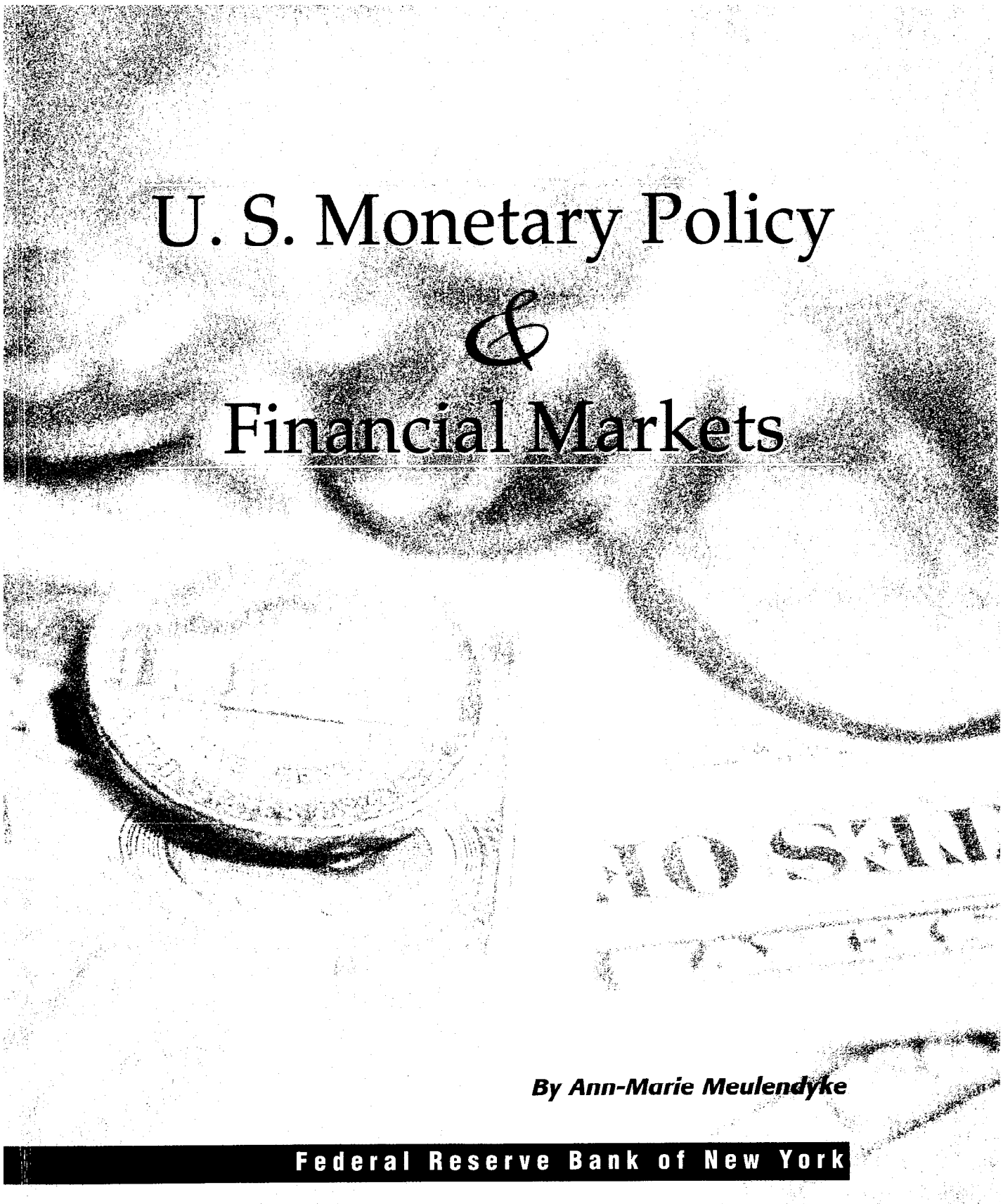
U. S. Monetary Policy & Financial Markets



By Ann-Marie Meulendyke

Federal Reserve Bank of New York

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FEDERAL RESERVE BANK OF NEW YORK 1998

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Foreword

Understanding how monetary policy is formed and implemented is of considerable importance to economists, market participants, students and, indeed, the general public. This edition of *U.S. Monetary Policy and Financial Markets* seeks to advance that understanding by providing a detailed look at Federal Reserve policy procedures. The book benefits from the extensive knowledge and experience of author Ann-Marie Meulendyke, a recently retired officer who worked nearly twenty-six years in the open market and research areas of the Bank. Ms. Meulendyke prepared her first version of this book in 1989 and has now made significant revisions.

This updated edition reflects recent changes in the approach to monetary policy by the United States. It begins with a historical review of monetary policy priorities and a discussion of the U.S. banking system and financial markets—the institutions that form the setting for policy. It then provides a comprehensive account of the steps involved in choosing and implementing monetary policy. The implications of policy decisions for the domestic and international economies are discussed in the closing chapters.

Designed to supplement monetary economics textbooks, *U.S. Monetary Policy and Financial Markets* will interest anyone who wishes to learn more about monetary policy and its effect on the marketplace. Earlier editions of the book have been widely read and consulted in the United States and abroad. We hope this updated version will prove useful to all readers, including central bankers in emerging market economies who are attempting to shift their monetary policy procedures from direct controls on bank credit and money to open market operations.

William J. McDonough
President
February 1998

Acknowledgments

Many people helped make this edition of *U.S. Monetary Policy and Financial Markets* possible. Paul Meek, who wrote the first edition of this book, published in 1982, set the stage for my earlier version, published in 1990. His book, which provided the public with detailed information about the process of making and implementing Federal Reserve monetary policy, proved to be a valuable and widely used resource for students and financial market participants in the United States and abroad. The climate for and the techniques of monetary policy underwent extensive changes during the 1980s, which motivated the 1990 edition. Changes have continued in the 1990s. Consequently, another edition seemed appropriate to restore the timeliness of the material. This latest volume has largely preserved the structure of its predecessors while incorporating a considerable new amount of information.

Several people earn special mention because they worked extensively on two of the chapters. Donald Morgan and Philip Strahan of the Research and Market Analysis Group made significant revisions to the sections of Chapter 3 that cover the structure of the banking system and banking risks. The spread of interstate banking and the implementation of risk-based capital requirements have significantly influenced the functioning of the U.S. banking system in recent years. (In the last edition, a large part of the chapter was written by Donald Vangel, some of whose work has been retained.) Susan Charrette and Tanya Ghaleb, also of the Research and Market Analysis Group, were primarily responsible for extensive revisions to Chapter 9 (prepared by Christine Cumming in the 1990 edition). The international nature of the U.S. dollar and the financial system has continued to evolve, calling for modifications.

The book also owes a great deal to colleagues in the Markets Group. William Gorgas provided a wide range of support for the book. He undertook library work, data collection, and preparation of tables and charts. He also drew on his knowledge and contacts in the financial markets to provide more extensive help in updating

Chapter 4. Deborah Perelmuter and Marc Tishfield also made useful comments and suggestions for Chapter 4.

Spence Hilton, Dino Kos, Sandra Krieger, John Partlan, and Eileen Spinner all provided valuable comments on Chapters 5-7, the chapters that describe formulating and implementing monetary policy. Gerald Cohen and John Partlan assisted with the sections in Chapter 1 that review the performance of the monetary aggregates. Eileen Steigleder assisted in the revision of Chapter 2. Kenneth Guentner and Betsy White also offered helpful suggestions on that chapter.

A number of the members of the Research and Market Analysis Group assisted. Beverly Hirtle provided helpful comments on Chapter 3. John Kambhu reviewed part of Chapter 4. Ronnie Lowenstein, Cara Lown, Patricia Mosser, Eli Remolona, and Charles Steindel all made helpful suggestions on Chapter 8.

The completed manuscript was reviewed by Peter R. Fisher and Frederic S. Mishkin of the Federal Reserve Bank of New York and David Lindsey of the Board of Governors.

Some people outside the Federal Reserve System also provided valuable assistance on portions of the book. Thanks go to James Paterson of Chase Manhattan Bank, Cary Leahey of High Frequency Economics, Ltd., Maureen Lee and Robert Clinton of Morgan Guaranty Trust Company, and Lawrence DiTorre of Prebon Yamane (U S A) Inc.

Other forms of support were also invaluable. Valerie LaPorte, Michael De Mott, Elizabeth Miranda, and Ed Steinberg edited the book, encouraging clarity. M. Akbar Akhtar, Peter Bakstansky, and Robin Bensignor of the Public Information Department oversaw aspects of the editing and production. Joel Kent, Gina Lukaszewicz, Joanna Barnish, and Robert Van Wicklen of the Markets Group and Martina Heyd of the Research and Market Analysis Group assisted in chart preparation. Finally, special thanks go to my secretary, Evelyn Schustack, who made numerous revisions to the documents and to Elisa Ambroselli, who helped with final revisions to prepare the document for publication. While all of the people named helped to make the book much more accurate and readable than it might otherwise have been, I bear the responsibility for remaining errors.

Ann-Marie Meulendyke

Chapter 1

Monetary Policy and the U.S. Economy

Few components of economic policymaking are as important to the nation's economic well-being as monetary policy. This book describes monetary policy from the vantage point of the Federal Reserve Bank of New York's Open Market Trading Desk, the area responsible for carrying out most monetary policy actions. The book emphasizes the process of formulating and implementing policy.

As the central bank for the United States, the Federal Reserve has been entrusted by Congress with the responsibility for conducting monetary policy—that is, the terms and conditions under which money and credit are provided to the economy. Money comprises currency issued by the Federal Reserve and coin issued by the U.S. Treasury, as well as various kinds of deposits at commercial banks and other financial institutions. Credit encompasses loans made by depository institutions and by other types of financial or nonfinancial entities; it includes loans evidenced by debt instruments such as notes or bonds.

Congress, through the Federal Reserve Act and other legislation, has long provided the rules and guidelines for Federal Reserve policymaking. Currently, the framework for the monetary policy process is the Full Employment and Balanced Growth Act of 1978, usually referred to as the Humphrey-Hawkins Act for its primary sponsors. The act calls for the Federal Reserve to establish annual growth targets for monetary and credit aggregates and to explain how these targets relate to goals for economic activity, employment, and prices. Monetary policy is carried out through the

Federal Reserve's regulations and techniques for currency issuance and its provision of reserve balances—balances that depository institutions hold at their regional Federal Reserve Bank. The behavior of reserves—reserve balances plus currency held by depository institutions—can in turn influence deposit behavior since reserves partially back some classes of deposits.[1] Through its monetary policy actions, the Federal Reserve can influence the rates and other conditions under which credit is extended, although it cannot directly control the quantity of credit or its price.[2]

In addition to its mandate to carry out monetary policy in a way that promotes sustainable economic expansion and reasonable price stability, the Federal Reserve has responsibilities for encouraging the smooth functioning of the nation's financial system. It strives to accommodate the substantial short-run variations in the demand for money and credit that inevitably arise in a complex market economy. The Federal Reserve monitors a wide range of financial variables and responds when the variables seem to indicate that credit conditions are out of step with the Federal Reserve System's policy goals. Chief among the challenges facing the Federal Reserve are determining the appropriate policy stance and balancing long- and short-run objectives in the execution of policy. Decisions must be made as events are unfolding on the basis of data whose full significance is not yet clear. The policy actions themselves become part of the dynamic economic processes and may have effects that extend over considerable periods of time.

The remainder of this chapter provides an overview of the other chapters of the book. It then explains the role of money in the economy and examines the tools of policy. This information serves as background for the discussion of the financial system and policy process in later chapters.

