Following the Financial News

The *Wall Street Journal* Forecasting Survey for 2003 (*continued*)

In percent except for dollar vs. yen and dollar vs. euro

	JULY 2002 SURVEY						NEW FORECASTS FOR 2003									
	3-MO. TREASURY BILL-a Dec.	10-YR. TREASURY NOTE Dec.	GDP-b Q1–Q3 2002	CPI-c Nov.	$U.S. vs. YEN Dec.	UNEMPL. Nov.	3-MO. TREASURY BILLS-a June	10-YR. TREASURY NOTE June	GDP-b Q1 2003	GDP-b Q2 2003	GDP-b Q3 2003	GDP-b Q4 2003	CPI-c May	$U.S. vs. YEN June	$U.S. vs. EURO June	UNEMPL. May
Maury Harris, UBS Warburg	2.00	5.00	1.7	2.0	120	5.9	1.60	4.60	**2.5**	4.5	3.5	3.5	2.3	115	1.05	5.7
William B. Hummer, Wayne Hummer Invest.	2.21	5.05	2.2	2.4	119	5.5	1.31	4.14	**2.5**	3.1	3.6	3.8	2.1	125	1.05	5.8
R. Shrouds/R. Fry, DuPont Co.	1.80	5.00	2.9	2.1	110	5.8	1.30	4.50	**2.5**	3.0	3.5	3.5	1.9	128	1.05	6.0
Allen Sinai, Decision Economics Inc.	1.82	4.94	0.8	1.9	123	6.0	1.27	4.17	**2.5**	2.2	2.9	3.2	2.2	135	1.06	6.5
Sung Won Sohn, Wells Fargo & Co.	2.05	5.20	1.8	3.0	115	5.7	1.30	4.40	**2.5**	3.7	3.8	3.8	1.5	125	0.99	5.8
Gary Thayer, A.G. Edwards	2.20	5.60	2.0	1.8	120	5.5	1.40	4.50	**2.5**	3.5	3.0	4.5	2.1	119	1.06	5.7
Mark Zandi, Economy.com	2.20	5.25	1.1	2.2	125	6.0	1.70	4.50	**2.4**	2.7	3.2	3.8	2.2	125	1.00	6.3
R. Berner/D. Greenlaw, Morgan Stanley	2.00	5.30	1.9	2.6	124	5.8	1.50	4.50	**2.3**	3.8	3.9	3.5	1.9	120	1.05	5.9
David Resler, Nomura Securities International	1.90	5.10	3.2	2.4	120	5.9	1.25	4.25	**2.3**	3.0	3.5	3.8	1.8	125	1.04	6.0
Edward Leamer, UCLA Anderson Forecast	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	2.03	4.00	**2.2**	2.3	2.7	3.2	2.4	N.A.	1.10	6.1
David Rosenberg, Merrill Lynch[d]	2.25	5.25	2.3	2.0	125	5.8	1.20	4.00	**2.2**	3.3	3.0	3.5	2.4	125	1.07	6.5
Saul Hymans, RSQE, University of Michigan	2.30	5.30	1.9	2.7	122	5.6	1.72	4.03	**2.1**	4.3	4.2	4.2	2.4	N.A.	N.A.	6.1
Nicholas S. Perna, Perna Associates	2.62	5.53	1.3	2.1	122	5.7	1.47	4.53	**2.1**	3.0	2.9	3.1	2.3	114	1.03	5.5
Richard Yamarone, Argus Research	3.00	5.65	3.1	2.8	128	4.7	1.70	4.60	**2.1**	2.5	3.0	2.5	3.3	128	1.00	5.6
Ram Bhagavatula, The Royal Bank of Scotland	2.45	5.35	3.8	2.4	121	5.4	1.10	3.75	**2.0**	2.8	4.1	4.3	21	127	1.06	6.1
J. Dewey Daane, Vanderbilt University	2.00	5.00	0.8	2.0	121	6.0	1.60	4.50	**2.0**	2.2	2.4	2.6	2.0	118	1.00	5.9
Peter Hooper, Deutsche Bank Securities	2.25	5.40	2.7	2.3	130	5.7	1.75	4.50	**2.0**	4.0	4.0	3.9	1.4	130	1.05	6.1
William T. Wilson, Ernst & Young	2.50	6.25	2.0	2.5	115	5.5	1.60	5.40	**2.0**	5.0	4.0	4.1	1.4	120	1.00	5.6
Robert DiClemente, Citibank SSB	1.90	5.30	2.6	1.9	125	5.8	1.30	4.60	**1.8**	2.7	3.3	4.1	1.9	132	0.93	5.9
Mike Cosgrove, Econoclast	2.00	5.30	2.1	2.3	130	6.0	1.30	4.30	**1.6**	2.9	3.5	4.0	2.4	125	1.00	6.0
William C. Dudley, Goldman Sachs	2.00	5.00	1.5	2.4	132	6.0	1.00	4.20	**1.5**	2.5	3.0	3.5	2.1	120	1.08	6.4
Ethan S. Harris, Lehman Brothers	N.A.	4.85	N.A.	2.2	116	6.1	1.20	4.20	**1.5**	3.0	3.5	4.0	2.3	124	1.07	6.2
Donald H. Straszheim, Straszheim Global Adv.	2.25	5.15	N.A.	1.9	114	5.9	1.40	4.40	**1.0**	2.0	4.0	4.0	2.0	127	1.04	6.1
A. Gary Shilling, A. Gary Shilling & Co.	1.50	4.00	–1.1	0.5	130	6.4	0.75	3.50	**–2.0**	–2.0	2.0	3.0	1.2	130	0.94	7.3
AVERAGE [e]	**2.20**	**5.20**	**2.3**	**2.2**	**122**	**5.8**	**1.41**	**4.42**	**2.7**	**3.2**	**3.7**	**3.7**	**2.2**	**125**	**1.02**	**6.0**
ACTUAL NUMBERS as of Dec. 31, 2002	**1.21**	**3.82**	**3.4**	**2.2**	**119**	**6.0**										

