Chapter 1

1. Although the Federal Reserve does not control any of the monetary aggregates directly, it can influence their behavior by setting the terms for providing reserves and currency. It has often been argued that the Federal Reserve could control a group of liabilities on its balance sheet, specifically what is called the monetary base, or sometimes high-powered money or outside money. The monetary base is defined in the box on p. 10. Originally, those in favor of controlling the monetary base argued that it represented government-issued money and it formed the basis of the other monetary aggregates. The linkages from the base to other measures were through a combination of specified reserve requirement ratios and normal business practices of depository institutions and the public. Currently, the linkages are not very strong, in part because a significant portion of deposits are free of reserve requirements.

   The Federal Reserve would have difficulty controlling the monetary base directly without major institutional changes. Currency is provided to banks on demand; therefore, any attempt to offset such provision could make reserves highly variable and deposits unstable. In addition, commercial banks can borrow reserves at the discount window. This option gives them the means to offset deliberate reserve adjustments by the Federal Reserve, further contributing to potential difficulties in controlling the monetary base.

2. The Federal Reserve does announce an annual monitoring range for a particular measure of credit market debt, that of the domestic nonfinancial sectors, defined in the box on p. 10.

   Lenders make credit available at a variety of interest rates, which are only loosely linked to the rates that the Federal Reserve can control.

3. See, for instance, Thomas Mayer, James S. Duesenberry, and Robert Z. Aliber, *Money, Banking, and the Economy*, 4th ed. (New York: W.W. Norton and Co., 1990), 4.

4. Even when the underlying conditions are stable, the demand for money will vary considerably from day to day and week to week in response to seasonal and institutional payment conventions. The Federal Reserve attempts to sort out these effects and accommodate the short-run changes in money demand without compromising its ability to achieve long-term goals.

5. See Richard G. Anderson and Robert H. Rasche, "A Revised Measure of the St. Louis Adjusted Monetary Base," Federal Reserve Bank of St. Louis *Review* 78, no. 2 (March-April 1996): 3-13.

6. The effects of these funds on the behavior of M2 were discussed in the report submitted to the Congress on July 20, 1993, pursuant to the Full Employment and Balanced Growth Act of 1978. See Board of Governors of the Federal Reserve System, "Monetary Policy Report to the Congress," Federal Reserve *Bulletin* 79, no. 9 (September 1993): 843. These measures are also discussed in Sean Collins and Cheryl L. Edwards, "An Alternative Monetary Aggregate: M2 Plus Household Holdings of Bond and Equity Mutual Funds," Federal Reserve Bank of St. Louis *Review* 76, no. 6 (November-December 1994): 7-29.

7. See Board of Governors of the Federal Reserve System, "Announcements," Federal Reserve *Bulletin* 77, no. 2 (February 1991): 95-6, and Federal Reserve *Bulletin* 78, no. 4 (April 1992): 272-3

Chapter 2

1. This chapter draws heavily from policy records of the various Open Market Committees, annual reports prepared by the open market function of the Federal Reserve Bank of New York, and Milton Friedman and Anna Jacobson Schwartz, *A Monetary History of the United States*, 1867-1960 (Princeton: Princeton University Press, 1963).

   The first three sections make extensive use of W. Randolph Burgess, *The Reserve Banks and the Money Market* (New York: Harper and Brothers, 1936); and House Committee on Banking and Currency, Subcommittee on Domestic Finance, *Federal Reserve Structure and the Development of Monetary Policy: 1915-1935*, 92d Cong., 1st sess., December 1971.

2. Richard H. Timberlake, *Monetary Policy in the United States: An Intellectual and Institutional History* (Chicago: University of Chicago Press, 1993), 1-50.

3. Timberlake, *Monetary Policy in the United States*, 65-83, 104-7, and 183-97.

4. Friedman and Schwartz, *Monetary History of the United States*, 156-68.

5. Timberlake, *Monetary Policy in the United States*, 183-213.

6. Jeffrey A. Miron, "Financial Panics, the Seasonality of the Nominal Interest Rate, and the Founding of the Fed," *American Economic Review* 76, no. 1 (March 1986): 125-40.

7. Henry Parker Willis, *The Federal Reserve System* (New York: Ronald Press Co., 1923), 894-5.

8. The Second Liberty Loan Act authorized the Treasury to issue certificates of indebtedness, which were short-term coupon instruments with maturities of one year or less to be sold in anticipation of tax receipts or issuance of Treasury notes or bonds. These securities were issued from 1917 through 1934, December 1941 through April 1964, and January 1966 through July 1967, and were then discontinued. In 1917, certificates of indebtedness were the only short-term Treasury instrument; Treasury bills were not introduced until 1929.

9. Federal Reserve Board, *4th Annual Report of the Federal Reserve Board Covering Operations for the Year 1917* (1918), 2-4.

10. Willis, *Federal Reserve System*, 1115-8.

11. Leland Crabbe, "The International Gold Standard and U.S. Monetary Policy from World War I to the New Deal," *Federal Reserve Bulletin* 75, no. 6 (June 1989): 423-40; Marvin Goodfriend, "Central Banking under the Gold Standard," Federal Reserve Bank of Richmond Working Paper no. 88-5, 1988.

12. The Federal Reserve Board's *10th Annual Report*, released in February 1924, sets out the Board's view of policy.

13. Benjamin Strong, "Federal Reserve Control of Credit" (address delivered before students of the graduate college, Harvard University, Cambridge, Massachusetts, November 28, 1922); reprint, Federal Reserve Bank of New York *Quarterly Review*, Special 75th Anniversary Issue, May 1989: 6-14.

14. From 1926 to 1928, Congress contemplated legislation that would direct the Federal Reserve to keep prices steady, legislation that the Federal Reserve spokesmen generally opposed. The testimony by various Federal Reserve officials and academic economists revealed the range of thinking at the time. For more information, see Robert L. Hetzel, "The Rules versus Discretion Debate over Monetary Policy in the 1920s," Federal Reserve Bank of Richmond *Economic Review* 71, no. 6 (November-December 1985): 3-14.

15. The Committee members were kept informed of developments affecting the System Account through written reports prepared in the open market operations area of the Federal Reserve Bank of New York. These reports described reserve and money market conditions, trading desk operations, and weekly lending patterns of large banks and provided background information on other securities markets. They were prepared at the end of each statement period and before each Committee meeting. The reports, with modifications, are still prepared today.

16. Once the Banking Act of 1935 proscribed such direct Federal Reserve loans to the Treasury, the Federal Reserve regarded temporary sales as having been ruled out as well. Burgess, *Reserve Banks*, 117.

17. S.E. Harris, T*wenty Years of Federal Reserve Policy* (Cambridge: Harvard University Press, 1933), 147-54.

18. The New York Fed did not violate the leeway provision because it booked only $25 million of the securities purchased to the System special investment account. It booked the rest to the Bank's own account, a practice that was permitted until 1935. During the week ended October 30, discount window borrowing rose $195 million, to $991 million.

    Outright holdings of BAs rose to $320 million, about $100 million above month-earlier levels. RPs on Treasuries and BAs dropped slightly over the month, to $85 million.

19. George W. Norris, statement by Governor Norris, minutes of the OMPC meeting, September 1930.

20. Most OMPC members were bankers who subscribed to the real bills view. They apparently did not understand the contractionary mechanism at work during the banking crises, even though the linkages had been understood at the New York Fed for some time.

    Governor Strong had testified before a congressional committee in 1926 on the power of open market operations (Hetzel, "Rules versus Discretion Debate"). Strong had described the expansion side of the mechanism in detail, explaining how an increase in reserves leads over time to a multiple increase in deposits. He noted that a drain of currency would reduce the expansionary potential of an increase in reserves. This was the same mechanism through which the stepped-up currency withdrawals were depriving the bank of needed reserves and causing a serious contraction of deposits during the banking crises.