Overview of the Book

The structure of this book largely follows that of its predecessors: Paul Meek's 1982 volume and my 1989 volume on U.S. monetary policy. The subject matter is arranged in certain broad divisions. Chapters 2-4 cover various aspects of the institutional setting for U.S. monetary policy. They are followed by three chapters describing the policy process itself, then two exploring the ways that policy affects the domestic and international economy. Chapter 10 assesses the recent record of monetary policy and the economic and financial conditions that have accompanied it.

1. Evolution of Federal Reserve Procedures

The history of the policy process, the subject of Chapter 2, reveals how the Federal Reserve has responded to new problems and changing conditions by significantly modifying its primary goals and the techniques for achieving them. Indeed, since the Federal Reserve's beginnings in 1914, both Congress and the Federal Reserve have substantially revised their views of the Federal Reserve's mandate. In the early days, the gold standard was expected to stabilize the price level. The Federal Reserve saw its role as providing reserves to accommodate routine variations in the need for credit to finance trade and as providing currency to avoid financial panics. The experience of the Great Depression altered priorities, however, and in the years following the Second World War, the policymakers considered economic stabilization a primary goal. Then, as inflationary forces grew during the 1970s, the goal of price stability acquired increased importance. Partly as a result of the high costs of inflation experienced in the 1970s, Federal Reserve policymakers have generally come to consider price stability to be the primary long-run objective of monetary policy.

The Federal Reserve's monetary policy tools (described in a later section of this chapter) have also evolved over time. In the System's early years, loans to the banks through the discount window were the predominant means of short-term adjustments to the banks' reserve balances at the Federal Reserve. Secular changes in money and credit stemmed primarily from changes in monetary gold. In more recent times, both secular growth in money and accommodation of short-term variation in money and credit demands have been provided primarily through open market operations. The setting and changing of reserve requirement ratios has generally played a subsidiary role in the policy process, although requirements can have a powerful impact.

2. The Depository Institutions

Monetary policy reflects continuing interactions among the Federal Reserve, financial institutions, the financial markets, and members of the nonbank public who deposit and borrow funds. The functioning of depository institutions plays a role in transmitting Federal Reserve policy to the economy. Chapter 3 reviews the structure of banking in the United States and aspects of risk and reserve management.

The United States has long had an extraordinarily large number of banking institutions, primarily reflecting restrictions on branching. In recent years, easing of such restrictions and other

institutional developments have encouraged heavy merger activity. The structure has been evolving against a background of increased regulatory emphasis on risk management. Depository institutions must consider many factors when managing the components of their balance sheets. When making loans or investments, they must weigh the interest to be earned against the risks incurred. They must also take account of the cost of capital requirements on the assets acquired and the return on capital that the assets should generate. In attracting deposit liabilities, depository institutions factor in the direct and indirect costs involved, including paying interest and account management expenditures as well as any reserve requirements and insurance premiums on those deposits. If the maturities of the assets and liabilities differ, the institutions must consider the implications of changes in interest rates over their lives.

The techniques that banks employ for managing their reserves held with the Federal Reserve have evolved over time. Banks use their reserve balances intensively to settle interbank transactions. As reserve requirements have been cut, many banks have found that they need more reserves for clearing and settlement than to meet reserve requirements. Because reserves earn no interest, these banks have devoted considerable resources to achieving desired reserve levels.

3. The Role of the Financial Markets

The effects of monetary policy actions are not limited to depository institutions. Indeed, as described in Chapter 4, governments at various levels, quasi-governmental agencies, private corporations, and individuals engage in extensive direct financial market borrowing and lending. The United States has vast financial markets where debt and equity are created and redistributed. These markets are competitive and serve to direct capital to the users with the most urgent demands.

Depository institutions, other financial firms, nonfinancial businesses, and governments all place funds in, or borrow from, the money market—the term used for financial markets specializing in instruments with initial maturities of a year or less—to bridge differences in timing between receipts and payments. They also use the market to defer long-term borrowing or lending to a more advantageous time. They use the longer term capital markets to borrow for investment purposes. Lenders may place funds for a long period, or they may purchase a security with the intention of selling it in what is called the secondary market when cash is needed.

Active secondary markets facilitate transfers of existing debt instruments before maturity and enable the Trading Desk at the Federal Reserve Bank of New York to conduct open market operations efficiently. Open market operations take place in two segments of the markets: one for outright transactions in U.S. Treasury securities and one for temporary purchases and sales of government securities, referred to as repurchase agreements (RPs) and matched sale-purchase agreements (MSPs).

The Federal funds market allows depository institutions to exchange reserve balances at the Federal Reserve among themselves, an arrangement that promotes the efficient use of reserves and the building of a large volume of deposits and credit on a relatively small reserve base. By adding or reducing reserves, open market operations have a direct impact on the Federal funds market. The Federal funds rate, the rate for overnight exchanges of Federal funds, responds to reserve availability.

4. The Policy Process

The formulation and execution of monetary policy, reviewed in Chapters 5-7, occur in several stages. The process originates with the actions of the Federal Open Market Committee (FOMC), the Federal Reserve's principal monetary policymaking unit. The Committee typically meets eight times a year in Washington, D.C. At these meetings, the seven governors and the presidents of the twelve regional Reserve Banks evaluate the economic outlook and develop monetary policy. The Chairman of the Board of Governors presides over the meetings; the permanent voting members of the Committee include the governors and the president of the New York Federal Reserve Bank. Four other Reserve Bank presidents serve as voting members on a rotating basis for one-year terms.

At every FOMC meeting, instructions are adopted and sent to the Trading Desk at the New York Federal Reserve. This "directive" indicates whether the Committee desires to increase, maintain, or decrease the degree of "pressure" on reserve positions. The indicators of reserve pressures have varied over the years. At the time of this writing, the FOMC is characterizing them as reserve provision to the banking system consistent with keeping the interbank Federal funds rate in line with a stated goal. The directive also indicates that potential economic, financial, or monetary developments could call for adjustments to the degree of reserve pressure during the period between meetings.

The Trading Desk provides reserves to the banking system in a manner designed to be consistent with the FOMC's desired Federal funds rate. In implementing the Committee's directive, the Desk

purchases or sells U.S. Treasury debt instruments to bring reserves in line with established objectives.

Each February, the FOMC sets growth rate ranges for various monetary and credit measures during the current calendar year. The ranges are reported by the Federal Reserve Chairman to the banking committees of the Congress, as required by the Humphrey-Hawkins Act. In July, the Chairman reports any revisions in that year's objectives, along with preliminary goals for the subsequent year. The uncertain relationships among money, economic activity, and prices have led to a de-emphasis of the money objectives, but they still must be set.

Changes in the monetary policy stance of the FOMC have been announced through press releases issued on the day of the decision since February 1994. The Federal funds rate tends to move to the new level when the change is announced; however, for the rate to be sustained at that level, reserves supplied by the Trading Desk must be consistent with the demands of the banking system.

Depository institutions respond to the change in the cost of funding by shifting the rate structures of their assets and liabilities. A higher funds rate should lead to higher market rates and increased incentives for other economic participants to reduce their holdings of money and their use of credit. Gradually, growth of money balances and credit should slow. At some point, the pace of real economic activity and of inflation will abate. Conversely, when the Federal funds rate falls, depository institutions will be encouraged to acquire more assets. The resultant portfolio adjustments will eventually work to spur monetary growth, increase credit availability, and quicken economic activity.

5. The Economic Impact

What, then, are the channels through which monetary policy impulses are transmitted to the economy? This question, addressed in Chapter 8, is difficult to answer completely because lags and feedback effects hamper efforts to trace all connections. Furthermore, a complex economy operating in a wider world context will not always react in a predictable way to a particular policy initiative. Nonetheless, much has been learned over the years. Individuals and businesses decide to buy or sell goods and services and to borrow or lend on the basis of current and expected values of income, interest rates, and prices. In addition, they respond to the costs of obtaining credit. The Federal Reserve is responsible for analyzing these influences and formulating a monetary policy that appropriately considers them.

Analysts of the monetary transmission process differ over the importance they attach to the various channels. Some economists have emphasized the influence of interest rates on economic decisions. Others have emphasized the importance of adjustments in money supply and demand in determining the state of the economy and the behavior of the price level. Still others have stressed the cost and availability of credit. The impact of expectations on economic decisions has received considerable attention in recent years. Expectations formulation has become an important component of the analysis of the monetary transmission mechanism. In particular, many analysts have examined the role of inflation expectations in determining interest rates. Judging whether interest rates are high or low requires knowing the degree to which inflation is expected to erode the purchasing power of money during the term for which the funds are borrowed or lent.

Various sectors of the economy will respond differently to monetary policy influences, in part because interest rate changes have different implications for them. For instance, consumers as a group are net creditors, while the federal government is generally a net debtor. Moreover, within each sector and income group, debt or credit positions will vary considerably.

Finally, the communication of economic and financial developments can be a factor in policy transmission. A considerable amount of information is disseminated very rapidly and must be interpreted in the context of underlying forces. With prices and interest rates being relatively volatile during the last three decades, firms with particular needs to predict and understand interest rate developments have devoted considerable resources to monitoring the economy and Federal Reserve policy.

6. International Dimensions of Monetary Policy

In the United States, monetary policy is still largely conducted with an eye toward domestic economic conditions and is guided heavily by domestic monetary and financial variables. Nevertheless, the Unites States is far from being a closed economy. As Chapter 9 shows, U.S. monetary policy can have a significant impact on other countries' economies, and developments abroad can affect the U.S. economy to a substantial degree. Moreover, foreigners use U.S. dollars as a transactions medium and a store of value, and to establish value in long-term contracts. In many dollar transactions, U.S. residents are not even participants, and the transactions do not enter into U.S. economic statistics.

The increased awareness that the United States is an open economy that cannot operate in isolation from the rest of the world

reflects the rapid expansion of international trade and financial transactions in the post-World War II period. As foreign trade has grown, both absolutely and as a share of economic activity, exchange rates have come to have a substantial bearing on U.S. income and production levels and on the U.S. inflation rate. Increased trade has been accompanied by enlarged international capital flows, which were facilitated by the dismantling of capital controls by many nations in the 1970s. Looked at in isolation, the floating exchange rates that replaced pegged rates in the early 1970s increased the opportunities for each country to pursue its own monetary policy goals independent of the actions of other nations. Nevertheless, increased trade and financial flows worked to make exchange rate changes—including those that stem from monetary policy actions—important policy considerations. They also elevated the importance of coordinated policy procedures among major countries in the world economy.

7. Recent Monetary Policy

So far in the 1990s, monetary policy has operated with a view to the importance of achieving price stability to provide a healthy climate for sustainable economic expansion with a minimum of distortions. It is recognized that the central bank must constantly be alert because institutional pressures to inflate are always present to varying degrees. Other goals must be kept in sight as well, such as easing the extremes of economic activity and minimizing structural imbalances. Chapter 10 briefly reviews some of the recent developments shaping monetary policy.

Money and the Economy

Conceptually, money consists of instruments with certain characteristics. Textbooks have generally defined it as a medium of exchange, a standard of value, a standard of deferred payments, and a store of wealth.[3] As such, money represents generalized purchasing power, which ought to be reasonably well linked over time with the nominal value of the total spending and output of goods and services in the nation's economic system. Individuals and companies choose to hold money because its use greatly simplifies a wide range of economic transactions. They limit their money balances, however, because holding money has costs in the form of forgone opportunities for alternative investments in goods, services, or financial instruments. The amount of money that is consistent with a central bank's goals for prices

and output depends upon the customs, practices, regulations, and political environment of its country's economy.