N.A. Not Available; a Treasury bill rates are on a bond-equivalent basis; b Real gross domestic product, average annualized rate for first three quarters, based on January and July surveys; c Year-to-year change in the consumer price index; d David Rosenberg replaces Bruce Steinberg at Merrill Lynch; e Averages are for analysts polled at time of survey

Source: Wall Street Journal, Thursday, January 2, 2003, p. A2.

Application

Money and Interest Rates

The liquidity preference analysis in Figure 11 seems to lead to the conclusion that an increase in the money supply will lower interest rates. This conclusion has important policy implications because it has frequently caused politicians to call for a more rapid growth of the money supply in order to drive down interest rates.

But is this conclusion that money and interest rates should be negatively related correct? Might there be other important factors left out of the liquidity preference analysis in Figure 11 that would reverse this conclusion? We will provide answers to these questions by applying the supply and demand analysis we have used in this chapter to obtain a deeper understanding of the relationship between money and interest rates.

An important criticism of the conclusion that a rise in the money supply lowers interest rates has been raised by Milton Friedman, a Nobel laureate in economics. He acknowledges that the liquidity preference analysis is correct and calls the result—that an increase in the money supply (*everything else*

remaining equal) lowers interest rates—the *liquidity effect*. However, he views the liquidity effect as merely part of the story: An increase in the money supply might not leave "everything else equal" and will have other effects on the economy that may make interest rates rise. If these effects are substantial, it is entirely possible that when the money supply rises, interest rates too may rise.

We have already laid the groundwork to discuss these other effects because we have shown how changes in income, the price level, and expected inflation affect the equilibrium interest rate.

Study Guide

To get further practice with the loanable funds and liquidity preference frameworks, show how the effects discussed here work by drawing the supply and demand diagrams that explain each effect. This exercise will also improve your understanding of the effect of money on interest rates.

1. *Income Effect*. Because an increasing money supply is an expansionary influence on the economy, it should raise national income and wealth. Both the liquidity preference and loanable funds frameworks indicate that interest rates will then rise (see Figures 7 and 10). Thus ***the income effect of an increase in the money supply is a rise in interest rates in response to the higher level of income***.