21. The literature analyzing this period debates whether the requirement for gold collateral against currency forced the Federal Reserve's

hand. Most writers have argued that it was not really a binding constraint. See David C. Wheelock, "The Fed's Failure to Act as Lender of Last Resort during the Great Depression, 1929-1933," in *Papers and Proceedings of the Conference on Bank Structure and Competition* (Federal Reserve Bank of Chicago, May 1989), 154-69.

22. Board of Governors of the Federal Reserve System, minutes of the joint meeting of the Federal Reserve Board and the OMPC, April 1932.

23. Burgess, *Reserve Banks*, 65.

24. In 1936 and 1937, the System's holdings of longer term debt were increased, while short-term debt holdings fell (Table 1).

25. Board of Governors of the Federal Reserve System, *24th Annual Report of the Board of Governors of the Federal Reserve System* (1938), 7.

26. Board of Governors of the Federal Reserve System, *26th Annual Report of the Board of Governors of the Federal Reserve System* (1939), and *27th Annual Report of the Board of Governors of the Federal Reserve System* (1940).

27. Friedman and Schwartz, *Monetary History of the United States*, 563.

28. This section and those that follow draw heavily from Ann-Marie Meulendyke, "A Review of Federal Reserve Policy Targets and Operating Guides in Recent Decades," Federal Reserve Bank of New York *Quarterly Review* 13, no. 3 (autumn 1988): 6-17, and "Reserve Requirements and the Discount Window in Recent Decades," Federal Reserve Bank of New York *Quarterly Review* 17, no. 3 (autumn 1992): 25-43.

29. Allan Sproul, who participated in the negotiations as President of the Federal Reserve Bank of New York, offered an interesting commentary on the process in "The 'Accord'—A Landmark in the First Fifty Years of the Federal Reserve System," Federal Reserve Bank of New York *Monthly Review*, November 1964; reprint, Lawrence S. Ritter, ed., *Selected Papers of Allan Sproul* (Federal Reserve Bank of New York, December 1980).

30. Federal Open Market Committee, Federal Reserve System, "Federal Open Market Committee Report of Ad Hoc Subcommittee on the Government Securities Market," 1952; reprint, House Committee on Banking and Currency, *The Federal Reserve System after Fifty Years: Hearings before the Subcommittee on Domestic Finance*, vol. 3, 88th Cong., 2d sess. (Washington, D.C.: U.S. Government Printing Office, 1964), 2005-55.

31. Although it ended its routine support of interest rates in 1953, the Federal Reserve followed a so-called even-keel policy during Treasury financing periods until the early 1970s. In the 1950s and 1960s, most Treasury coupon securities were sold as fixed-price offerings. Around the financing periods, the Fed avoided changes in policy stance and tried to prevent changes in money market conditions. Major financing operations occurred four times a year, around the middle of each quarter, but extra unscheduled financing operations occurred when the Treasury found itself short of money. In the 1970s, debt issuance was put on a regular cycle on the recommendation of Treasury Secretary William Simon, and coupon issues were generally sold at auction.

32. During the subcommittee hearings, several dealers had objected to the technique used by the Trading Desk to arrange an open market operation at its own initiative. The Desk, on a rotating basis, had chosen one of a group of ten recognized dealers as a broker or agent to handle its orders in the market. The dealers that were not part of that group complained that they were unfairly excluded from dealings with the Federal Reserve. Those in the group were dissatisfied because they could not transact business with the Fed for their own portfolios at times when they served as agent.

33. Free reserves are referred to as net borrowed reserves when borrowed reserves are greater than excess reserves. (Descriptions of the various measures of reserves appear in Chapter 6, Box A.)

34. At that time, the Trading Desk was not authorized to modify its policy stance between meetings without receiving additional instructions from the Committee. The Executive Committee of the FOMC met frequently—generally every two weeks through the middle of 1955. Subsequently, the full Committee met every three weeks and sometimes had telephone meetings between regular meetings.

35. See [Peter D. Sternlight], "The Significance and Limitations of Free Reserves," Federal Reserve Bank of New York *Monthly Review* 40, no. 11 (November 1958): 162-7, and "Free Reserves and Bank Reserve Management," Federal Reserve Bank of Kansas City *Monthly Review*, November 1961: 10-16. A critique of free reserves and a survey of the literature

is provided by A. James Meigs, *Free Reserves and the Money Supply* (Chicago: University of Chicago Press, 1962).

36. Until 1968, maintenance periods were one week long for reserve city banks (member banks with offices located in cities with Federal Reserve Banks or branches) and two weeks long for country banks (all other member banks). Computation and maintenance periods were essentially contemporaneous. In 1968, the Board of Governors adopted a system of lagged reserve accounting, under which reserve requirements were based on average deposit levels from two weeks earlier, with all member banks settling weekly. The change made it easier to hit free reserve targets—ironically, shortly before free reserve targeting ended.

37. The daily conference call was introduced in 1954.

38. Federal Reserve Bank of New York, "Open Market Operations and Changes in Operating Procedures during 1954," report prepared for the Federal Open Market Committee, 1955, 18. The report went on to say that the introduction of outright operations for same-day "cash" settlement reduced the need for RPs.

39. Governor Robertson was particularly troubled by the practice at the time of lending through RPs only to nonbank dealers and at rates below the discount rate. Board of Governors of the Federal Reserve System, *48th Annual Report of the Board of Governors of the Federal Reserve System* (1961), 47-9.

40. Federal Reserve Bank of New York, "Open Market Operations during 1966," report prepared for the Federal Open Market Committee, 1967, 52-4.

41. There had been interbank exchanges of Federal Reserve funds (or Federal funds, as they came to be called) as early as the 1920s; at that time, trades were mostly negotiated directly between two banks rather than through brokers. Burgess, *Reserve Banks*, 152. For further discussion of the expansion of the market in the 1960s, see Mark H. Willes, "Federal Funds during Tight Money," Federal Reserve Bank of Philadelphia *Business Review*, November 1967: 3-11, and "Federal Funds and Country Bank Reserve Management," Federal Reserve Bank of Philadelphia *Business Review*, September 1963: 3-8.

42. Summarized in Federal Open Market Committee, Federal Reserve System, "Records of Policy Action," reports prepared for the February 7, 1961, and March 7, 1961 meetings; reprint, Board of Governors of the Federal Reserve System, *48th Annual Report of the Board of Governors of the Federal Reserve System, Covering Operations for the Year 1961* (1962), 37-46.

43. James Tobin, *The New Economics One Decade Older* (Princeton: Princeton University Press, 1972), 32-4. Tobin indicates that after the first few months of 1961, the Treasury became concerned that the average maturity of the debt was too short and sought to lengthen it, thus offsetting the Desk's efforts to shorten the maturity of debt in the public's hands.

44. Coupon operations were described as "a relatively marginal factor at least over any extended period of time" in Federal Reserve Bank of New York, "Open Market Operations during 1967," report prepared for the Federal Open Market Committee, 1968, 12.

45. Logically, the bank credit proxy, which represented most of the liability side of the banks' balance sheets, should have moved in a similar fashion to bank credit, which was a large share of the asset side of their balance sheets. But the two measures often differed, primarily because of the growing use of nondeposit liabilities to finance credit extension. In 1969, the definition of the bank credit proxy was expanded to include liabilities to foreign branches, the largest nondeposit liability. Nonetheless, the proxy continued to deviate from bank credit when reserve ratio changes made bank assets and liabilities diverge.