Expectations of future price changes will also affect how much money people will wish to hold as a share of economic activity. For instance, if rapid inflation is expected, people will seek to minimize their holdings of those forms of money that do not provide a return sufficient to offset the expected loss of purchasing power caused by rising prices. Alternatively, if prices are expected to be steady, people will generally hold more money because of its convenience in conducting transactions. When monetary growth exceeds the amount needed to support sustainable growth in economic activity, prices will rise.

Stability or slow change in the factors affecting the demand for money increases the likelihood of a predictable relationship between money and economic activity.[4] Rapid innovation in the nature of monetary instruments, however, such as occurred in the United States in recent decades, weakens those relationships. Also weakening the demand-for-money relationship is the increasing ease with which one can shift between money and those non-money instruments that provide a greater return than money. Essentially, there is no good match between the conceptual definition of money and the actual financial instruments that exist in the United States.

Because financial instruments have varying degrees of "moneyness," the Federal Reserve has set forth several definitions of money, listed in the box on p. 10. The narrow measure of money, M1, comes closest to conforming to all the criteria of the textbook definition, but it omits items that have most of the characteristics of money and are often better stores of value than M1.

The broader measures, M2 and M3, capture some of these close substitutes for M1. In the broader definitions, however, the ease of using the funds for purchases tends to decline. For example, there are penalties for early withdrawals from small time-deposit accounts, a component of M2 but not M1. These accounts generally have the advantage of higher yields, which increases their popularity. Sometimes the distinctions between measures are minor; for example, it is very easy to shift between M1 and the liquid components of the broader aggregates, such as money market deposit accounts and mutual funds. Large shifts often occur when the opportunity cost of holding M1 changes.

1. Money and the Policy Process

In the policy process, some measure of money traditionally served as an intermediate target or indicator, standing between the Federal Reserve's ultimate policy goals of sustainable economic growth with price stability and the operating targets used for day-to-day

Money and Credit Definitions

M1 consists of currency in circulation outside of the Treasury, Federal Reserve Banks, and depository institutions; travelers checks; demand deposits at all commercial banks other than those due to depository institutions, the U.S. government, and foreign banks and official institutions, less cash items in the process of collection and Federal Reserve float; other checkable deposits (OCD), including negotiable order of withdrawal (NOW) and automatic transfer service (ATS) accounts at depository institutions; credit union share draft accounts; and demand deposits at thrift institutions.

M2 consists of M1 plus savings deposits, including money market deposit accounts; small time deposits, including retail repurchase agreements (RPs) in amounts of less than $100,000; and balances in retail money market mutual funds. M2 excludes individual retirement accounts (IRAs) and Keogh (self-employed retirement) balances at depository institutions and in money market funds. Also excluded are all balances held by U.S. commercial banks, retail money market funds (general purpose and broker-dealer), foreign governments, foreign commercial banks, and the U.S. government.

M3 consists of M2 plus time deposits and RPs in amounts of $100,000 or more issued by commercial banks and thrift institutions, Eurodollars held by U.S. residents at foreign branches of U.S. banks worldwide and at all banking offices in the United Kingdom and Canada, and all balances in institution-only money market mutual funds. M3 excludes amounts held by depository institutions, the U.S. government, money market funds, foreign banks, and official institutions.

Debt is defined as outstanding debt of the U.S. government, state and local governments, and private domestic nonfinancial sectors. Private debt includes corporate bonds, mortgages, consumer credit (including bank loans), other bank loans, commercial paper, bankers' acceptances, and other debt instruments. The Federal Reserve Board's flow of funds accounts are the source of domestic nonfinancial debt data expressed as monthly averages.

The **monetary base** consists of currency outside the Federal Reserve—including vault cash held by depository institutions—and required and excess reserve balances held at the Federal Reserve. The Board of Governors and the St. Louis Federal Reserve publish separate versions of the monetary base. They use different techniques to adjust the required reserve portion for changes in reserve requirement ratios. Beginning in mid-1996, the St. Louis base has included required clearing balances. (Required clearing balances are additional balances at the Federal Reserve that depository institutions contract to hold in order to facilitate the clearing of interbank transactions. They are discussed in Chapter 6, Box A.) Furthermore, in view of the sharp decline in required reserve ratios and other institutional developments, changes in reserve ratios affect only a subset of depository institutions. The new version of the St. Louis reserve adjustment magnitude incorporates only those changes in reserve requirement ratios that are binding on the depositories.[5]

policy implementation. Money occupied this position because its behavior was related both to the ultimate goals, which could not be controlled directly, and to the potential policy tools over which "the Fed" had direct control.

From the 1950s to the 1980s, most empirical data supported the view that M1 growth was a reasonably predictable leading determinant of nominal economic activity. Although no mechanism was available to control M1 precisely, approximate control was possible over time through adjustments in either the levels of banks' reserve balances or short-term interest rates. Similarly, the response of nominal gross domestic product (GDP) to changes in M1 showed seasonal and cyclical variation, but it also seemed to be reasonably predictable over the long run.

Starting in the 1970s, the Federal Reserve sought to take advantage of the empirical regularities and to control money growth with the intention of achieving sustainable economic growth while reducing inflation. As described in Chapter 2, however, a number of factors caused the money targets to be overshot persistently, particularly in the second half of the decade. Prices rose until inflation reached wholly unacceptable levels late in the decade. Eager to wind down the inflationary process of the 1970s, in October 1979 the Federal Reserve shifted gears and adopted a more aggressive approach to controlling money.

The technique met with considerable success if judged by its effect on average money growth and its impact on inflation. By 1982, substantial progress had been made in overcoming inflation, but the economy was in a deep recession. Nonetheless, M1 was growing rapidly by the standards then prevailing. It appeared that the previous relationships between M1 growth and nominal economic activity were not faring well. Consequently, the Fed modified its policy implementation techniques late in 1982 to deemphasize the money growth targets, especially those for M1. Later, distortions in the relationships between the broader money measures and economic activity led to reductions in their role as well.

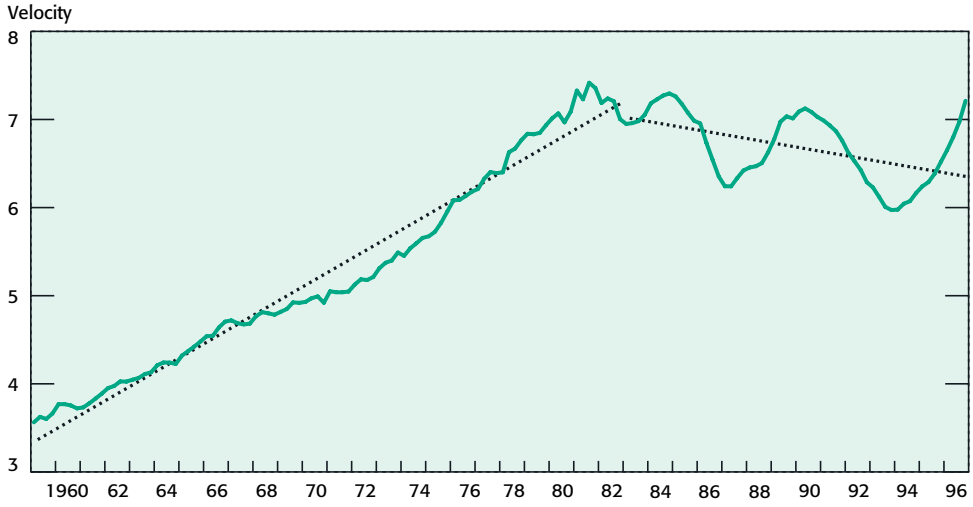
While cutting back on their reliance on the behavior of the monetary aggregates as policy indicators, policymakers placed greater emphasis on measures that might be termed indicator variables. These included short- and long-term interest rates adjusted for inflation and statistics on employment, production, spending, wages, prices, and international trade. None of these measures is directly controllable, and any of them could change for reasons other than the state of monetary policy. Nonetheless, taken together, they should suggest at least the likely course of overall economic activity and the direction in which policy instruments should be adjusted to achieve the ultimate policy goals.

2. Difficulties with Money Demand Relationships

The causes of the shifts in money demand have gradually become better understood. For many years, nominal GDP had grown modestly faster than M1, so the income velocity of M1, or its rate of turnover per income-generating transaction, had shown a modest upward trend. But a series of factors combined to make people less reluctant to hold M1 balances, and income velocity declined on balance beginning in the early 1980s (Chart 1). The spread of interest-bearing consumer transaction accounts included in M1 encouraged individuals to hold some of their savings in transaction form. In addition, lower inflation reduced the loss in purchasing power from holding money balances, an outcome that made holding money a more attractive option. When interest rates began falling, forgone interest also declined. The demand for money also became more sensitive to short-run interest rate movements. With components of M1 paying rates above zero but slow to change, large swings occurred in the relationship between market rates and rates on money balances. As a result, there were also large swings in M1 (Chart 2). Recently, the introduction of sweep accounts has once more lowered measured M1. Banks have been parking consumer checking balances in money market accounts to reduce costs.

Increased demand for U.S. currency in foreign countries during the 1980s and 1990s also interfered with the traditional M1 relationships. The foreign demand largely reflected efforts by residents of

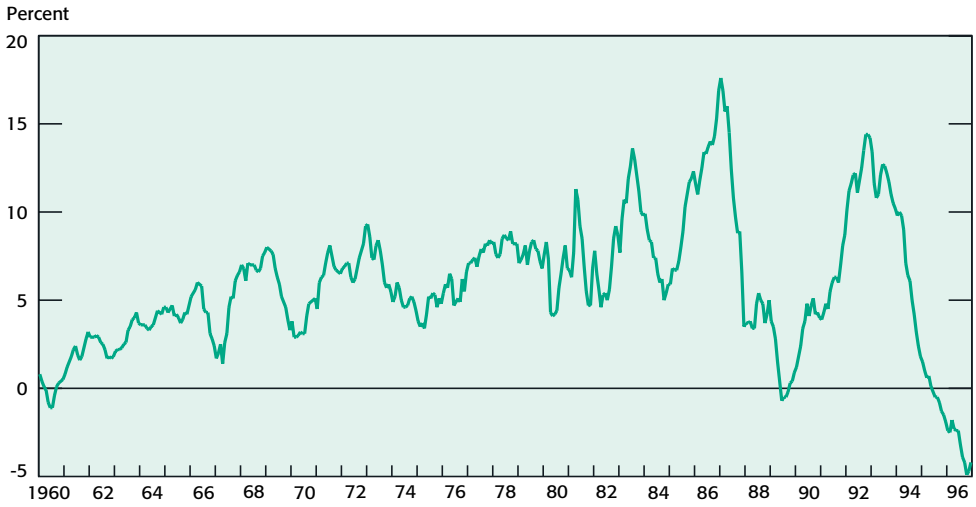
Chart 1. **M1 Velocity and Trends**



Sources: Board of Governors of the Federal Reserve System; U.S. Department of Commerce.

Notes: Velocity trend from 1959:Q1 to 1982:Q4 was 4.0 percent per year; velocity trend from 1983:Q1 to 1996:Q4 was -1.2 percent per year.