2. *Price-Level Effect*. An increase in the money supply can also cause the overall price level in the economy to rise. The liquidity preference framework predicts that this will lead to a rise in interest rates. So ***the price-level effect from an increase in the money supply is a rise in interest rates in response to the rise in the price level***.

3. *Expected-Inflation Effect*. The higher inflation rate that results from an increase in the money supply also affects interest rates by affecting the expected inflation rate. Specifically, an increase in the money supply may lead people to expect a higher price level in the future—hence the expected inflation rate will be higher. The loanable funds framework has shown us that this increase in expected inflation will lead to a higher level of interest rates. Therefore, ***the expected-inflation effect of an increase in the money supply is a rise in interest rates in response to the rise in the expected inflation rate***.

At first glance it might appear that the price-level effect and the expected-inflation effect are the same thing. They both indicate that increases in the price level induced by an increase in the money supply will raise interest rates. However, there is a subtle difference between the two, and this is why they are discussed as two separate effects.

Suppose that there is a onetime increase in the money supply today that leads to a rise in prices to a permanently higher level by next year. As the price level rises over the course of this year, the interest rate will rise via the price-level effect. Only at the end of the year, when the price level has risen to its peak, will the price-level effect be at a maximum.

The rising price level will also raise interest rates via the expected-inflation effect, because people will expect that inflation will be higher over the course of the year. However, when the price level stops rising next year, inflation and the expected inflation rate will return to zero. Any rise in interest rates as a result of the earlier rise in expected inflation will then be

reversed. We thus see that in contrast to the price-level effect, which reaches its greatest impact next year, the expected-inflation effect will have its smallest impact (zero impact) next year. The basic difference between the two effects, then, is that the price-level effect remains even after prices have stopped rising, whereas the expected-inflation effect disappears.

An important point is that the expected-inflation effect will persist only as long as the price level continues to rise. As we will see in our discussion of monetary theory in subsequent chapters, a onetime increase in the money supply will not produce a continually rising price level; only a higher rate of money supply growth will. Thus a higher rate of money supply growth is needed if the expected-inflation effect is to persist.

Does a Higher Rate of Growth of the Money Supply Lower Interest Rates?

We can now put together all the effects we have discussed to help us decide whether our analysis supports the politicians who advocate a greater rate of growth of the money supply when they feel that interest rates are too high. Of all the effects, only the liquidity effect indicates that a higher rate of money growth will cause a decline in interest rates. In contrast, the income, price-level, and expected-inflation effects indicate that interest rates will rise when money growth is higher. Which of these effects are largest, and how quickly do they take effect? The answers are critical in determining whether interest rates will rise or fall when money supply growth is increased.

Generally, the liquidity effect from the greater money growth takes effect immediately, because the rising money supply leads to an immediate decline in the equilibrium interest rate. The income and price-level effects take time to work, because it takes time for the increasing money supply to raise the price level and income, which in turn raise interest rates. The expected-inflation effect, which also raises interest rates, can be slow or fast, depending on whether people adjust their expectations of inflation slowly or quickly when the money growth rate is increased.

Three possibilities are outlined in Figure 12; each shows how interest rates respond over time to an increased rate of money supply growth starting at time T. Panel (a) shows a case in which the liquidity effect dominates the other effects so that the interest rate falls from i_1 at time T to a final level of i_2. The liquidity effect operates quickly to lower the interest rate, but as time goes by, the other effects start to reverse some of the decline. Because the liquidity effect is larger than the others, however, the interest rate never rises back to its initial level.

Panel (b) has a smaller liquidity effect than the other effects, with the expected-inflation effect operating slowly because expectations of inflation are slow to adjust upward. Initially, the liquidity effect drives down the interest rate. Then the income, price-level, and expected-inflation effects begin to raise it. Because these effects are dominant, the interest rate eventually rises above its initial level to i_2. In the short run, lower interest rates result from increased money growth, but eventually they end up climbing above the initial level.