46. During the next few years, the government imposed a variety of wage-price controls, which had the effect of creating shortages and distorting various price indices. It also created a Committee on Interest and Dividends; it restricted interest rate increases and thus distorted financial market activities.

47. The Treasury's experiences with managing its debt are discussed in Charles C. Baker Jr., "The Basis and Practice of Treasury Debt Management," in Michael P. Dooley, Herbert M. Kaufman, and Raymond E. Lombra, eds., *The Political Economy of Policy-Making, Essays in Honor of Will E. Mason* (Beverly Hills, Calif.: Sage Publications, 1979), 175-218.

48. Federal Reserve Bank of New York, "Monetary Policy and Open Market Operations during 1992," Federal Reserve Bank of New York *Quarterly Review*, spring 1993: 107-8.

49. Joanna Frodin Robinson, "A New Look at Costs and Benefits of Membership in the Federal Reserve System" (Ph.D. diss., University of Connecticut, 1976).

50. Meulendyke, "Reserve Requirements and the Discount Window," 39.

51. At the time, Ml consisted of currency and privately held demand deposits at commercial banks. Other checkable deposits at commercial banks and transaction deposits at thrift institutions were added to the definition in 1980. M2 consisted of M1 plus time and savings deposits other than large CDs at commercial banks. Thrift institution deposits, overnight RPs, Eurodollars, and money market funds were not included until 1980.

52. Government deposits at the time were relatively large and variable. All tax and loan account monies kept in commercial banks were subject to reserve requirements until 1977, when a legal change introduced note option accounts that pay interest and are not subject to reserve requirements.

53. Chapters 6 and 7 describe the various policy tools and how they affect reserves.

54. The Depository Institutions Deregulation and Monetary Control Act (MCA) of 1980—described more extensively later in the chapter—extended reserve requirements to a wider array of depository institutions and mandated a flatter reserve requirement structure for transaction deposits. The new structure was phased in gradually, over a four-year period for member banks and a seven-year period for nonmember depository institutions, so it provided only limited assistance to the forecasting process between 1979 and 1982.

55. The Board of Governors staff made estimates of consistent combinations of borrowed reserves and money growth for the given discount rate. The estimates were derived from modified versions of money demand models and borrowed reserve equations.

56. At the time, reserve requirements were based upon deposit levels from two weeks earlier, as they had been since 1968. This arrangement had the advantage of making reserve requirement levels known to forecasters but the disadvantage of forcing all of the adjustment to changes in nonborrowed reserves into borrowed reserves. Even if banks and their customers promptly adjusted their deposit levels in response to a change in reserve availability, they could not change required reserve levels until two weeks later, thus prolonging the adjustment to the new reserve availability.

    Concerns about this delay led the Fed to review reserve requirement computation and holding periods. The Board decided in 1982 to adopt what has been referred to as quasi-contemporaneous reserve ratios, under which the reserve computation period was two weeks long ending every other Monday, while the reserve maintenance period was the two weeks ending two days later. To give banks time to prepare, the new system was not implemented until February 1984.

57. The scope for adjusting excess reserves was very limited since banks at the time held only minimal levels of excess reserves, generally in a $200 million to $300 million range in 1979. Excess reserves grew gradually as MCA extended to nonmember depositories, but those institutions did not have much flexibility to reduce their excess reserve positions. The relationships among reserve measures and the effects of these measures on bank behavior and monetary growth are discussed more extensively in Chapter 6.

58. Dana Johnson, "Interest Rate Variability under the New Operating Procedures and the Initial Response in Financial Markets," in *New Monetary Control Procedures*, vol. 1 (Board of Governors of the Federal Reserve System, February 1981).

59. The new structure of reserve requirements and a schedule for the transition were specified in the act.

60. For a review of the borrowed reserves operating procedures and a comparison with the earlier nonborrowed reserves procedures, see Henry C. Wallich, "Recent Techniques of Monetary Policy," Federal Reserve Bank of Kansas City *Economic Review* 69, no. 5 (May 1984): 21-30; and Brian F. Madigan and Warren T. Trepeta, "Implementation of U.S. Monetary Policy," in *Changes in Money Market Instruments and Procedures: Objectives and Implications* (Bank for International Settlements, March 1986).

61. The Desk drained the excess reserves created as a result of the borrowing by reducing its holdings of Treasury bills. Thereafter, the FOMC sought to build up the bill portion of the portfolio to give it ample liquidity to handle larger potential crises. Chapter 7 describes liquidity and other portfolio structure issues.

Chapter 3

1. Congress passed legislation in 1994 requiring states to permit interstate banking. The same legislation allows interstate branching, at the states' prerogative, as of June 1, 1997.

2. The figures for the United Kingdom are for the end of 1995 and are drawn from Bank for International Settlements, *Statistics on Payment Systems in the Group of Ten Countries* (Basle, Switzerland, December 1996), 104.

3. Credit unions provide services similar to those offered by thrift institutions; their clientele typically consists of members of affinity groups, such as employees of a particular corporation or members of a union.

4. Although credit unions outnumbered commercial banks by about 2,000 at the end of 1995, commercial banks held ten times more assets.

5. Federal Reserve Bank of New York, "Large-Dollar Payment Flows from New York," Federal Reserve Bank of New York *Quarterly Review* 12, no. 4 (winter 1987-88): 6-13.

6. In June 1988, the Supreme Court allowed the Federal Reserve to authorize underwriting of commercial paper, municipal bonds, and mortgage-backed and consumer debt-backed securities by bank affiliates. Since June 1989, the Federal Reserve has allowed some commercial bank holding companies to underwrite corporate bonds through separate subsidiaries. For more discussion, see R. Glenn Hubbard, *Money, the Financial System, and the Economy* (Reading, Mass.: Addison-Wesley, 1995).

7. Interest on demand deposits, the only type of checkable deposit that may be offered to commercial customers, is currently still prohibited. While banks can pay implicit interest in the form of services, they are not anxious to encourage the use of demand deposits because these deposits are still subject to reserve requirements.

8. John Boyd and Mark Gertler, "Are Banks Dead? Or, Are the Reports Greatly Exaggerated?" in *Proceedings of a Conference on Bank Structure and Competition* (Federal Reserve Bank of Chicago, 1994), 85-117.

9. The G-10 countries are Belgium, Canada, France, Germany, Italy, Japan, the Netherlands, Sweden, the United Kingdom, and the United States.

10. This comparison accounts for inflation over the period by valuing 1980 assets in 1996 dollars.

11. Allen N. Berger, Anil K. Kashyap, and Joseph M. Scalise, "The Transformation of the U.S. Banking Industry: What a Long, Strange Trip It's Been," *Brookings Papers on Economic Activity*, no. 2 (1995). This share includes onshore lending (by agencies and branches of foreign banks operating in the United States) and offshore lending (direct loans to U.S. corporations by foreign banks in their home countries and loans booked offshore that are arranged by U.S. agencies and branches of foreign banks). Excluded are loans by U.S.-chartered subsidiaries of foreign banks.

12. In 1992, the Board of Governors of the Federal Reserve System allowed banks to market mutual funds that the banks also advised. For details, see Phillip R. Mack, "Recent Trends in the Mutual Fund Industry," *Federal Reserve Bulletin* 79, no. 11 (November 1993): 1001-12.

13. The rest of this section focuses on the diversified business of commercial banking, although some of the discussion could be applied to thrift institutions. Because thrifts specialize in consumer deposit-taking and real estate loans, their risk exposures and strategies for managing risk differ from those of commercial banks.

14. Other risks include legal (risks associated with contract uncertainty) and operational (risks associated with the failure of operating systems such as computerized accounting systems).