Chart 2. **M1 Growth**
Change from Twelve Months Earlier

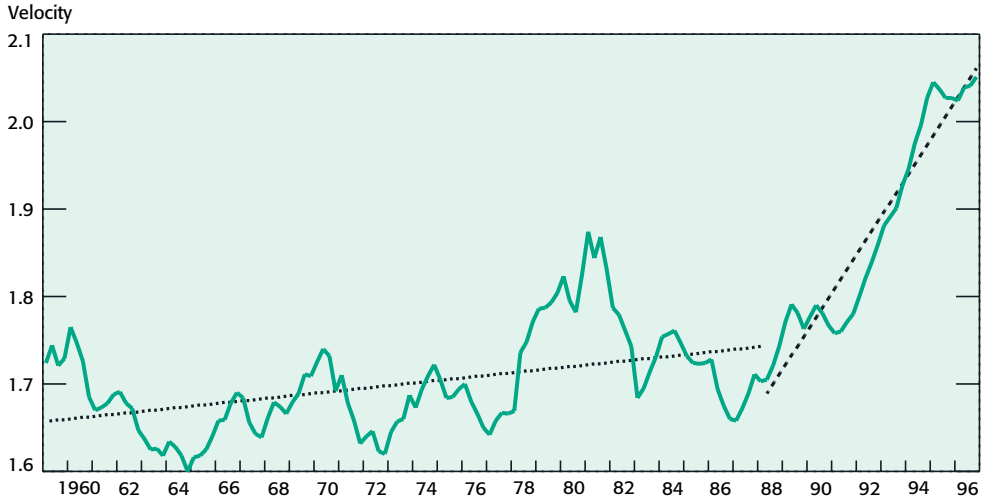


Source: Board of Governors of the Federal Reserve System.

countries with high inflation to substitute a more stable dollar for their own currency. The dollars were not held to facilitate transactions in the United States, so they did not bear much relation to U.S. income measures.

For M2 and M3, the variability of velocity increased. The trend velocities may have shifted, but both series have varied enough to make patterns uncertain (Charts 3 and 4). During the early-to-mid-1980s, a combination of high interest rates and financial innovation encouraged shifting among different types of money. Money market deposit accounts introduced at the end of 1982 were very popular and encouraged the growth of M2 and M3 (Charts 5 and 6). However, late in the 1980s, M2 and M3 growth slowed even as interest rates declined. The sluggish rate of growth continued for several years after the 1990-91 recession—a somewhat surprising trend given the pickup in the economy starting in 1992. One possible explanation for this phenomenon is that since the early 1990s interest rates on components of M2 such as savings and small time deposit accounts have remained low relative to money market interest rates. Early in the 1990s, commercial banks were not aggressively seeking retail accounts because they were attempting to hold down the expansion in their balance sheets to repair their capital positions. M3 was also held down for a while because loans were soft and dollar funding from abroad was attractive to domestic banks.

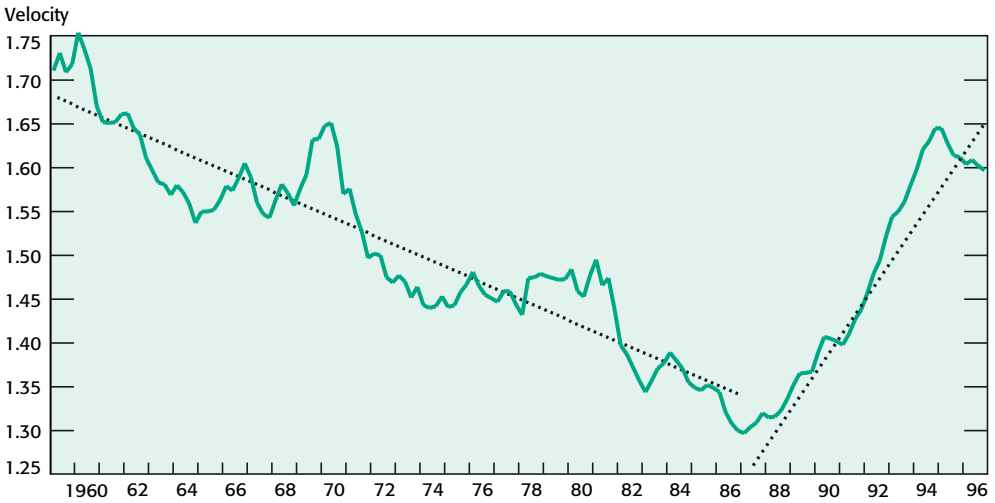
Chart 3. M2 Velocity and Trends



Sources: Board of Governors of the Federal Reserve System; U.S. Department of Commerce.

Notes: Velocity trend from 1959:Q1 to 1988:Q1 was 0.07 percent per year; velocity trend from 1988:Q2 to 1996:Q4 was 1.1 percent per year.

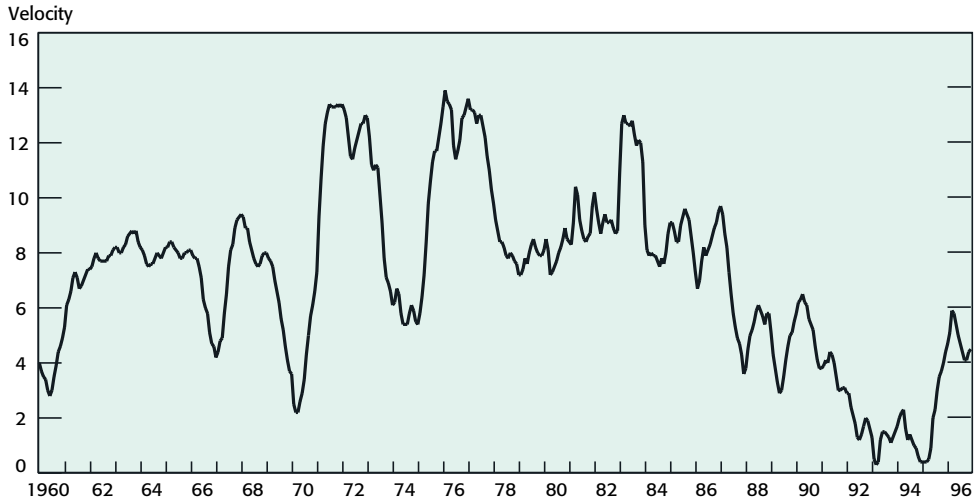
Chart 4. M3 Velocity and Trends



Sources: Board of Governors of the Federal Reserve System; U.S. Department of Commerce.

Notes: Velocity trend from 1959:Q1 to 1986:Q4 was -0.3 percent per year; velocity trend from 1987:Q1 to 1996:Q4 was 1.0 percent per year.

Chart 5. **M2 Growth**
Change from Twelve Months Earlier



Source: Board of Governors of the Federal Reserve System.

Chart 6. **M3 Growth**
Change from Twelve Months Earlier

Source: Board of Governors of the Federal Reserve System.

Another factor at work in the early 1990s was a shift of wealth into stock and bond mutual funds as these funds grew in popularity among investors. The Federal Reserve considered including those mutual funds in an expanded M2 measure but did not do so. The expanded aggregate did capture some of the substitution out of M2 and removed much of the weakness during the early 1990s. However, the expanded total was almost as volatile as M2, indicating that other forces probably were affecting both M2 and mutual funds. Another difficulty with the expanded measure is that stock and bond mutual funds are themselves subject to sometimes volatile capital gains and losses.[6] More recently, the relationship between the traditional measure of M2 and economic activity appears to have stabilized somewhat, but it is too early to be sure.

The Tools of Policy

The Federal Reserve's three traditional primary instruments of monetary policy are open market purchases and sales of U.S. government securities, direct borrowing by banks from the discount window, and the imposition of reserve requirements. Using these tools, the Federal Reserve can affect the cost and availability of reserves to commercial banks and other depository institutions. The tools can be used separately or in combination. Each of the tools is under a different jurisdiction within the Federal Reserve System, but their use can, if needed, be coordinated to meet the needs of a particular situation. Open market operations provide the greatest flexibility and are the most actively employed tool. Nevertheless, the FOMC must take account of the settings of the other instruments when making its choices for open market policy.

1. Open Market Operations

Open market operations are the primary tool used for regulating the pace at which reserves are supplied to the banking system. They consist of Federal Reserve purchases and sales of financial instruments, usually securities issued by the U.S. Treasury. Open market operations are carried out by the Trading Desk of the Federal Reserve Bank of New York under direction from the FOMC. The transactions are arranged through firms that act as dealers, routinely buying and selling Treasury debt. Purchases by the Desk add reserves to the banking system, while sales drain them. Such purchases and sales may be made either outright or under a temporary arrangement in which the transaction is reversed after a specified number of days.

2. The Discount Window

The discount window permits depository institutions to borrow reserve balances from the Federal Reserve at a specified rate provided they meet certain conditions set by the Board of Governors of the Federal Reserve System through Regulation A. Discount rate changes are initiated by the regional Reserve Banks' boards of directors and are subject to final review and determination by the Board of Governors.

Since the mid-1960s, the basic discount rate frequently has been below the prevailing Federal funds rate. The Federal Reserve has relied on administrative procedures to limit access to the window by restricting the frequency and amounts of borrowing. Despite the often attractive rates, the discount window has been used very little in recent years, and borrowing has diminished in importance as a policy tool. The Federal Reserve's administrative restrictions used to be the primary factor that discouraged borrowing, but in the last decade banks themselves have been responsible for much of the limitation. Heavy borrowing in the 1980s by a few banks with financial difficulties caused others to avoid the window for fear depositors might conclude that they were also in trouble. Reluctance to borrow contributes to a seemingly contradictory result—namely, that increases in the amount of reserves in the banking system, when provided through the discount window, make reserve availability more restrictive on the margin because such increases put banks under pressure to find other sources of reserves to repay the loans.

Changes in either the discount rate or the rules and guidelines for access to the window can affect the costs to depository institutions of obtaining reserves to support deposit and credit growth. The response of depository institutions to the discount rate settings may affect short-term interest rates, although the Federal funds rate has greater influence. The implicit or explicit message about monetary policy contained in the discount rate change announcement probably has more effect on bank behavior than does the rate change itself.

3. Reserve Requirements

Reserve requirements play a role in establishing the banks' demand for reserves and help determine the effects of the other monetary tools on bank behavior. Commercial banks and other financial institutions accepting deposits against which payments can be made must maintain reserves in the form of cash in their vaults or deposits at Federal Reserve Banks. The existence of reserve requirements underlies the relationship between the volume of reserves and the transaction deposit component of money.

The Depository Institutions Deregulation and Monetary Control Act of 1980 (MCA) imposed uniform reserve requirements across all depository institutions holding transaction deposits. It also specified a schedule for implementing the new reserve requirements between 1980 and 1987. The MCA gave the Board of Governors of the Federal Reserve System authority to alter reserve requirements within specified ranges.

No changes in reserve requirements were made during the 1980s for the express purpose of influencing the behavior of money or credit. Reserve requirements have been cut twice in recent years—at the end of 1990 and in 1992—to help reduce the banking system's operating costs. Over time, it was anticipated that most of the cost savings would be passed on to depositors and borrowers. In addition, the reductions were expected to strengthen the financial conditions of banks and thereby improve their access to capital markets, putting them in a better position to extend credit.[7] Recent efforts by depository institutions to avoid reserve requirements by sweeping consumer checking account balances into savings accounts have lowered required reserve balances to levels where they are not binding on the behavior of most depositories.