Panel (c) has the expected-inflation effect dominating as well as operating rapidly because people quickly raise their expectations of inflation when the rate of money growth increases. The expected-inflation effect begins immediately to overpower the liquidity effect, and the interest rate immediately starts

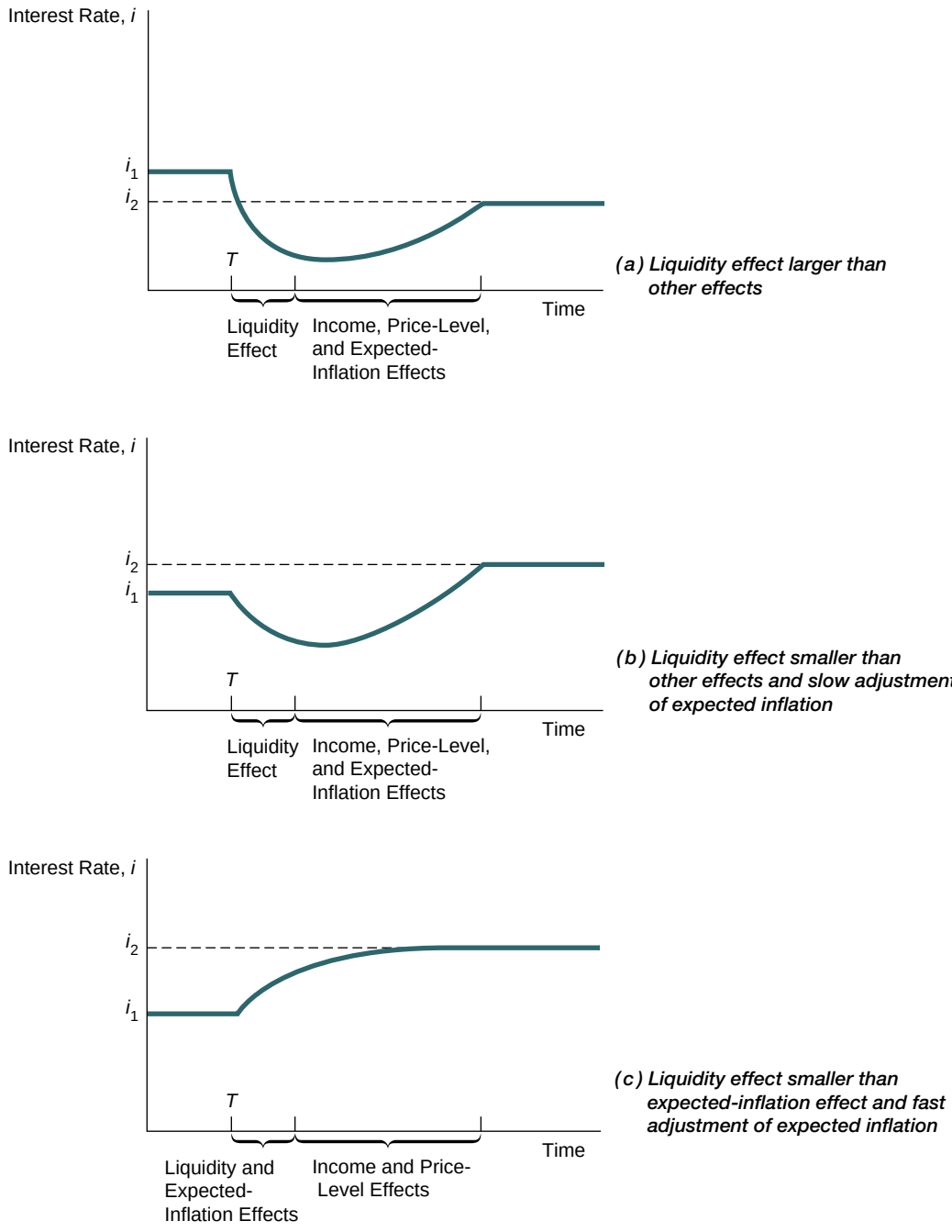

FIGURE 12 Response Over Time to an Increase in Money Supply Growth

to climb. Over time, as the income and price-level effects start to take hold, the interest rate rises even higher, and the eventual outcome is an interest rate that is substantially above the initial interest rate. The result shows clearly that increasing money supply growth is not the answer to reducing interest rates; rather, money growth should be reduced in order to lower interest rates!