15. The existence of a legal ceiling on U.S. Treasury debt issuance means that the Treasury could run out of borrowing authority when the government is running a deficit if the ceiling were not raised in a timely fashion. Periodically, legislation to raise the ceiling has been held hostage during disputes between the Congress and the President. So far, the Treasury has found ways to avoid default through a range of techniques, such as leaving Treasury trust funds uninvested. Treasury debt generally trades with no allowance for default risk.

16. Some banks also face risks associated with changes in equity and commodity prices.

17. Duration is a more sophisticated measure than simple repricing gap measures for assessing interest rate mismatches in that it takes into account the timing of the cash flows involved. Duration weights the present value of annual cash flows by their term to maturity so that near-term payments get proportionally greater weight and work to shorten the duration of an instrument compared with its nominal maturity. Thus, a loan that pays interest and principal monthly always has a

shorter duration than its maturity, while duration and maturity are identical for loans that pay both interest and principal only at maturity. The duration concept is discussed extensively in Gerald O. Bierwag, *Duration Analysis* (Cambridge, Mass.: Ballinger Publishing Company, 1987). For a discussion of the duration concept and its use in measurement of interest rate risk at banks, see James V. Houpt and James A. Embersit, "A Method for Evaluating Interest Rate Risk in U.S. Commercial Banks," Federal Reserve *Bulletin* 77, no. 8 (August 1991).

18. For a discussion of banks' use of derivatives, see Franklin R. Edwards and Frederic S. Mishkin, "The Decline of Traditional Banking: Implications for Financial Stability and Regulatory Policy," Federal Reserve Bank of New York *Economic Policy Review* 1, no. 2 (1995): 27-45.

19. This section benefited from helpful comments by Maureen Lee and Robert Clinton of Morgan Guaranty Trust Company and James Paterson of Chase Manhattan Bank.

20. A detailed description of reserve measures and accounting techniques appears in Chapter 6, Box A.

21. Recent developments in reserves and their effects on policy implementation are discussed more extensively in Chapter 6.

22. Eurodollar transactions are occasionally settled over Fedwire if both parties agree.

23. If a bank is in financial difficulty or has often exceeded its overdraft guidelines, it may not be permitted to run daylight overdrafts. For such a bank, its position will be monitored and transfer requests will be honored only when the bank has sufficient funds to avoid overdrafts.

24. The fee reflects an annual rate of 24 basis points using a standard ten-hour day for Fedwire operations. The charge is made on all end-of-minute overdrafts in excess of a deductible based on 10 percent of a bank's capital. See Board of Governors of the Federal Reserve System, *Overview of the Federal Reserve's Payments System Risk Policy* (1993), which describes the calculation in detail.

25. See Federal Reserve Bank of New York, "Monetary Policy and Open Market Operations during 1994," *Annual Report, 1994* (1995), 31-3.

Chapter 4

1. This chapter draws on the following sources: Marcia Stigum, *The Money Market*, rev. ed. (Homewood, Ill.: Dow Jones-Irwin, l990); Timothy Q. Cook and Timothy D. Rowe, eds., *Instruments of the Money Market*, 7th ed. (Federal Reserve Bank of Richmond, 1993); and First Boston Corporation, *Handbook of Securities of the United States Government and Federal Agencies, and Related Money Market Instruments* (July 1990).

2. Lawrence DiTore of Prebon Yamane and James Paterson of Chase Manhattan Bank provided helpful information for this section.

3. The various reserve concepts are described in Chapter 6, Box A.

4. The other eligible participants in the Federal funds market are some federally sponsored agencies, including the Federal Home Loan Banks, the Federal National Mortgage Association, and the Federal Home Loan Mortgage Association, and certain official international banking organizations, such as the International Bank for Reconstruction and Development. Under a provision of Regulation D, securities dealers may make one Federal funds loan per day through a correspondent.

5. The Federal Home Loan Banks sell reserve balances in the funds market on behalf of the member savings and loan associations and place excess liquidity from their own longer term financing operations in the market. The U.S. Central Credit Union sells funds on behalf of member credit unions.

6. The call report labels indicate Federal funds purchased and sold, but the entries actually include RPs. Correction of the labels is planned for 1997.

7. FDIC insurance premia rose sharply in 1991. They were increased from 12¢ to 19.5¢ per $100 and later to 23¢ per $100. Premia were cut sharply in 1995, and virtually eliminated by year-end for well-capitalized banks, since the insurance fund had reached its target level.

8. Traditionally, the first tier consisted of some of the largest U.S. money center banks while the second tier consisted of the large regional banks. The spread between these two tiers, however, has virtually disappeared. Recently, many prime European banks have acquired membership in the top tier. The next group

contains most Japanese banks, differentiated according to market perceptions of their credit quality. The final tier includes some non-Japanese foreign branches and agencies of foreign banks and Edge Act subsidiaries of U.S. banks—institutions established to transact foreign-related business outside a bank's home state.

9. Nonmarketable debt includes savings bonds, which are sold to the public as requested. They are sold at a discount and pay the face value at maturity. Special securities are sold to state and local governments when these governments want to invest the proceeds of a tax-exempt security sale. To keep the local governments from making arbitrage profits from their tax-exempt status by selling low-cost debt and purchasing Treasury debt paying higher rates, the Treasury sells these special issues (often referred to as SLGs, or "slugs"), which pay rates equal to the municipalities' cost of funds. Special nonmarketable issues are also sold to Treasury trust funds.

10. The formula for the rate of discount on a bill is: $d=((F-P)/F)x(360/t)$, where d is the rate of discount, F the face value, P the price paid, and t the number of days to maturity. For bills maturing in six months or less, bond equivalent yields, which are higher, are computed as follows: $y=((F-P)/P)x(365/t)$, where y is the bond equivalent yield. Calculations are more complex for longer time periods since they must account for the semiannual coupon payments made on coupon securities. For the other formulas, see *The CSFB Guide to Yield Calculations in the International Bond and Money Markets* (Chicago: Probus Publishing Co., 1988), 8-10.

11. The Treasury gives a general indication of the timing and nature of its debt sales for the indefinite future. It offers quarterly reports of the issues it plans to sell.

12. When dealers sell short, they sell securities that they do not own on the assumption that they can acquire them, through either purchase or loan, in time for delivery.

13. For additional information, see Richard C. Breeden, Nicholas F. Brady, and Alan Greenspan, *Joint Report on the Government Securities Market* (January 1992).

14. Futures contracts can typically be divided into two groups: those based on intermediate- and long-term instruments and those based on short-term instruments. The former category includes the ten-year Treasury note futures contract and the Treasury bond futures contract, each with a face value of $100,000. In the latter category, the most active contracts are the Eurodollar and Treasury bill futures contracts, each with a face value of $1,000,000.

15. See Sean Becketti, "The Role of Stripped Securities in Portfolio Management," Federal Reserve Bank of Kansas City *Economic Review* 73, no. 5 (May 1988): 20-31.

16. Interest rate spreads over Treasury debt rose sharply during the crisis, peaking at about 200 basis points compared with 1 to 5 basis points before the difficulties developed.

17. In 1989, the passage of the Financial Institutions Reform, Recovery, and Enforcement Act (FIRREA) opened membership in the FHLB to other thrifts and commercial banks as well as to savings and loan associations. FIRREA also created the Resolution Trust Company (RTC) to oversee the liquidation of insolvent thrift institutions' assets. The job was essentially completed at the end of 1995, and the RTC was disbanded. The RTC obtained its funding from the Resolution Funding Corporation (REFCORP), which issued both thirty-year and forty-year bonds in 1989 and 1990.