Chapter 2

The Federal Reserve and U.S. Monetary Policy: A Short History

The tools that the Federal Reserve uses today and its approach to formulating and implementing monetary policy have evolved considerably from what the framers of the Federal Reserve Act had in mind in 1913. The economic consequences of two world wars, the Great Depression, and the inflation of the 1970s have contributed to significant changes in Federal Reserve policy priorities and in the techniques and tools used to pursue them. A System that was decentralized at the outset has become much less so; the goals of price and economic stabilization now figure importantly in the Federal Reserve's objectives for monetary policy; and open market operations, a procedure not even mentioned in 1913, has become the primary tool of policy. This account focuses on the changing views of the Federal Reserve's primary monetary policy responsibilities and on the discovery and development of policy guidelines and tools. It should provide some understanding of the roots of the current policy process, the focus of much of the book.[1]

The Federal Reserve's Beginnings and World War I: 1914 to 1920

The Federal Reserve System was created against a background of long-standing distrust in centralized power and of central banks in particular. In the 19th century, the United States had twice established central banks to stabilize the banking system through reserve and currency management activities. However, the charters of the First Bank of the United States (1791-1811) and the Second Bank of the United States (1816-32) were not renewed by Congress upon expiration, primarily because of political distrust of the eastern financial establishment and a desire by western farmers for inexpensive credit.[2]

From 1846 until the establishment of the Federal Reserve in 1914, reserve management was effected through a "national banking system." Under this system, "country banks" were required to hold reserves at larger banks as well as in the form of cash. "Reserve city banks" were required to hold reserves in cash and as deposits in "central reserve city banks." Central reserve city banks were required to hold their reserves in cash. The Treasury Department altered reserve levels by adding or draining funds that it kept on deposit at central reserve city banks. The large city banks were unable to respond adequately to seasonal and cyclical variations in the cash and credit requirements of the economy. The years were marked by periodic financial crises that were resolved primarily through emergency actions of private bankers.[3]

In 1907, a banking panic was brought under control through extraordinary actions by a group of commercial banks, led by J. Pierpont Morgan.[4] The panic inspired considerable interest in developing a better system to deal with future crises. A series of congressional studies, hearings, and proposals culminated in the passage of the Federal Reserve Act in December 1913.[5]

The system created by the act consisted of the Federal Reserve Board in Washington, D.C. and twelve regional Federal Reserve Banks with main offices and branches to serve the entire country. The Federal Reserve System was directed, in the words of the preamble to the Federal Reserve Act, "to furnish an elastic currency, to afford the means of rediscounting commercial paper, to establish a more effective supervision of banking in the United States, and for other purposes." It was anticipated that credit extended by the Federal Reserve Banks to commercial banks would rise and fall with seasonal and longer term variations in business activity, thus providing a self-adjusting mechanism that would prevent shortages of currency or runs on banks from leading to financial panic and a breakdown in the economy. The framers

did not worry about the inflationary potential of such accommodative credit provision, because long experience with the gold standard had led them to expect that gold flows would limit inflationary or deflationary tendencies.

From the beginning, the Federal Reserve was reasonably successful in accommodating the seasonal swings in the demand for currency—in the terminology of the act, providing for "an elastic currency." It thereby alleviated some of the troublesome strains on the commercial banks that arose from the cyclical pattern of credit demands in agriculture and from the year-end rise in currency demand. Interest rates no longer exhibited seasonal fluctuations to the degree that they had earlier.[6] Other aspects of the System's mandate developed more slowly and were subject to experimentation and controversy.

The act established a decentralized system. The regional Reserve Banks were to have considerable authority to set the terms for credit provision in response to local developments and to regulate member banks in their districts. The Board in Washington was assigned responsibility for overseeing the activities of the Reserve Banks. The Board consisted of a governor and four other regular members, with the Secretary of the Treasury and the Comptroller of the Currency designated as ex officio members. The twelve regional banks were headed by governors, most of whom had been commercial bankers.

Between the outbreak of World War I in 1914 and the United States entry into the war in 1917, gold flowed into the country from Europe to purchase goods needed for the war effort. The Federal Reserve found that it did not have the tools to offset the inflationary impact of the inflows. Nor did it have the power to raise reserve requirements; indeed, the Federal Reserve Act mandated reductions in reserve requirements for several years while reserve balances were being consolidated at the Federal Reserve rather than scattered among the large commercial banks. The Reserve Banks did not yet have many securities, so they could not absorb liquidity through securities sales. (Table 1 shows the history of the Federal Reserve portfolio from 1914 through 1950. The early years' figures are overstated because repurchase agreements in bankers' acceptances [BAs] are included with outright holdings.) Indeed, only minimal amounts of Treasury debt were outstanding, most of it backing national bank notes. At the end of 1916, the total interest-bearing Treasury debt was just under $1 billion, consisting mostly of relatively long-term securities.

In that period, the only tool potentially available to offset the reserves provided by gold inflows was the discount window. Discount rates (or rediscount rates as they were then called)—the rates at which the Reserve Banks made loans to the member banks by discounting eligible paper—could

Table 1. **Federal Reserve Holdings, 1914-50 (Pre-Treasury–Federal Reserve Accord)**
Millions of U.S. Dollars

Year-End	Treasury Bills	Treasury Certificates	Treasury Notes	Treasury Bonds	Total Treasury Securities[a]	Bankers' Acceptances	Total Holdings[a]	Annual Growth Rate (Percent)
1914	0.0	0.0	0.0	0.5	0.5	N/A	0.5	
1915	0.0	0.0	0.0	16.0	16.0	64.8	80.8	3,100.0
1916	0.0	0.0	11.0	44.0	55.0	121.2	176.2	243.8
1917	0.0	43.0	27.0	52.0	122.0	266.9	388.9	121.8
1918	0.0	201.0	9.0	28.0	238.0	285.3	523.3	95.1
1919	0.0	273.2	0.5	26.8	300.5	71.6	372.1	26.3
1920	0.0	260.6	0.5	26.3	287.4	187.2	474.6	-4.4
1921	0.0	183.5	17.6	33.0	234.1	145.0	379.1	-18.5
1922	0.0	226.5	178.6	28.3	433.4	271.0	704.4	85.1
1923	0.0	17.1	87.0	29.5	133.6	352.0	485.6	-69.2
1924	0.0	115.5	349.4	75.3	540.2	386.9	927.1	304.3
1925	0.0	126.7	187.1	60.8	374.6	372.2	746.8	-30.7
1926	0.0	179.5	87.3	48.0	314.8	381.0	695.8	-16.0
1927	0.0	232.2	52.2	275.6	560.0	308.9	868.9	77.9
1928	0.0	49.8	95.8	51.6	197.2	437.5	634.7	-64.8
1929	56.3	161.9	199.4	69.7	487.3	235.3	722.6	147.1
1930	24.2	312.6	208.1	141.2	686.1	288.8	974.9	34.9
1931	130.7	270.1	31.5	342.3	774.6	215.3	989.9	1.5
1932	414.6	719.0	296.5	421.0	1,851.1	3.6	1,854.7	87.4
1933	515.8	425.1	1,053.2	441.2	2,435.3	108.1	2,543.4	37.1
1934	527.5	0.0	1,507.1	395.7	2,430.3	0.1	2,430.4	-4.4
1935	573.0	0.0	1,641.6	215.7	2,430.3	0.0	2,430.3	0.0
1936	598.6	0.0	1,341.0	490.6	2,430.2	0.0	2,430.2	0.0
1937	657.5	0.0	1,155.0	751.5	2,564.0	0.5	2,564.5	5.5
1938	566.2	0.0	1,156.9	840.9	2,564.0	0.5	2,564.5	0.0
1939	0.0	0.0	1,133.2	1,351.0	2,484.2	0.0	2,484.2	-3.1
1940	0.0	0.0	899.5	1,284.6	2,184.1	0.0	2,184.1	-12.1
1941	10.4	0.0	777.3	1,466.8	2,254.5	0.0	2,254.5	3.2
1942	1,010.0	1,041.0	1,345.1	2,792.6	6,188.7	0.0	6,188.7	174.5
1943	6,768.3	2,467.3	677.9	1,629.5	11,543.0	0.0	11,543.0	86.5
1944	11,147.9	4,886.6	1,568.2	1,243.4	18,846.1	0.0	18,846.1	63.3
1945	12,831.2	8,364.5	2,119.7	946.9	24,262.3	0.0	24,262.3	28.7
1946	14,745.0	7,496.0	355.3	753.4	23,349.7	0.0	23,349.7	-3.8
1947	11,433.4	6,796.5	1,476.6	2,852.9	22,559.4	0.0	22,559.4	-3.4
1948	5,487.4	6,077.6	790.6	10,977.2	23,332.8	0.0	23,332.8	3.4
1949	4,829.2	6,275.5	562.2	7,217.7	18,884.6	0.0	18,884.6	-19.1
1950	1,244.0	2,334.2	12,526.2	4,620.1	20,724.5	0.0	20,724.5	9.7

Source: Federal Reserve Bank of New York.

Note: Data exclude effects of repurchase agreements, except for bankers' acceptance figures before 1927.

[a] Figures may not sum to totals because of rounding.

have been raised sufficiently to discourage banks from using the facility. The governors did discuss such an approach but did not take that step. While the rates varied considerably, they were left low enough to encourage banks to use the facility to obtain needed reserves. The rates differed among Reserve Banks and according to the type of paper being discounted. Rates were initially established on a decentralized basis that gave each Reserve Bank flexibility to respond to the regional economic climate. By 1917, each Reserve Bank had developed a complicated rate structure that classified eligible paper according to risk and maturity features.[7]

Once the United States entered the war, gold flows almost disappeared. The United States extended massive loans to its allies, eliminating their need to make gold payments to the United States. It also restricted exports of gold. The Federal Reserve had to cope with the large issuance of Treasury debt needed to finance the war effort. The Liberty Loan Acts authorized a series of debt sales up to certain dollar limits.[8] Previously, Congress had approved debt issues individually. The Secretary of the Treasury assigned the responsibility for placing short-term Treasury certificates and redeeming them upon maturity to the Federal Reserve to facilitate the Treasury's financing efforts.

The Secretary of the Treasury insisted that the Federal Reserve hold down interest rates while the Treasury's Liberty Loan issues were being sold. The first certificates of indebtedness were offered at a rate substantially below market rates, reflecting the Treasury's unstated intention to have the Federal Reserve subscribe for the entire issue. The Fed did take most of the issue, but with some reluctance.[9] Criticism of this financing measure was widespread on the grounds that it placed the Federal Reserve's funds "at the disposal of the Secretary of the Treasury for his immediate uses" and could result in destabilization of the banking system.[10] Thereafter, Treasury certificates were offered at competitive rates. To help sell the issues, the Fed made purchases attractive to member banks by allowing preferential rates for the discounting of Treasury securities. Expansion of Federal Reserve credit took the place of gold inflows as a major source of inflationary growth in money and credit.

After the war, the Federal Reserve struggled to sort out how to operate in a climate that had changed greatly. The Treasury had become an important participant in the credit markets. The discount rate was held down to support Treasury finance; deposits expanded and inflation accelerated, prompting an outflow of gold. Federal Reserve officials debated whether penalty discount rates should be established or moral suasion used to discourage banks from extending credit for speculation in commodities. Decisions were deferred, however, until 1920, when the outflow of gold had reached critical proportions, and the combination of currency expansion and gold outflows had reduced the ratio of gold to Federal Reserve notes to a level approaching

the 40 percent legal minimum then in effect. In that year, the Treasury dropped its opposition to higher rates. Higher discount rates reversed the gold outflows but contributed to dramatic declines in money and prices and a short but severe economic contraction.[11]

Adapting to a Changed Environment in the 1920s

The 1920s were marked by ongoing discoveries about the effects of the various monetary policy tools and considerable debate over the role of the Federal Reserve. For much of the decade, banks made heavy use of the discount window. An understanding existed that individual banks should not be continuously in debt to the Federal Reserve, but on any given day about one-third to one-half of them were likely to be borrowing. Large banks were expected to repay their loans within a few days, while smaller banks could borrow for a couple of weeks at a time. Borrowed reserves often met a significant portion of the banks' total reserve requirement.