An important issue for economic policymakers is which of these three scenarios is closest to reality. If a decline in interest rates is desired, then an increase in money supply growth is called for when the liquidity effect dominates the other effects, as in panel (a). A decrease in money growth is appropriate if the other effects dominate the liquidity effect and expectations of inflation adjust rapidly, as in panel (c). If the other effects dominate the liquidity effect but expectations of inflation adjust only slowly, as in panel (b), then whether you want to increase or decrease money growth depends on whether you care more about what happens in the short run or the long run.

Which scenario is supported by the evidence? The relationship of interest rates and money growth from 1950 to 2002 is plotted in Figure 13. When the rate of money supply growth began to climb in the mid-1960s, interest rates rose, indicating that the liquidity effect was dominated by the price-level, income, and expected-inflation effects. By the 1970s, interest rates reached

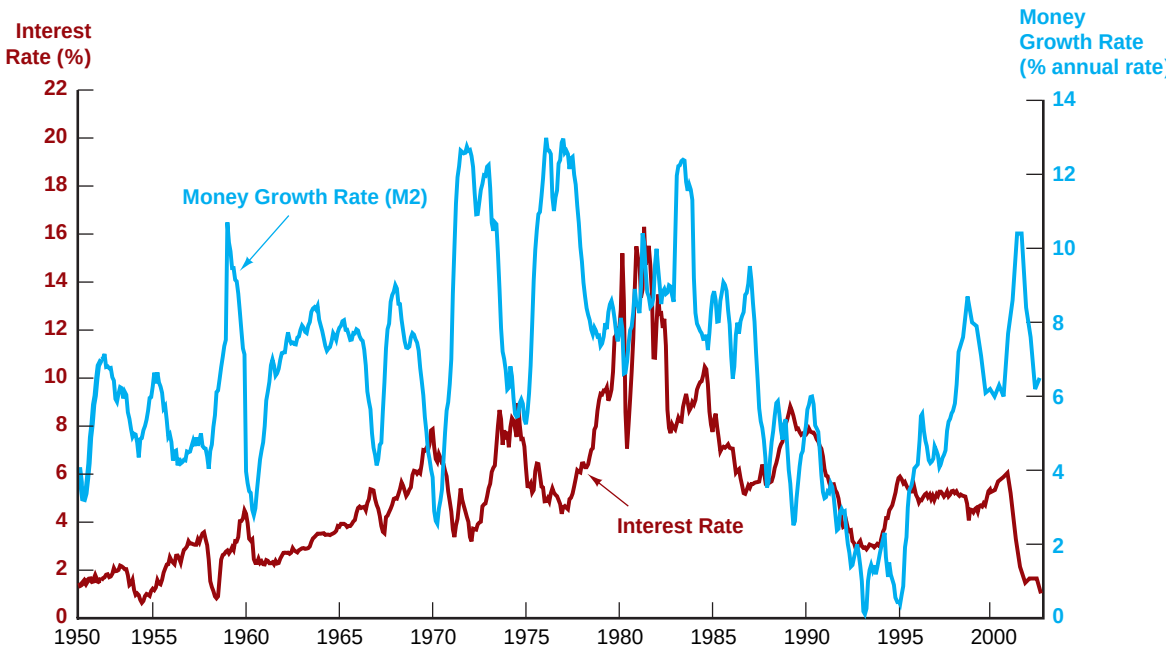

FIGURE 13 Money Growth (M2, Annual Rate) and Interest Rates (Three-Month Treasury Bills), 1950–2002

Sources: Federal Reserve: www.federalreserve.gov/releases/h6/hist/h6hist1.txt.

levels unprecedented in the post-World War II period, as did the rate of money supply growth.