18. FICO, FAC, and REFCORP debt was sold in auctions.

19. For more information on this market, see Frank Fabozzi, *The Handbook of Mortgage-Backed Securities*, 4th ed. (Chicago: Probus Publishing Co., 1995).

20. Municipalities may occasionally issue commercial paper.

21. S&P uses ratings of A-1+, A-1, A-2, and A-3; Moody's uses P-1, P-2, and P-3; and Fitch uses F-1, F-2, and F-3.

22. The term "bond" is often used generically to refer to debentures and notes, which have no specific pledged collateral.

23. Some investors, such as commercial banks, are limited to investment-grade issues (rated Baa by Moody's and BBB by S&P, or higher). FIRREA required thrift institutions to divest their junk bond holdings.

24. A brief history of the early years of the Eurobond market can be found in Frederick G. Fisher III, *The Eurodollar Bond Market* (London: Euromoney Publications, 1979). The interest equalization tax was especially burdensome to the bond markets because it took the form of an up-front fee based on the principal amount and the maturity.

25. Although most of the Eurobond market is based in London, an agreement with the domestic authorities requires deutsche mark and Swiss franc Eurobonds to be issued in the foreign bond markets in Germany and Switzerland, respectively.

26. See Public Securities Association, *Fundamentals of Municipal Bonds*, 4th ed. (1990).

27. The ratings schemes for municipal bonds are similar to those for corporate bonds. For municipal notes, Moody's uses the symbols MIG 1 to MIG 4, while S&P uses SP-1 to SP-3.

28. Municipal entities can even default on general obligation debt. In December 1994, California's Orange County declared bankruptcy following the disclosure that an investment pool run by the county treasurer had suffered large losses. The fund held mostly Federal Agency securities, primarily structured notes, and had become highly leveraged through extensive use of the RP market. At the time of this writing, a series of lawsuits were in progress charging that various county officials had acted irresponsibly.

Chapter 5

1. Formally titled the "Full Employment and Balanced Growth Act of l978." The meetings preceding the Humphrey-Hawkins testimony occasionally take place in late January or June.

2. On occasion, the need for greater leeway is not evident at the time of a meeting, but shifting conditions introduce a need between meetings. The Chairman advises the Committee members of such a need during the intermeeting period and canvasses them for their votes.

3. The nature and rationale for foreign exchange intervention is described in the box in Chapter 9. The effects of intervention on bank reserves are discussed in Chapter 6, Box B.

4. At the end of 1996, the Federal Reserve had swap lines with the central banks of fourteen countries and the Bank for International Settlements totaling $32.4 billion. See Federal Reserve Bank of New York, "Treasury and Federal Reserve Foreign Exchange Operations, October-December 1996"; reprint, Board of Governors of the Federal Reserve System, *Federal Reserve Bulletin* 83, no. 3 (March 1997): 190.

5. In recent years, the Chairman generally has arranged for FOMC members to discuss a possible policy move in an intermeeting conference call. A vote is usually not taken, particularly if the FOMC adopted an asymmetric directive and the action followed developments that were discussed at the regular meeting.

6. The early paragraphs of the directive review recent developments in the economy, the exchange markets, and the monetary aggregates. They state the FOMC's fundamental goals of price stability and sustainable economic expansion and report the annual money and credit growth ranges. Except for the paragraphs on the long-run objectives constructed at the February and July meetings, these paragraphs are rarely discussed at meetings, although they can be discussed if any member wants to recommend a change from the suggested wording.

Chapter 6

1. Because the bulk of reserve balances is held by commercial banks, the term "bank" is used in this chapter to refer to all types of depository institutions, except in formal definitions of terms.

2. Other adjustment options are discussed in Section 4.

3. The Treasury does allow some tax receipts to accumulate in bank demand deposits for one day. The cash in these deposits is subject to reserve requirements. After a day, those balances are either transferred to Federal Reserve accounts or to tax and loan accounts (described below) and are no longer subject to reserve requirements. In 1996, Treasury demand deposits averaged $4.2 billion, with a peak level close to $26 billion.

   In 1995, the Treasury began to require large corporate taxpayers to submit tax payments electronically. Such payments bypass Treasury demand deposits and are remitted either to tax and loan accounts or to the Treasury's Fed account. Over time, electronic tax payments are expected to significantly reduce the level of Treasury demand deposits.

4. The staffs must also estimate interbank deposits, which are not part of the monetary aggregates but are subject to reserve requirements. Interbank deposits have no pronounced trend, although they show both a seasonal pattern and residual volatility.

5. The largest banks report deposit data with a two-day lag. A second group of smaller banks

reports weekly with a lag of about one week, but a sample of these institutions reports more promptly to help the estimation process. Together, these two groups hold about 93 percent of transaction deposits. Three smaller groups of banks report to the Federal Reserve quarterly, annually, or not at all, depending on their size. Their figures are not available for reserve estimation. Their absence does not affect reserve forecasting since their reserve requirements are computed on a lagged basis. (If they are insured by the Federal Deposit Insurance Corporation, they must file call reports covering the final day of each quarter.)

6. The penalty for an overnight overdraft is at a rate 4 percentage points above the effective Federal funds rate that day. In addition, the banks must make up the overdraft by holding the same amount of extra reserves on other days in that maintenance period.

7. An extensive discussion of these reserve factors and the techniques for forecasting them can be found in John C. Partlan, Kausar Hamdani, and Kathleen M. Camilli, "Reserves Forecasting for Open Market Operations," Federal Reserve Bank of New York *Quarterly Review* 11, no. 1 (spring 1986): 19-33.

8. Although banks are prohibited by law from paying explicit interest on demand deposits, they can adjust the implicit return by changing fees charged and services provided.

9. Reserve balances in the definition exclude those used to satisfy required clearing balances (defined below) or to pay for float (defined in Box B).

10. For days on which depository institutions are closed, all deposit, reserve, and vault cash levels are treated as equal to the previous day's end-of-day levels.

11. Traditional Federal Reserve accounting procedures count Friday vault cash as still being held on Saturday and Sunday, while in practice a significant portion is withdrawn.

12. A bank can use excess reserves carried forward in the next period by running a deficiency equal to the excess carried forward, provided doing so does not put it into overdraft. If it does not use the excess in that period, the carryover is lost. A bank must cover in the next period a deficiency carried forward by holding excess reserves in a volume at least equal to the deficiency or it will be judged to have failed to satisfy its requirement in the earlier period.

13. Schedules of reserve requirements were contained in the MCA. At the completion of the phase-in period, institutions had to hold reserves on transaction deposits equal to 3 percent up to an indexed dollar amount and reserves equal to l2 percent on transaction deposits in excess of the indexed amount. The Garn-St Germain Act exempted the first $2 million of reservable deposits from reserve requirements and indexed the exempted amount. Member commercial bank reserve requirements were gradually reduced between 1980 and 1984. Nonmember commercial banks and other depository institutions, however, had not been subject to the Federal Reserve's reserve requirements before passage of the MCA; they became subject to requirements phased in between 1980 and 1987. By the latter date, the same reserve requirements applied to member and nonmember institutions. The MCA eliminated reserve requirements on "personal" time and savings deposits and all deposits with original maturities of eighteen months or more. It cut reserve requirements on shorter term, "nonpersonal" time deposits to a flat 3 percent.

    The MCA specifies that the maximum reserve requirement on transaction deposits may be set by the Board of Governors within a range of 8 to 14 percent. The requirement on nonpersonal time deposits may be set within a range of 0 to 9 percent. The current maximum requirement on transaction deposits is 10 percent. Currently, there is no positive requirement on time deposits.