The discount rates were usually kept modestly above the rate on ninety-day bankers' acceptances and modestly below the rate on four-to-six-month commercial paper. Occasionally, the Fed attempted to discourage use of the discount window for speculative purposes. Multiple rates for discounting different types of paper prevailed through 1921. Small differences among the regional Reserve Banks' discount rates often existed until World War II. Discount rate changes had to be approved by the Board, a requirement that sometimes precipitated disputes between the Board and the Reserve Banks. On average, the discount rates were changed about twice a year.

Federal Reserve thinking was influenced by the so-called real bills doctrine, particularly in Washington, where Board member Adolph Miller was its strongest advocate. This doctrine held that credit used to finance commercial activity should expand and contract in line with the needs of trade. Accordingly, because short-term commercial bills were issued to finance commercial transactions, it was believed that they could not be issued in excessive amounts and could not be inflationary. In contrast, other loans might encourage speculation and thus could be excessive. This reasoning led some to conclude that the Federal Reserve should encourage financing conducted through commercial bills and discourage speculation.[12] Other hypotheses were being developed at the New York Federal Reserve and in academic circles. Inflation, according to these alternative views, arose from excessive credit expansion. Any provisions of Federal Reserve credit, regardless of the original reason for the extension, would stimulate eco-

nomic activity and could potentially lead to inflation.[13]

From its founding, the Federal Reserve had promoted the creation and development of BAs—a form of commercial bill (described in Chapter 4). BAs were believed to be a desirable means of promoting domestic and international trading of goods. Federal Reserve Banks had purchased BAs before 1917 in order to provide earning assets to meet expenses and to encourage the growth of the instrument. The volume of purchases had fallen off after the United States entered the war, when earnings from discount window loans covered expenses. Purchases of BAs were resumed in the 1920s, initially to lift earnings of the Reserve Banks and to help develop a secondary market for these instruments. To this end, Federal Reserve Banks also arranged repurchase agreements against BAs. In accord with the real bills doctrine, many officials did not believe that Federal Reserve purchases of BAs could be inflationary. Purchases of Treasury certificates of indebtedness evoked more concern. Removing Treasury securities from bank portfolios freed funds that could then be used for speculative purposes.

Early in the 1920s, most Federal Reserve officials still regarded open market purchases primarily as a source of revenue rather than as a tool for regulating reserves for the purpose of controlling money and credit. Each Reserve Bank made its own purchases of both Treasury securities and BAs. It soon became apparent that these purchases had an impact on short-term interest rates. Benjamin Strong, the influential governor of the New York Federal Reserve Bank, was one of the first officials to recognize the power of open market operations to affect reserve and credit conditions and, through them, economic activity and prices. He argued that under a system with fractional reserve requirements, increases in bank reserves, whether they came from an inflow of currency to the banks or from Federal Reserve provision, would support a multiple expansion of deposits and credit. Governor Strong wanted to use open market operations to offset undesired changes in gold holdings and to stabilize economic activity.

Beginning in 1920, Governor Strong sought to achieve better coordination of open market operations. He preferred to have all operations on behalf of the System conducted by the New York Federal Reserve, but initially his goal was to coordinate open market operations among the regional Reserve Banks. A series of committees were formed to explore ways to achieve coordination and prevent the Reserve Banks from bidding for securities against each other or the Treasury. Gradually, the policy implications of the operations came to be considered. The efforts to study and coordinate Reserve Bank operations led to the creation of the Open Market Investment Committee (OMIC) in 1923, consisting of the governors of the Federal Reserve Banks in New York, Boston, Philadelphia, Cleveland, and Chicago. None of the various

open market committees during the 1920s had the exclusive power to approve the open market operations of all regional banks either in BAs or in government securities. They did, however, receive reports on purchases and redemptions of maturing issues to guide the choices for System operations. A Trading Desk at the New York Fed carried out operations for the Federal Reserve System as well as for the New York Bank.

During the 1920s, the U.S. Treasury Department believed it had some authority over Federal Reserve operations involving Treasury debt issues. Indeed, in 1922, the Treasury expressed distress at the amount of its securities that had been purchased and asked the Federal Reserve Banks to liquidate their holdings of its debt to avoid inflation. Governor Strong acquiesced to the request for portfolio liquidation because gold inflows to the United States were financing credit expansion. Other governors, concerned that sales of Treasury securities would reduce earnings, agreed only reluctantly. Because of the gold inflows, discount window use (another source of earnings) did not rise as the portfolio declined, and Federal Reserve earnings reached critically low levels. The Treasury then agreed that the Federal Reserve Banks could hold sufficient securities to cover expenses.

The view that open market operations could serve as a countercyclical tool to influence reserve and credit conditions gained adherents as the 1920s progressed.[14] Nonetheless, there were ongoing disputes between those who wanted a procyclical policy based on the demand for credit for commercial transactions (real bills) and those who wanted to make credit readily available when the economy was in a recession and stringent when the economy was growing rapidly. The OMIC, with Treasury approval, began to use open market operations as a countercyclical policy tool during the 1924 recession.

The OMIC gauged whether credit was tight or easy by watching short-term market interest rates and the amount of borrowing from the discount window. A number of analysts observed that open market purchases that did not offset gold outflows encouraged banks to repay discount window credits. By the same token, open market sales encouraged increased borrowing. Some people interpreted this pattern to mean that open market operations had no effect on reserve availability or on a bank's ability to lend. But others, including analysts at the New York Reserve Bank, argued that limitations on prolonged discount window borrowing might make those banks reducing their borrowing feel more comfortable in extending additional loans. Thus, open market purchases would have an expansionary effect. Nonetheless, some analysts who conceded that open market operations and discount rate changes could moderate business cycles questioned the wisdom of countercyclical monetary policy because they feared it might impart an inflationary bias to policy.

During much of the 1920s and 1930s, outright purchases and sales of Treasury securities in the market were the only type of open market operation regularly undertaken at the Federal Reserve's initiative. At its regular meetings, the OMIC generally authorized the New York Fed to undertake outright purchases or sales of Treasury debt instruments for the consolidated System Account in amounts up to a specified level.[15] This "leeway" for portfolio changes was available if needed to achieve the desired credit conditions. Decisions would be made by observing the behavior of borrowed reserves, especially borrowings by the money center banks, and money market conditions, exemplified by the behavior of short-term interest rates and the ease or difficulty encountered by securities dealers in obtaining financing. Operations were conducted with recognized dealers and were negotiated on a case-by-case basis.

Other types of open market operations were generally carried out at the initiative of the banks or dealers and were sometimes referred to as passive open market operations. The Federal Reserve Banks established rates at which they would buy BAs. Through most of the 1920s, the rates were set close to market rates and slightly below the discount rate. If the Federal Reserve Banks were routinely buying more or fewer BAs than the OMIC wanted, the offering rate would be adjusted. Repurchase agreements (RPs) against both Treasury securities and BAs were arranged on behalf of nonbank dealers at the dealers' initiative for periods of up to fifteen days, with early withdrawals permitted. The Federal Reserve recognized that these passive operations affected bank reserves, but because of the operations' temporary nature (the average maturity of BAs purchased was only about fifteen days, and the BAs were redeemed at maturity), they were generally not seen as having policy significance. Instead, the operations were believed to ease temporary credit stringencies faced by dealers when reserves were drained by Treasury cash management operations or some other noncontrolled factor. The Federal Reserve did, on occasion, deliberately absorb reserves through what today would be called matched sale-purchase transactions. When reserves were abundant because Treasury cash positions were abnormally low before tax dates, the Fed sometimes made temporary sales of short-term Treasury certificates of indebtedness bought directly from the Treasury.[16]

During the 1920s, the System's domestic securities portfolio did not grow significantly on balance (Table 1). Federal Reserve officials reportedly preferred to purchase short-term securities.[17] Limited available supplies, however, led the Reserve Banks to purchase a mix of securities that spanned the maturity spectrum. In some years, holdings of certificates of indebtedness did outweigh the longer term portion of the portfolio.

Major Contraction: 1929 to 1933

The absence of consensus concerning either the role or the power of the Federal Reserve to respond to cyclical forces proved to be a severe handicap during the 1929-33 contraction phase of the Great Depression. Economic activity had already begun to weaken at the time of the stock market crash in October 1929, but the Federal Reserve had felt helpless to provide stimulus without also feeding the speculative boom in stock prices. Governor George Harrison, who had assumed leadership of the New York Fed after Governor Strong's death in October 1928, had argued in 1928 for a sharp but short-lived increase in the discount rate, tempered by open market purchases. The Board turned down his requests until August 1929, by which time Governor Harrison felt that it was probably too late. Initially, the Fed tried, with limited success, to use moral suasion to discourage banks from borrowing funds from the discount window to invest in financial instruments. Once it did raise the discount rate, it made only limited use of open market operations to soften the pressure of high rates.

On October 29, 1929, when the stock market crashed, the New York Fed bought about $125 million of Treasury securities, five times the maximum weekly purchase amount authorized by the OMIC. The purchases about doubled total holdings of government securities by all Federal Reserve Banks, which stood at $271 million on October 31, 1929.[18] The New York Fed also indicated that its discount facility would be available to help the New York City banks that provided assistance to other banks facing cash needs. The OMIC, however, did not approve further purchases of securities until its next meeting, worrying that such an action would be inflationary. It then approved only enough leeway to provide for the normal seasonal increase in currency.

In 1930, the OMIC was replaced by the Open Market Policy Conference (OMPC), composed of all twelve Federal Reserve Bank governors and the members of the Federal Reserve Board. Power to call and lead the meetings was transferred from the New York Fed governor to the governor of the Board. The reorganization, which had been in the works since 1928, had the effect of shifting power from the New York Fed to the Board. An executive committee, consisting of a subset of the OMPC members, met more frequently than the whole conference and worked closely with the Trading Desk at the New York Fed on the specifics of operations. The use of an executive committee was continued until 1955, when improved transportation made frequent meetings of the full open market committee relatively easy to arrange.

During 1930, the OMPC resisted using a countercyclical approach to policy to offset the weakness of economic activity. Although Governor Harrison

asked the OMPC several times for authorization to buy more Treasury securities to promote business recovery, he was permitted to purchase only small amounts. The predominant sentiment was that with the economy weakening, the needs of trade were declining, making the contraction in money and credit appropriate. At least one governor viewed the economic weakness as the inevitable consequence of the earlier "economic debauch" of the speculative boom.[19]

The Federal Reserve did lower discount rates in several steps until 1931, but at a pace that lagged behind the effects of the contraction in money, credit, and prices. Board member Adolph Miller argued that further cuts in interest rates were desirable to counter the depressed business conditions. To support his view that the discount rate cuts to date might not have been sufficient, Miller contended at the September 1930 meeting that in times of depression, a money rate is "a particularly imperfect indicator of the true state of credit." Nonetheless, the OMPC remained cautious, hoping that economic conditions would improve.

The OMPC was disturbed by the banking crises that took place from October to December 1930 and in March 1931. During these periods, bank failures and runs on banks caused the demand for currency to rise dramatically. The Federal Reserve provided the currency demanded but did not fully offset the reduction in member bank reserves that the banks suffered as the currency was paid out. Available records do not indicate that the OMPC members discussed the severe contractions of member bank reserves, money, and credit resulting from the currency drains. The OMPC made no adjustments to its routine instructions for open market operations, which generally authorized net purchases (and in some instances, sales) of up to $100 million of Treasury securities between meetings if they were needed to stabilize money market rates. Much of the conference's discussion following the first banking crisis concerned supervisory issues, particularly as they applied to the Bank of the United States, by far the largest failure.[20]

In contrast, the Federal Reserve raised rates promptly in October 1931 to stem gold outflows that occurred after Great Britain went off the gold standard.[21] The New York Fed raised its basic discount rate from 1 1/2 to 3 1/2 percent. The action severely strained an already weakened financial system. The higher rates did stem the gold outflow, but they also led to a renewed increase in the rate of bank failures and another depositor rush to currency. Although banks used the discount window because they needed the reserves, they were uncomfortable doing so, and some feared that using the window would be viewed as a sign of financial weakness.