The scenario depicted in panel (a) of Figure 12 seems doubtful, and the case for lowering interest rates by raising the rate of money growth is much weakened. Looking back at Figure 6, which shows the relationship between interest rates and expected inflation, you should not find this too surprising. The rise in the rate of money supply growth in the 1960s and 1970s is matched by a large rise in expected inflation, which would lead us to predict that the expected-inflation effect would be dominant. It is the most plausible explanation for why interest rates rose in the face of higher money growth. However, Figure 13 does not really tell us which one of the two scenarios, panel (b) or panel (c) of Figure 12, is more accurate. It depends critically on how fast people's expectations about inflation adjust. However, recent research using more sophisticated methods than just looking at a graph like Figure 13 do indicate that increased money growth temporarily lowers short-term interest rates.[7]

[7]See Lawrence J. Christiano and Martin Eichenbaum, "Identification and the Liquidity Effect of a Monetary Policy Shock," in *Business Cycles, Growth, and Political Economy,* ed. Alex Cukierman, Zvi Hercowitz, and Leonardo Leiderman (Cambridge, Mass.: MIT Press, 1992), pp. 335–370; Eric M. Leeper and David B. Gordon, "In Search of the Liquidity Effect," *Journal of Monetary Economics* 29 (1992): 341–370; Steven Strongin, "The Identification of Monetary Policy Disturbances: Explaining the Liquidity Puzzle," *Journal of Monetary Economics* 35 (1995): 463–497; Adrian Pagan and John C. Robertson, "Resolving the Liquidity Effect," *Federal Reserve Bank of St. Louis Review* 77 (May-June 1995): 33–54; and Ben S. Bernanke and Ilian Mihov, "Measuring Monetary Policy," *Quarterly Journal of Economics* 113, 3 (August 1998), pp. 869–902.

Summary

1. The theory of asset demand tells us that the quantity demanded of an asset is (a) positively related to wealth, (b) positively related to the expected return on the asset relative to alternative assets, (c) negatively related to the riskiness of the asset relative to alternative assets, and (d) positively related to the liquidity of the asset relative to alternative assets.
2. The supply and demand analysis for bonds, frequently referred to as the loanable funds framework, provides one theory of how interest rates are determined. It predicts that interest rates will change when there is a change in demand because of changes in income (or wealth), expected returns, risk, or liquidity or when there is a change in supply because of changes in the attractiveness of investment opportunities, the real cost of borrowing, or government activities.
3. An alternative theory of how interest rates are determined is provided by the liquidity preference framework, which analyzes the supply of and demand for money. It shows that interest rates will change when there is a change in the demand for money because of changes in income or the price level or when there is a change in the supply of money.
4. There are four possible effects of an increase in the money supply on interest rates: the liquidity effect, the income effect, the price-level effect, and the expected-inflation effect. The liquidity effect indicates that a rise in money supply growth will lead to a decline in interest rates; the other effects work in the opposite direction. The evidence seems to indicate that the income, price-level, and expected-inflation effects dominate the liquidity effect such that an increase in money supply growth leads to higher rather than lower interest rates.

Key Terms

asset market approach, p. 93
demand curve, p. 87
expected return, p. 86
excess demand, p. 90
excess supply, p. 90
Fisher effect, p. 100
liquidity, p. 86
liquidity preference framework, p. 105
loanable funds, p. 92
loanable funds framework, p. 92
market equilibrium, p. 90
opportunity cost, p. 106
risk, p. 86
supply curve, p. 90
theory of asset demand, p. 87
wealth, p. 86

Questions and Problems

Questions marked with an asterisk are answered at the end of the book in an appendix, "Answers to Selected Questions and Problems."

1. Explain why you would be more or less willing to buy a share of Microsoft stock in the following situations:
   a. Your wealth falls.
   b. You expect the stock to appreciate in value.
   c. The bond market becomes more liquid.
   d. You expect gold to appreciate in value.
   e. Prices in the bond market become more volatile.

*2. Explain why you would be more or less willing to buy a house under the following circumstances:
   a. You just inherited $100,000.
   b. Real estate commissions fall from 6% of the sales price to 5% of the sales price.
   c. You expect Microsoft stock to double in value next year.
   d. Prices in the stock market become more volatile.
   e. You expect housing prices to fall.