14. Very small depository institutions are exempt from reserve requirements and only report their deposits annually. Institutions of the next larger size only report quarterly. For that group, required reserves on transaction deposits are lagged. Most of these institutions meet their entire requirement with vault cash.

15. Under the reserve accounting structure introduced in February 1984, reserve requirements on nonpersonal time deposits were computed on a lagged basis. When they were positive, they were known before the maintenance period started.

16. As of December 1996, only about 2,500 depository institutions were bound (out of a total of 23,500). About 9,200 institutions maintained reserve accounts at Federal Reserve Banks. A number of nonbound institutions have reserve accounts because they clear some or all of their own interbank transactions.

17. The Federal Reserve does not include the adjustment for carryovers in its excess reserve measure. If it did, the reserve measures would not match consolidated Federal Reserve balance sheets by maintenance period.

18. The International Banking Act extended reserve requirements to foreign banking institutions operating in the United States.

19. The Federal Reserve Banks reserve the right to charge a higher rate in the event of sizable borrowing resulting from technical problems.

20. Under Regulation A of the Board of Governors (as amended January 30, 1994), in accordance with provisions of FDICIA, advances to or discounts for insured depository institutions known to be undercapitalized are limited to borrowing durations of 60 days in any 120-calendar-day period. A Federal Reserve Bank may continue lending for sixty-day periods after receipt of a written certification of viability from the Chairman of the Board of Governors or the head of the appropriate federal banking agency.

    For critically undercapitalized depository institutions, advances or discounts are limited to five days, beginning on the date that their critically undercapitalized condition becomes known. The Board of Governors may make exceptions to these rules, but if it does so, and the FDIC incurs excess losses in a liquidation or other resolution of an insolvency, the Federal Reserve Banks may be subject to assessments to cover the loss.

21. Seigniorage refers to the return earned on issuing money in excess of the direct costs of producing it.

22. The standard working balance target has been $5 billion since October 1988, when it was raised from $3 billion.

23. Depository institutions receive Treasury funds when their customers make payments to the Treasury. Those that do not wish to participate in the TT&L program remit all such funds to the Federal Reserve the next day.

24. Same-day or next-day calls generally are made only on large banks (referred to as C banks). Calls also are made on smaller institutions (A and B banks), but they are usually made with longer lead times and are not used for marginal adjustments to the balance. Calls are calculated as of the book balance in each TT&L account on the previous day. Direct investments will be sent to all participating depository institutions. They are computed as a share of the available capacity of each institution.

25. Because forecast errors tend to be larger after major tax dates, the Treasury temporarily targets a $7 billion balance at the Federal Reserve for a week or two after those dates (if the balance would not otherwise be above that level) to assure a positive balance at the end of the day.

26. If the Federal Reserve were to finance a purchase by drawing on a swap line with another central bank, there would be no reserve effect. It would credit dollars to the central bank that provided the currency, and that bank would invest the proceeds, offsetting the reserve drain. If the Fed used foreign exchange acquired from a dollar sale to pay down a swap drawing, the reserve impact of the intervention would again be offset when the central bank paid back the dollars it acquired in the swap. Intervention has not been financed with swaps since 1980.

27. If the Treasury intervenes to buy dollars and uses them to retire SDR certificates or reverse a warehousing transaction, reserves will be drained.

Chapter 7

1. On individual days, revisions to operating factors can be large. One-day forecast misses on the order of $2 billion are not uncommon, particularly during periods with heavy tax collections and parts of the year with frequent bad weather. In 1996, the peak error was around $5 billion. (Required reserves are only forecast for maintenance periods.)

2. The authorization continues to permit aggregate holdings of prime bankers' acceptances up to $l00 million should circumstances call for it. The Federal Reserve has not, however, conducted any outright operations in bankers' acceptances for its own account since 1977, when, as indicated in Chapter 4, the FOMC concluded that the market was sufficiently developed to make Federal Reserve participation unnecessary. In addition, the authorization still permits the Desk to buy acceptances under RP, although it has not done so since l984.

    The authorization also permits the Desk to lend securities from the System portfolio against collateral to dealers to smooth the clearing operations in the securities markets and ensure effective conduct of open market operations. The loans have no direct reserve impact; the interest paid by the dealers results in a negligible reserve drain.

3. Over the years, a variety of provisions had permitted the Treasury to borrow limited amounts directly from the Federal Reserve. Options for such loans existed until 1935. Temporary provisions for direct loans were reintroduced in 1942 and renewed with varying restrictions a number of times thereafter. Authority for any kind of direct loans to the Treasury lapsed in 1981 and has not been renewed.

4. The Federal Reserve's holdings of maturing issues routinely far exceed the normal maximum amounts for noncompetitive tenders, described in Chapter 4. The Treasury permits the Fed to bid noncompetitively because neither organization would want the disruption to reserve and debt management that would result if the Federal Reserve's tender were rejected unintentionally.

5. Federally sponsored agencies often pay down debt or replace maturing issues with a type of security the Desk does not buy. As a consequence, in some years, the Desk has only been able to roll over a modest share of maturing issues, and runoffs of maturing agency issues have been sizable.

6. Through December 1996, the largest single bill purchase (in 1996) was about $6 1/2 billion. The largest coupon purchase (in 1994) was around $5 billion. The largest bill sale (in 1989) was about $4 1/2 billion.

7. While the Federal Reserve has authority to purchase or sell securities of federally sponsored agencies, it has not bought such securities in the market since 1981. It last sold them in 1979. These securities are less convenient to buy or sell than Treasuries. There are a large number of small nonhomogeneous issues, making choices less straightforward.

8. For operational convenience, the Desk has often omitted from the operation issues maturing within the upcoming six to eight months.

9. These percentages exclude the trades through government securities brokers that mostly represent interdealer trades to achieve desired positions rather than trades with customers.

10. Transaction data do not have maturity breakdowns that match those used in the multistage coupon purchases.

11. Those federal agency securities that are eligible for outright purchase are also eligible for purchase under RP.

12. Through December 1996, the largest volume of RPs arranged on a single day was almost $18 1/2 billion (December 1990), and the largest volume of contracts outstanding was about $23 3/4 billion (December 1996).

13. RPs are made for the account of the Federal Reserve Bank of New York rather than for the System Open Market Account. The System Account must be divided each business day among the twelve Federal Reserve Banks. Such division would be cumbersome for a short maturity instrument involving a wide range of securities. RPs and MSPs are subject to the terms of the Master Open Market Agreement, which affirms the right of the Reserve Bank to sell the securities in the event the dealer does not repurchase them or to keep the monies received if securities are not returned in an MSP operation.

14. In a technical sense, customer-related RPs merely offset the drain of reserves that results when the foreign central banks receive money into their Federal Reserve accounts. Since foreign investments occur every day, the Federal Reserve builds an estimate of the reserve drain into its reserve forecasts.

15. When open market operations were used as a signaling device, market participants sometimes interpreted a customer-related RP as indicating that the Federal funds rate was at an acceptable level. A System RP was interpreted as suggesting that the funds rate was too high. The distinction had diminished in importance long before the Federal Reserve began announcing policy changes. It ceased to have any significance with the switch to announcements in 1994.

16. Through December 1996, the largest MSP operation made in the market amounted to $7 3/4 billion (March 1979). The largest balance of such contracts outstanding was about $10 1/2 billion (February 1989).

17. The Treasury does not want its balance to end the day overdrawn because the Federal Reserve does not have the authority to lend to the Treasury directly. An inadvertent overdraft is possible in the event that expected inflows are not received or unexpected outflows occur. The target balance is set high enough to keep the risk of an overdraft very low.