In April 1932, the OMPC gained another proponent of a more active countercyclical policy, the new Treasury Secretary, Ogden Mills. He found

the Federal Reserve's failure to act "almost inconceivable and almost unforgivable . . . the resources of the System should be put to work on a scale commensurate with the existing emergency."[22] In the face of strong pressure from Congress and the Hoover administration, the OMPC did authorize $500 million of purchases of Treasury securities. (The leeway had been increased gradually from $120 million to $250 million between August 1931 and February 1932.) The reserve impact of the initial purchases was partially offset by gold outflows, but after a couple of months gold flowed back. Bank failures gradually subsided, and people began to return currency to the banks. The banks used some of the additional reserves to reduce their use of the discount window and to increase their holdings of excess reserves. But money and credit also grew, and the economy showed some meager signs of recovery for a while in 1932.

The OMPC members, however, believed that excess reserves were rising because banks were not finding attractive lending opportunities. More likely, banks simply wanted more excess reserves in the wake of the banking crises. Burgess notes that during the depression, banks became increasingly strict in their lending practices and were not taking care of their regular customers.[23] But in the face of the excess reserves, the Fed gave up on adding reserves and did not make any more substantial open market purchases after August 1932. Indeed, in November the OMPC contemplated selling securities to eliminate the excess reserves, but the administration discouraged that policy course. Early in 1933, the Fed again rejected suggestions to do something stimulative, even though a third severe banking crisis began in January and lasted into March.

Active Policymaking by the Administration: 1933 to 1939

When the Roosevelt administration was installed in March 1933, it very quickly instituted a universal bank holiday in the hope of resolving the crisis atmosphere and ending the series of runs and bank failures. Banking legislation in 1933 gave legal status to the bank holiday and authorized orderly reopenings. It allowed for issuance of Federal Reserve notes against government collateral and emergency issuance against other collateral. The Board was given power to alter member bank reserve requirements within a fairly wide range that included the existing ratios as lower bounds; the OMPC, as then constituted, was formally recognized. Finally, the legislation introduced federal deposit insurance and created the Federal Deposit Insur-

ance Corporation (FDIC). Temporary insurance began in January 1934 while a more permanent plan was worked out.

The Banking Act of 1935 went further. It reorganized the Federal Reserve System, introducing the basic structure that exists today. The Board became the Board of Governors of the Federal Reserve System, with seven governors, one of whom was designated Chairman. The Treasury Secretary and the Comptroller of the Currency no longer sat on the Board. The act formally charged the Board with responsibility for exercising such powers as it possessed to promote conditions consistent with business stability. The Reserve Bank governors were redesignated as presidents, and membership of the renamed Federal Open Market Committee (FOMC) was limited to five presidents at any one time. The act also took away the power of individual Reserve Banks to buy or sell government debt without permission of the FOMC, thereby formally ending one of the major controversies of the 1920s. Finally, it made permanent the provision of deposit insurance.

The Roosevelt administration generally supported activist government economic policies, and it took the lead in ending the pattern of money contraction. In 1934, Marriner Eccles was appointed Governor of the Board (and later Chairman as the restructuring took effect). He was a strong believer in an active Federal Reserve policy to combat deflation and unemployment. The OMPC and then the FOMC pursued policies designed to produce easy financial conditions. Nevertheless, the Federal Reserve actually made little use of either open market operations or rediscounting, its traditional policy tools.

Instead, gold returned to center stage as the primary source of money expansion. The administration took the country off the gold standard in April 1933. It allowed the price of gold to rise in the market until it established a new parity of $35.00 a troy ounce in January 1934, up from $20.67. The price was high enough to attract a large gold inflow from abroad, which the Treasury monetized by issuing gold certificates to the Federal Reserve. The Federal Reserve did not offset the resulting rise in reserve balances. Furthermore, because deposit insurance was increasing public confidence in the banks and ending the runs, currency flowed back to the banks and increased their reserves. Hence, even though the Federal Reserve took no action, reserves and money grew rapidly between 1934 and 1937, and economic activity expanded.

The gold and currency flows did stimulate money growth, but reserves grew even faster and the banks built up unprecedented holdings of excess reserves. At the time, Fed officials were puzzled by the buildup, and many of them interpreted it as a sign that there was no loan demand from creditworthy customers. They worried that the excess reserves could set off

inflation at some point in the future and consequently sought a way to eliminate them. Open market sales of securities were contemplated, but the excesses were so large that such sales would have reduced Federal Reserve earnings to the point where covering expenses might have been difficult. Discount window borrowing already was negligible, so there was no scope for further reductions.

Instead, the Federal Reserve turned to its new tool, reserve requirement ratios, and raised the ratios dramatically in several steps in late 1936 and early 1937. To the frustration of Fed officials, the banks built up their excess reserves again and, in the process, contracted the money stock. At the same time, the Treasury stopped issuing gold certificates to the Federal Reserve against the gold inflows, thus halting reserve injections from that source. Economic activity contracted until 1938, when the Fed reduced reserve requirements modestly and the Treasury resumed monetizing gold inflows.

The Federal Reserve made almost no use of open market operations to change the size of its portfolio, not even to offset seasonal movements in currency and the Treasury balance. Variations in excess reserves were permitted to absorb the seasonal swings in those factors. The Fed replaced maturing issues and, to achieve "orderly markets," made swaps that changed the composition of its holdings.[24] In 1937, the FOMC announced that it was prepared to make open market purchases to maintain orderly market conditions and to facilitate adjustment of the banking system to the increased reserve requirements. Between April 4 and April 28, $96 million of Treasury bonds were added to the portfolio to stabilize the market for government bonds because "the increased importance of bonds as a medium of investment for idle bank funds makes the maintenance of stable conditions in the bond market an important concern of banking administration."[25] At the close of 1937, the portfolio had grown slightly, to $2,564 million (Table 1).

Furthermore, even though the Fed cut the discount rate to 1 1/2 percent and then to 1 percent, the facility fell into disuse after the banking crisis of 1933. Throughout the late 1930s, the discount rate almost always exceeded market rates on short-term instruments. The combination of high excess reserves and a slight penalty rate took away the incentive to use the window. Outstanding discount window credit rarely exceeded $10 million in the latter half of the 1930s.

In 1939 and 1940, gold inflows to the United States reached unprecedented levels reflecting capital flight from Europe during the war and payments from Great Britain for war materiel, causing bank reserve levels to swell significantly. Reserves were drained slowly through periodic securities sales from the System's portfolio over the course of these two years. Because of

occasional disruptions in the U.S. Treasury securities markets, sizable purchases of Treasuries were also made on occasion to cushion price declines and restore orderly markets.[26]

Accommodating War Finance in the 1940s

Before the United States entered the Second World War, the Federal Reserve made only very limited use of open market operations—most notably, some purchases of Treasury securities after war was declared in Europe in 1939. Gold inflows continued to play the major role in supporting reserve expansion through 1941. As deficit financing of the war expanded, the Federal Reserve became a more active purchaser of Treasury debt. The Treasury wanted to keep its borrowing costs low and encouraged the Fed to hold down interest rates. In April 1942, the Fed formally pegged the rate at which it would buy Treasury bills at 3/8 of 1 percent, a level held until 1947. It pegged rates for making purchases (or sales) on longer term Treasury debt as well, although less formally. During this period, the Treasury—by dictating the rates at which the Federal Reserve would buy and sell securities—and the public, in its response to these rates, determined both the size and the composition of the Federal Reserve's portfolio. In practice, because the pattern of rates was steeper than underlying market forces called for, the largest purchases were of short-term debt.[27] Indeed, sales of Treasury bills and certificates of indebtedness to the Federal Reserve were often substantial. Because the discount rate was always at least 1/2 percent, banks that held Treasury bills found it advantageous to sell them to the Federal Reserve when they needed funding, rather than to use the discount window. Hence, discount window borrowing was not important during the war.

With confidence in the banks rising and prosperous economic times making banks more willing to expand loans and investments, excess reserves fell. The drop was assisted in November 1941 by an increase in reserve requirements. Measured inflation picked up initially, but once the United States entered the war late in 1941, it became very modest. Some inflation was disguised by price controls, but the public also chose to hold more money balances and save more in a wartime economy with few consumer goods available.

After the war, the nation's resolve to avoid another depression was embodied in the Employment Act of 1946. The federal government, including the Federal Reserve System, actively sought to achieve reasonably full employment of resources. The economy quickly shifted resources to civilian production. In attempting to restrain money and credit growth, the Federal

Reserve was handicapped by its commitment to stabilize interest rates on government securities.

By the late 1940s, inflationary pressures emerged as people spent some of their accumulated wealth and reduced their money balances from the unusually high wartime levels. The government ran large budget surpluses, but the debt outstanding was still substantial. Accordingly, the Treasury resisted Federal Reserve requests to raise interest rates to contain the inflationary pressures. In 1947, the Treasury finally did agree to an upward adjustment of the rates on the shorter maturities, creating a considerably flatter yield curve. Federal Reserve purchases of securities were rather variable. Despite the inflation, the 2 1/2 percent rate on long-term bonds was above the market clearing rate, and the Federal Reserve actually sold bonds. Money fell, credit conditions tightened, and there was a mild recession in 1949.

Unlike most of its trading partners, the United States continued to maintain a fixed price for gold, $35 an ounce, during and after the war (although during the war gold exports were restricted). Following the war, the United States ran large trade surpluses as other countries began to rebuild. Gold flowed into the country. During the late 1940s, a series of international negotiations resulted in the establishment of a modified gold exchange standard. In addition, a new organization, the International Monetary Fund, was created to help countries reestablish pegged exchange rates and to ease the transition to new exchange rates when currency imbalances created unacceptably large reserve flows at the existing rates. The founders of the new system believed that it would be flexible enough to prevent a recurrence of the international stresses of the 1930s. (In practice, adjustments proved more difficult than had been anticipated and were not often made.) The procedures took on the name of the resort in New Hampshire where negotiators met, and came to be known as the Bretton Woods system.

Resumption of an Active Monetary Policy in the 1950s and 1960s[28]

In 1950, inflation related to the Korean War convinced the FOMC that the rates being pegged on Treasury securities were too low. The Trading Desk attempted to discourage securities dealers from offering it Treasury issues. The Desk often delayed processing offers for several hours to induce dealers to find another purchaser. In the end, however, if the dealers could not obtain reasonable bids from other sources, the Fed generally bought the securities at the pegged rates.

The Treasury was reluctant to give up the ability to finance the debt cheaply, and the Federal Reserve negotiated with the Treasury for an extended period to gain the right to make its own monetary policy decisions. By March 1951, an "Accord" was reached that allowed the Federal Reserve to resume an active and independent monetary policy. William McChesney Martin, who was soon to become Chairman of the Board of Governors of the Federal Reserve, handled the final stages of the negotiation for the Treasury.[29]

After the Accord, the FOMC created a subcommittee, headed by Chairman Martin, to investigate how best to carry out an active monetary policy and to encourage the return of an efficiently functioning government securities market.[30] The FOMC adopted most of the key recommendations of the subcommittee and gradually withdrew its support of interest rates.[31] Between 1953 and 1960, it pursued what came to be known as a "bills only" policy, generally confining open market operations to short-maturity Treasury securities—bills and certificates of indebtedness. The approach left longer maturity coupon securities free to trade without Federal Reserve interference, helping the market-clearing mechanism to function and emphasizing that longer term interest rates were no longer pegged. The decision was also justified by citing a common belief that, historically, effective central banks had largely restricted their portfolios to high-quality short-term liquid instruments. On only one occasion, in 1958, were coupon securities purchased to address "disorderly" markets. (Coupon securities maturing in less than a year were purchased in 1960 when other issues were in short supply.)