3. Explain why you would be more or less willing to buy gold under the following circumstances:
   a. Gold again becomes acceptable as a medium of exchange.
   b. Prices in the gold market become more volatile.
   c. You expect inflation to rise, and gold prices tend to move with the aggregate price level.
   d. You expect interest rates to rise.

*4. Explain why you would be more or less willing to buy long-term AT&T bonds under the following circumstances:
   a. Trading in these bonds increases, making them easier to sell.
   b. You expect a bear market in stocks (stock prices are expected to decline).
   c. Brokerage commissions on stocks fall.
   d. You expect interest rates to rise.
   e. Brokerage commissions on bonds fall.

5. What would happen to the demand for Rembrandts if the stock market undergoes a boom? Why?

Answer each question by drawing the appropriate supply and demand diagrams.

*6. An important way in which the Federal Reserve decreases the money supply is by selling bonds to the public. Using a supply and demand analysis for bonds, show what effect this action has on interest rates. Is your answer consistent with what you would expect to find with the liquidity preference framework?

7. Using both the liquidity preference framework and supply and demand for bonds framework, show why interest rates are procyclical (rising when the economy is expanding and falling during recessions).

*8. Why should a rise in the price level (but not in expected inflation) cause interest rates to rise when the nominal money supply is fixed?

9. Find the "Credit Markets" column in the *Wall Street Journal*. Underline the statements in the column that explain bond price movements, and draw the appropriate supply and demand diagrams that support these statements.

10. What effect will a sudden increase in the volatility of gold prices have on interest rates?

*11. How might a sudden increase in people's expectations of future real estate prices affect interest rates?

12. Explain what effect a large federal deficit might have on interest rates.

*13. Using both the supply and demand for bonds and liquidity preference frameworks, show what the effect is on interest rates when the riskiness of bonds rises. Are the results the same in the two frameworks?

14. If the price level falls next year, remaining fixed thereafter, and the money supply is fixed, what is likely to happen to interest rates over the next two years? (*Hint:* Take account of both the price-level effect and the expected-inflation effect.)

*15. Will there be an effect on interest rates if brokerage commissions on stocks fall? Explain your answer.

Using Economic Analysis to Predict the Future

16. The president of the United States announces in a press conference that he will fight the higher inflation rate with a new anti-inflation program. Predict what will happen to interest rates if the public believes him.

*17. The chairman of the Fed announces that interest rates will rise sharply next year, and the market believes him. What will happen to today's interest rate on AT&T bonds, such as the $8\frac{1}{8}$s of 2022?

18. Predict what will happen to interest rates if the public suddenly expects a large increase in stock prices.

*19. Predict what will happen to interest rates if prices in the bond market become more volatile.

20. If the next chair of the Federal Reserve Board has a reputation for advocating an even slower rate of money growth than the current chair, what will happen to interest rates? Discuss the possible resulting situations.

Web Exercises

1. One of the largest single influences on the level of interest rates is inflation. There are a number of sites that report inflation over time. Go to ftp://ftp.bls.gov/pub/special.requests/cpi/cpiai.txt and review the data available. Note that the last columns report various averages. Move this data into a spreadsheet using the method discussed in the Web exploration at the end of Chapter 1. What has the average rate of inflation been since 1950, 1960, 1970, 1980, and 1990? What year had the lowest level of inflation? What year had the highest level of inflation?

2. Increasing prices erodes the purchasing power of the dollar. It is interesting to compute what goods would have cost at some point in the past after adjusting for inflation. Go to www.interest.com/hugh/calc/cpi.cgi. What would a car that cost $22,000 today have cost the year that you were born?

3. One of the points made in this chapter is that inflation erodes investment returns. Go to www.src-net.com/InvestmentMultiplier/iminflation.htm and review how changes in inflation alter your real return. What happens to the difference between the adjusted value of an investment compared to its inflation-adjusted value as:
   a. Inflation increases?
   b. The investment horizon lengthens?
   c. Expected returns increase?