18. For many years, the regular entry time was around 11:30 a.m. It was moved to around 10:30 a.m., primarily because the RP market is most active early in the morning. Sometimes the Desk may operate before the conference call. Expectations of collateral shortages and planned early closings of the markets ahead of major holidays have led to early entries.

19. The collateral is revalued each day before the close of the securities wire and each morning to ensure that there is proper coverage for potential movements in market prices. More collateral may be requested if coverage is insufficient.

20. The 1994 and 1995 reports appeared in the Federal Reserve Bank of New York's *Annual Report* and in the Board of Governors of the Federal Reserve System's Federal Reserve *Bulletin*. Reports for years before 1994 appeared in the Federal Reserve Bank of New York's spring *Quarterly Review*. The public information area at the Federal Reserve Bank of New York can provide copies of recent issues.

21. Breeden, Brady, and Greenspan, *Joint Report on the Government Securities Market*, Appendix E.

Chapter 8

1. For an overview of a number of issues concerning the transmission of monetary policy, see Frederic S. Mishkin, "The Channels of Monetary Transmission: Lessons for Monetary Policy" (paper prepared for the Banque de France–Université Conference "Financial Cycles and Growth," Marne la Vallée, France, January 24-26, 1996).

2. For a further description of the evolution of Keynesian thought in the 1950s and 1960s, see Paul A. Samuelson, "Money, Interest Rates, and Economic Activity: Their Interrelationship in a Market Economy," in *Proceedings of a Symposium on Money, Interest Rates, and Economic Activity* (New York: American Bankers Association, 1967); reprint, Robert C. Merton, ed., *The Collected Scientific Papers of Paul A. Samuelson*, vol. 3 (Cambridge: MIT Press, 1972), 550-70.

3. For more detailed discussions of the business cycle, see the essays in Robert J. Gordon, ed., *The American Business Cycle* (Chicago: University of Chicago Press, 1986). In one essay, "The Mechanisms of the Business Cycle in the Postwar Era," 39-122, Otto Eckstein and Allen Sinai identify five stages in the business cycle: recovery/expansion, boom, precrunch period/credit crunch, recession/decline, and reliquefication.

   In the same volume, Olivier J. Blanchard and Mark W. Watson question whether business fluctuations are sufficiently similar to give analytical value to the concept of a business cycle ("Are Business Cycles All Alike?" 123-79).

4. Gottfried Haberler, *Prosperity and Depression* (London: George Allen and Unwin, 1964).

5. A.W. Phillips, "The Relation between Unemployment and the Rate of Change of Money Wage Rates in the United Kingdom, 1861-1957," *Economica* 25, no. 100 (November 1958): 283-99.

6. Milton Friedman, "The Role of Monetary Policy" (presidential address delivered at the 80th Annual Meeting of the American Economic Association, Washington, D.C., December 29, 1967), *American Economic Review* 58, no. 1 (March 1968): 1-17; Edmund S. Phelps, "Money Wage Dynamics and Labor Market Equilibrium," *Journal of Political Economy* 76, no. 4 (July-August 1968): 687-711.

7. Friedman, "Role of Monetary Policy."

8. Irving Fisher, *The Theory of Interest* (New York: MacMillan, 1930).

9. A. Steven Holland, "Real Interest Rates: What Accounts for Their Recent Rise?" Federal Reserve Bank of St. Louis *Review* 66, no. 10 (December 1984): 18-29.

10. A number of different techniques have been used to estimate the ex ante real rate of interest. For instance, see Frederic S. Mishkin, "The Real Interest Rate: An Empirical Investigation," The Costs and Consequences of Inflation, *Carnegie-Rochester Conference Series on Public Policy* 15 (autumn 1981): 151-200; and Charles R. Nelson and William G. Schwert, "Short-Term Interest Rates as Predictors of Inflation: On Testing the Hypothesis That the Real Rate of Interest Is Constant," *American Economic Review* 67, no. 3 (June 1977): 478-86.

11. The concept was introduced in John F. Muth, "Rational Expectations and the Theory of Price Movements," *Econometrica* 29, no. 3 (July 1961): 315-35. Rational expectations analysis was applied to monetary questions by Robert E. Lucas Jr. in "Expectations and the Neutrality of Money," *Journal of Economic Theory* 4, no. 2 (April 1972): 103-24; and by Thomas J. Sargent and Neil Wallace in "'Rational' Expectations, the Optimal Monetary Instrument, and the Optimal Money Supply Rule," *Journal of Political Economy* 83, no. 2 (April 1975): 241-54.

12. The observation that a change in policy procedures will change the structure of the transmission mechanism was made in Robert E. Lucas Jr., "Econometric Policy Evaluation: A Critique," The Phillips Curve and Labor Markets, *Carnegie-Rochester Conference Series on Public Policy* 1 (1976): 19-46.

13. Michael Dotsey and Robert G. King, "Rational Expectations Business Cycle Models: A Survey," Federal Reserve Bank of Richmond *Economic Review* 74, no. 2 (March-April 1988): 3-15; and Chan Hut and Bharat Trehan, "Real Business Cycles: A Selective Survey," Federal Reserve Bank of San Francisco *Economic Review*, no. 2 (spring 1991): 3-17.

14. For a summary of the credit channel arguments, see Ben S. Bernanke and Mark Gertler, "Inside the Black Box: The Credit Channel of Monetary Policy Transmission," *Journal of Economic Perspectives* 9, no. 4 (fall 1995): 27-48.

15. Because the Federal Reserve alters reserves through purchases and sales of Treasury securities, it changes the amount of securities held by the public, a development that could independently affect rates. However, Federal Reserve purchases or sales usually represent such a small part of the total Treasury market that the rate impact, separate from the effects on reserves (and possibly on expectations), is very small.

16. Generally, the yield curve for Treasury securities is used as the reference standard because such securities are perceived to be free of credit risk, most of them are not subject to early redemption, and they enjoy a broad and active secondary market.

17. For a helpful review of common hypotheses of the yield curve, see Edwin J. Elton and Martin J. Gruber, *Modern Portfolio Theory and Investment Analysis* (New York: John Wiley and Sons, 1987), 458-67. For a review of the theoretical and empirical literature on the yield curve, see Robert J. Shiller and J. Houston McCulloch, "The Term Structure of Interest Rates," National Bureau of Economic Research Working Paper no. 2341, August 1987.

18. One previously popular hypothesis of yield curve determination was that markets for securities of different maturities were segmented. It was posited that parties normally borrowed or lent in a particular maturity range and would not be inclined to alter their actions in response to changes in the shape of the yield curve. Consequently, yields on different maturity instruments could move independently. While such segmentation may apply in limited circumstances, its general application is currently considered to depend on the implausible assumption that neither investors nor debt issuers could shift from one maturity sector to another when they saw an incentive to do so.

19. For instance, potential investors can compare the return from buying a long-term security with the expected return from buying a succession of short-term securities with the final one maturing at the same time as the long-term security. If one investment strategy is expected to produce a higher return than the other based on investors' expectations of future short-term rates, then investors and savers can adjust their strategy until rates are forced into line. Investors can buy the longer term security if their expectations about the course of interest rates over the security's lifetime support their view that the longer term instrument is more attractive. They will continue to switch to longer term issues until those rates fall relative to shorter rates by enough to remove the expected rate advantage of the longer term issues.

20. Because the slope of the yield curve embodies the market expectations of future interest rates, it can be used as a summary statistic of the market participants' predictions of future interest rate changes. Historically, the predictive power of the slope of the yield curve appears to have been strong for maturities shorter than six months, weak for maturities between six months and two years, and strong again for maturities longer than two years. See John Y. Campbell and Robert J. Shiller, "Yield Spreads and Interest Rate Movements: A Bird's Eye View," *Review of Economic Studies* 58 (May 1991): 495-514.

