countries where the government debt is not very safe because the government may default on its debt, investors tend to use a benchmark security from another country (often U.S. government bonds). In every country, something becomes the benchmark. In the Asian crisis in 1997 and the worldwide financial crisis in 1998 (when first Russia defaulted on its debt and later financial markets in many securities failed to operate when a large hedge fund failed), as investors throughout the world sought a safe haven for their wealth, the demand for U.S. government bonds grew tremendously and the interest rates on such bonds fell sharply. Suppose, however, that U.S. government debt ceased to exist. What would people do? They would probably try some alternative, but no other bond in existence is quite as useful for this purpose as U.S. government bonds. Bonds issued by private firms always have some default risk, more so if the worldwide economy is in a recession. Bonds issued by the governments of other industrialized countries might be good substitutes, but most people perceive that those governments might default on such loans or that exchange rates might change, causing the value of the bonds to change. Thus, alternative benchmarks are risky.

The second argument in favor of government debt is that it allows the government to borrow in bad times. Suppose, for example, that the United States is in a recession but other countries are having an economic boom. It makes sense for the U.S. government and U.S. citizens to borrow from abroad, so that their spending will not decline, which would make the recession worse. Then, when economic conditions improve, people in the United States could repay the loans. Thus, debt really is not bad; it is just a way to transfer funds between people and countries over time to reduce the severity of recessions. A country generally benefits by running a large government budget deficit in a time of recession.

The first argument against government debt is that politicians will use the debt to pay for projects that are not worthwhile, rather than having to pay for them from current taxes. When taxes must cover the costs of government spending, taxpayers feel the costs of such spending directly and thus may oppose politicians' attempts to spend too much. But, if politicians finance the expenditures by borrowing, and if taxpayers do not understand the future ramifications of the debt (which include higher future taxes), then politicians find it easier to increase government spending. Some economists believe that this was the main cause of the large increase in U.S. government debt in the 1970s and 1980s. It was not until strict financing laws were enacted in the late 1980s that the growth of government spending was finally curtailed.

The second argument against government debt is that government debt causes economic growth to decline. This happens because if the government borrows, interest rates may rise, so business firms will not borrow as much. Consequently, they do not invest in as much plant and equipment. As a result, the economy does not produce as much and economic growth is lower. This notion has been debated fiercely by economists, and they remain split on whether it is true or not. There continues to be much dispute over how important government debt is for economic growth.

Historically, there have been many negative views of government debt. For example, over 200 years ago, Adam Smith argued that debt has “. . . gradually enfeebled every state which has adopted it” (p. 881). Smith noted that many nations had been ruined financially when they ran up debt: “. . . the enormous debts which . . . oppress, and will in the long-run probably ruin all the great nations of Europe . . .” (p. 863). And when it comes to debt, as David Ricardo put it “That which is wise in an

individual is wise also in a nation” (p. 163), so governments should be no more willing to take on debt than are individuals.

One other argument that is important to consider, concerns the social-security system. The social-security system is set up to provide retirement income to everyone in the country. Wage taxes on those who work are used to provide benefits to retirees. The system works well if there is a balance of worker and retirees, but because of the baby-boom generation, that balance is being tilted. For the first few decades of this century, there will be many more workers than retirees, and the amount of money entering the social-security system will far exceed the outflow. In fact, the extra funds coming into the social-security system are the main source of the government’s overall surplus. But, what will happen later this century when the number of retirees begins to grow dramatically as the baby boomers retire? No one knows for sure, but some groups are certain to bear a high cost—either retirees or taxpayers, perhaps both. Either, the retirement age will be increased or benefits to retirees will be reduced, so that outflows from the social-security fund will be reduced, or taxes on young people will be increased sharply, so the inflows to the funds can keep up with the outflows. Even then, we could have a problem in a few years because the social-security fund invests in—you guessed it—U.S. government bonds. If those shrink in supply, the social-security system may be forced to invest in the bonds issued by corporations, which raises a new danger.

The danger from the social-security system and hence the government investing in financial securities issued by private corporations arises from politics. If the government invested in corporations, there would be tremendous political gamesmanship about choosing the companies the government would invest in. Indeed, when you look at privately run pension funds and compare them to those run by the government, the private funds have much higher returns, because the government-run funds invest inefficiently. This argument is important because it makes a large government surplus undesirable. Taxpayers would be better off investing for themselves rather than through the government.

So, we could face a dilemma. We would be happy if the U.S. government, after thirty years of continuous budget deficits, would finally stop borrowing so much. But the magnitude of the surpluses could be so great that it would cause problems by making the government debt disappear. Is there a solution? Two possibilities seem promising. First, if the debt is disappearing because economic growth is permanently higher, then it may be best to reduce tax rates permanently. That is the approach that led to the cuts in tax rates beginning in 2001. The problem with this solution, of course, is that if the higher economic growth we have had in recent years is just temporary, then we will face higher tax rates in the future. An alternative solution is for the government to mimic what people do in their personal lives—buy durable goods. When people become wealthier, they usually buy durable goods such as houses and cars. When the government becomes wealthier, rather than pay down its debt, it might be better off spending the money on improving the nation’s infrastructure—buildings, highways, schools, sewer systems, and airports. Such expenditures would create benefits for future generations and would offset the payments they would have make on the government debt they inherit.

## Recap

1. The existence of government debt has some value to the private sector.
2. Although balancing the government budget may seem desirable, it may be better for the government to keep some amount of debt and adjust its budget in other ways.

**Additional Question**

If you were a member of Congress, and you believed forecasts that suggest that government surpluses will be large and rising in the future, would you vote to: (a) increase government spending to use up the surpluses; (b) issue tax cuts to reduce government revenues; or (c) pay down the existing government debt? Defend your choice and explain the main arguments in favor of the other choices.

**Answer**

Many answers are possible. If government spending has been underfunded in the past because of financial constraints, then option (a) might be appropriate. If government spending has been at the right level from a cost-benefit standpoint, then option (b) would be sensible. If the ratio of government debt to GDP is high, and there are enough government bonds outstanding to provide for efficiency in financial markets (Hamilton's argument), then paying down some of the debt may be wise.

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