    The predictive power near the short end may be induced by the predictability of the Federal Reserve's actions in gradually raising or lowering its Federal funds target rate. See Glen D. Rudebusch, "Federal Reserve Interest Rate Targeting, Rational Expectations, and the Term Structure," *Journal of Monetary Economics* 35 (1995): 245-74. The lack of predictive power in the medium-term maturities has been attributed to a random-walk rate-setting behavior of the Federal Reserve. See N. Gregory Mankiw and Jeffrey A. Miron, "The Changing Behavior of the Term Structure of Interest Rates," *Quarterly Journal of Economics* 101, no. 2 (May 1986): 211-28. The predictive power near the long end may be due to an underlying tendency of interest rates to return to a mean value over long periods. See Eugene F. Fama and Robert R. Bliss, "The Information in Long-Maturity Forward Rates," *American Economic Review* 77, no. 4 (September 1987): 680-92.

21. See John H. Wood, "Do Yield Curves Normally Slope Up? The Term Structure of Interest

Rates, 1862-1982," Federal Reserve Bank of Chicago *Economic Perspectives* 7, no. 4 (July-August 1983): 17-23. Wood's examination of nineteenth-century data led him to question the view that an upward slope to the yield curve was normal. He suggested that the liquidity premium arose in the twentieth century because a change in the monetary standard from gold to essentially a fiat currency introduced an inflationary bias. Previously, inflation and deflation were considered to be about equally likely. Investors would benefit from being in the longer term security in the event of unexpected deflation.

22. See V. Vance Roley and Gordon H. Sellon Jr., "Monetary Policy Actions and Long-Term Interest Rates," Federal Reserve Bank of Kansas City *Economic Review* 80, no. 4 (1995): 73-89.

23. For more discussion of the interest rate sensitivity of household and business spending, see M. A. Akhtar and Ethan S. Harris, "Monetary Policy Influence on the Economy—An Empirical Analysis," Federal Reserve Bank of New York *Quarterly Review* 11, no. 4 (winter 1986-87): 19-34; and Bernanke and Gertler, "Inside the Black Box."

24. Lawrence M. Ausubel, "The Failure of Competition in the Credit Card Market," *American Economic Review* 81, no. 1 (1991): 53-5.

25. Steven M. Fazzari, R. Glenn Hubbard, and Bruce C. Petersen, "Financing Constraints and Corporate Investment," *Brookings Papers on Economic Activity*, no. 1 (1988): 141-88.

26. The relationships among monetary policy actions, interest rates, and inventories are discussed in Alan S. Blinder and Stanley Fischer, "Inventories, Rational Expectations and the Business Cycle," *Journal of Monetary Economics* 8, no. 3 (November 1981): 277-304; and M. A. Akhtar, "Effects of Interest Rates and Inventory Investment in the United States," *American Economic Review* 73, no. 3 (June 1983): 319-28.

27. As discussed in Chapter 4, "junk" bonds, or bonds with below-investment-grade ratings, have given firms with speculative credit ratings increased access to the capital markets over the last fifteen years. Junk bonds can be sold during recessions, but spreads tend to widen. For the weakest credits, the market may effectively disappear.

28. The impact of interest rates on the deficit is discussed in T.M. Holloway, "Measuring the Sensitivity of Net Interest Paid to the Business Cycle and to Inflation," *Public Finance Quarterly* 15, no. 3 (July 1987): 235-58.

29. Since the early 1980s, parts of the personal tax structure have been indexed for inflation. Consequently, nominal wage and salary increases that merely reflect higher prices have a limited impact on real government revenues.

30. See William Dewald, "Federal Deficits and Real Interest Rates: Theory and Evidence," Federal Reserve Bank of Atlanta *Economic Review* 68, no. 1 (January 1983): 20-9. He finds a fairly close inverse relationship between changes in the inflation rate and real rates but only a weak positive relationship between the size of the deficit and real rates once adjustment is made for the stage of the business cycle.

    See also Group of Ten, "Saving, Investment, and Real Interest Rates," a study for the Ministers and Governors of the Group of Ten, prepared by the Deputies, October 1995, 33.

31. Laura S. Rubin, "The State and Local Government Sector: Long-Term Trends and Recent Fiscal Pressures," Federal Reserve *Bulletin* 78, no. 12 (December 1992): 892-901.

32. David M. Jones, *The Buck Starts Here: How the Federal Reserve Can Make or Break your Financial Future* (Englewood Cliffs, N.J.: Prentice Hall, 1995), chap. 4.

33. See R. Mark Rogers, *Handbook of Key Economic Indicators* (Burr Ridge, Ill.: Irwin Professional Publishing, 1994).

Chapter 9

1. Hereafter, unless otherwise specified, "dollar" will refer to the U.S. dollar.

2. "Ceteris paribus" means "all other things being equal." That is, all other relevant factors remain unaltered. The economic effects of the change in monetary policy described here are assumed to take place under the ceteris paribus condition.

3. Developing countries hold a higher percentage of their reserves in dollars and dollar-denominated assets than do industrial countries. From 1990 to 1994, developing countries held an average of 63 percent of their reserves in dollars, while industrial countries held 48 percent of their reserves in dollars. International Monetary Fund, *Annual Report, 1995* (1996), 161.

4. Bank for International Settlements, press communique, Basle, Switzerland, October 24, 1995.
5. As noted in chapter 4, foreign firms often borrow in markets outside the United States by issuing bonds denominated in dollars.
6. See Richard D. Porter and Ruth A. Judson, "The Location of U.S. Currency: How Much Is Abroad?" Federal Reserve *Bulletin* 82, no. 10 (October 1996): 883-903.
7. BIS provides estimates of Eurocurrency liabilities to nonbank entities held at banks in its reporting group in Tables 4b and 4d of its quarterly *International Banking and Financial Market Developments*.
8. This statement assumes that the monetary easing is not matched with parallel moves (or expected moves) by foreign central banks.
9. Investors may also require added compensation for credit risk when investing abroad because of the greater difficulty of obtaining accurate information.
10. The ex ante real exchange rate is deflated by expected inflation, while the ex post is deflated by actual inflation.
11. Note that nominal bilateral exchange rates have, at times, been very volatile.
12. A country in which the exchange rate is fixed to the dollar would have to adjust its interest rate.
13. The Federal Reserve and the U.S. Treasury occasionally intervene directly in the foreign exchange markets to influence these markets. Such intervention is usually sterilized so that the Federal funds rate does not change. The box describes intervention practices.
14. A discussion of foreign exchange intervention practices is contained in Roger M. Kubarych, *Foreign Exchange Markets in the United States* (Federal Reserve Bank of New York, 1983).
15. The Group of Seven countries are the United States, Canada, France, Germany, Italy, Japan, and the United Kingdom.
16. See Bank for International Settlements, *Exchange Market Intervention and Monetary Policy* (Basle, 1988).

Chapter 10

1. Real GDP data were not available for the 1950s using the new chain-weighted deflator. Consequently, the growth rates reported here are based upon the older deflator, which used 1987 weights.
2. A number of rules have been suggested over the years to guide monetary policy. One such rule, which has recently been given attention, was proposed by John B. Taylor in "Discretion versus Policy Rules in Practice," *Carnegie-Rochester Conference Series on Public Policy* 39, no. 2 (December 1993): 195-214. Under his rule, the FOMC would set the Federal funds rate systematically in response to deviations of output from estimated potential GDP and of inflation from effective price stability, giving equal weight to both measures. The Board of Governors staff estimates funds rates using Taylor's rule, but the FOMC itself does not employ any rules.