To create a climate in which dealers could make markets on an equal footing, the Trading Desk developed the competitive "go around" technique, still in use today, in which all of the dealers are contacted simultaneously and given the opportunity to make bids or offers. The Desk also increased the number of dealers with which it would trade and specified criteria that dealers had to meet to qualify for a trading relationship.[32]

During the 1950s, the Federal Reserve developed open market operations into the primary tool for carrying out monetary policy, with discount rate and reserve requirement changes used as occasional supplements. Margin requirements on stock purchases were adjusted occasionally to encourage or discourage credit use. In establishing open market policy, the FOMC took into account that the level of the discount rate would influence interest rates and the banks' perception of reserve availability. It did not (and does not), however, have the authority to change the discount rate, and it considered the rate to be given within the context of short-term policymaking. The Board of Governors approved periodic adjustments to the discount rate when the rate got out of line with market rates. On other occasions, changes were made in conjunction with adjustments in other

tools when the Board wished to emphasize a shift in policy stance. The window was administered to reinforce the banks' reluctance to borrow from the Federal Reserve. The Board changed reserve requirements occasionally to signal a policy shift. The changes were far smaller in magnitude than those of the 1930s, and the impact on reserves was generally cushioned with open market operations that partially offset the reserve impact.

While FOMC members believed that interest rates played an important role in the economy, they felt it would be unwise to establish interest rate targets. The use of such targets, they reasoned, would increase the difficulty of making a break with the strict rate pegging of the 1940s. In developing policy guidelines at its meetings, the FOMC considered a number of indicators. It gave special emphasis to the behavior of bank credit (commercial bank loans and investments) as an intermediate policy guide. It sought to speed up bank credit growth in periods when economic activity showed weakness and to slow it down in periods of rapid growth. It did not have direct control over bank credit, however, or even timely information on recent performance. Consequently, bank credit was not suitable for day-to-day operating guidance, so short-run policy focused on free reserves, defined as excess reserves less reserves borrowed from the discount window.[33]

At the conclusion of each meeting, the FOMC created a written directive for the Trading Desk at the New York Fed. It was deliberately nonspecific, avoiding even a hint of targeting interest rates. For example, in November 1957, the FOMC directed the Desk to conduct operations "with a view to fostering sustainable growth in the economy without inflation, by moderating pressures on bank reserves." The Manager of the System Open Market Account surmised from listening to the discussion at the FOMC meeting what policy steps the Committee wanted.[34]

In the Desk's day-to-day operations, it targeted free reserves as a way of providing some anchor to policy guidelines. A relatively high level of free reserves was regarded as representing an easy policy: the excess reserves available to the banks were expected to facilitate more loans and investments. Net borrowed reserves left the banks without unpledged funds with which to expand lending and were consequently viewed as fostering a restrictive policy environment. High, rather than rising, free reserve levels were thought to foster expanding bank credit since banks would perpetually have more excess reserves than they wanted and would keep increasing their lending. High net borrowed reserve levels would, in a parallel manner, encourage persistent loan contraction.[35]

Research staff members developed and refined techniques during the 1950s and 1960s for estimating each day what free reserves would be for the

reserve maintenance period by forecasting both nonborrowed and required reserves.[36] The reserve factor estimates, which affected nonborrowed reserves, were subject to sizable errors, even though considerable resources were devoted to obtaining timely information about the past and likely future behavior of the more volatile factors. The reserve estimates and market conditions were reviewed at a daily conference call held with senior Board staff officials and a president who was a voting FOMC member.[37]

The Trading Desk generally bought or sold Treasury bills when forecasts suggested that free reserves were significantly below or above the objective, especially if the free reserve estimates were confirmed by money market conditions. RP operations were resumed in 1951. By this stage, RPs in both government securities and BAs were generally being undertaken at Federal Reserve initiative "to provide temporary, but immediate, reserve assistance to the central money market at times of unusual strain on that market."[38] Until the 1970s, RPs were done only with nonbank dealers at preannounced rates—usually at or slightly below the discount rate—although beginning in 1968, the RP rate was occasionally set slightly above the discount rate. The practice of arranging RPs only with nonbank dealers was a holdover from the earlier view that RPs served primarily to finance dealer positions in securities. On occasion during the 1950s and 1960s, an RP would still be arranged at the request of dealers facing difficulties in financing their positions in the markets. In discussing repurchase operations at the FOMC's annual reviews of operating guidelines, Governor J.L. Robertson objected to the FOMC's use of the instrument, arguing that RPs were not security purchases in the open market, as authorized by the Federal Reserve Act, but were actually loans to dealers.[39] Most members of the Committee disagreed. They considered RPs to be an appropriate instrument that had proved to be of inestimable value in the implementation of monetary policy; their continued use was authorized.

After the introduction of matched sale-purchase transactions (MSPs) in 1966, the Trading Desk was also able to drain reserves temporarily. MSPs were developed in response to problems that arose from a prolonged airline strike. The strike inhibited the clearing of checks through the banking system, which caused a sharp rise in Federal Reserve float and a corresponding bulge in reserves. MSPs proved to be a flexible way to absorb reserves on a short-term basis, leaving open the possibility of extending the period of reserve absorption by arranging new MSP transactions if the airline strike continued. Thereafter, MSPs proved useful in temporarily draining reserves during short-lived market disruptions and under more normal circumstances when temporary reserve drains were called for.[40]

Because the FOMC was also interested in money market conditions, the Trading Desk continued to watch the "tone and feel of the markets" each day

in deciding whether to respond to the signals given by the free reserve estimates. The tone of the markets might suggest whether the reserve estimates were accurate. If the banks were short of reserves, they would sell Treasury bills, a secondary reserve, and put upward pressure on bill rates. The banks would also cut back on loans to dealers, thus making dealer financing more difficult. Reading the tone of the markets was considered something of an art. Desk officials monitored Treasury bill rates, dealer financing costs, and comments from securities dealers concerning difficulties in financing their inventories of securities.

The rate on Federal funds played only a limited role as an indicator of reserve availability during these years, although it gained attention during the 1960s.[41] The interbank market was not very broad as the 1960s began, but activity was expanding. Until the mid-1960s, the Federal funds rate did not trade above the discount rate. During "tight money periods," when the Trading Desk was fostering significant net borrowed reserve positions, funds generally traded at the discount rate, and the funds rate was not considered a useful indicator of money market conditions. When free reserves were high, funds often traded below the discount rate and showed some day-to-day variation. At such times, the funds rate received greater attention as an indicator of reserve availability.

There was considerable surprise when the funds rate first rose above the discount rate, briefly in October 1964 and more persistently in 1965. As large banks became more active managers of the liability side of their balance sheets, they borrowed funds in the market in a sustained way. Banks had introduced large negotiable certificates of deposit (CDs) in 1961. But CD borrowings were (until 1991) subject to reserve requirements and (until 1970) to interest rate ceilings under Regulation Q. Borrowings from other banks through the Federal funds market were free of reserve requirements and interest rate ceilings. Furthermore, they were not subject to the restrictions on prolonged use that were applied to the Federal Reserve's discount window. The changes in liability management techniques meant that individual banks could expand credit even when they did not have free reserves if they were willing to bid aggressively for wholesale funding from other banks. Their actions were making free reserves a less reliable predictor of bank credit growth.

In 1961, several developments led the FOMC to abandon its "bills only" restrictions. The new Kennedy administration was concerned about gold outflows and balance of payments deficits and, at the same time, it wanted to encourage a rapid recovery from the recent recession. Higher rates seemed desirable to limit the gold outflows and help the balance of payments, while lower rates were wanted to speed up economic growth.

To deal with these problems simultaneously, the Treasury and the FOMC attempted to encourage lower long-term rates without pushing down short-term rates. The policy was referred to in internal Federal Reserve documents as "operation nudge" and elsewhere as "operation twist." For a few months, the Treasury engaged in maturity exchanges with trust accounts and concentrated its cash offerings in shorter maturities.

The Federal Reserve participated with some reluctance and skepticism, but it did not see any great danger in experimenting with the new procedure. It attempted to flatten the yield curve by purchasing Treasury notes and bonds while selling short-term Treasury securities.[42] The domestic portfolio grew by $1.7 billion over the course of 1961. Note and bond holdings increased by a substantial $8.8 billion, while certificate of indebtedness holdings fell by almost $7.4 billion (Table 2). The extent to which these actions changed the yield curve or modified investment decisions is a source of dispute, although the predominant view is that the impact on yields was minimal.[43] The Federal Reserve continued to buy coupon issues thereafter, but its efforts were not very aggressive. Reference to the efforts disappeared once short-term rates rose in 1963. The Treasury did not press for continued Fed purchases of long-term debt. Indeed, in the second half of the decade, the Treasury faced an unwanted shortening of its portfolio. Bonds could not carry a coupon with a rate above 4 1/4 percent, and market rates persistently exceeded that level. Notes—which were not subject to interest rate restrictions—had a maximum maturity of five years; it was extended to seven years in 1967.

The System portfolio grew rapidly over the balance of the decade. In addition to providing reserves to support rising money balances, reserves were needed to meet higher reserve requirements. The Federal Reserve purchased both short-term instruments (bills and certificates of indebtedness) and longer term coupon securities. However, there was no special emphasis on acquiring coupon securities, and holdings fell in some years.[44]

During the mid-1960s, policymakers generally viewed the basic policy process with some satisfaction. Reasonable price stability had been reestablished, and recessions had been mild, short-lived interruptions in a period of prolonged prosperity. In the latter half of the 1960s, however, rising inflation began to accompany the prosperity. Primary blame was placed on the budget deficits generated to finance U.S. involvement in the Vietnam War and "Great Society" social programs. But some at the Federal Reserve and in the academic community expressed the view that expansionary monetary policy was also contributing to inflation.

Economists, both within and outside the Federal Reserve, questioned the assumptions underlying the existing monetary policy procedures, including

Table 2. **System Open Market Account Holdings, 1951-96 (Post-Treasury–Federal Reserve Accord)**
Millions of U.S. Dollars

Year-End	Treasury Bills	Treasury Certificates	Treasury Notes	Treasury Bonds	Total Treasury Securities[a]	Federal Agency Securities	Bankers' Acceptances	Total Holdings[a]	Annual Growth Rate (Percent)
1951	467.9	12,724.6	5,068.1	5,344.0	23,604.6	0.0	0.0	23,604.6	13.9
1952	742.0	4,995.7	13,774.0	4,522.0	24,033.7	0.0	0.0	24,033.7	1.8
1953	2,596.3	5,816.5	13,263.7	3,641.2	25,317.7	0.0	0.0	25,317.7	5.3
1954	2,167.0	13,882.3	6,037.3	2,801.8	24,888.4	0.0	0.0	24,888.4	-1.7
1955	1,366.6	5,920.7	14,165.9	2,801.8	24,255.0	0.0	23.8	24,278.8	-2.4
1956	1,721.3	10,932.7	9,153.9	2,801.8	24,609.7	0.0	33.5	24,643.2	1.5
1957	983.6	19,933.6	0.0	2,801.8	23,719.0	0.0	42.3	23,761.3	-3.6
1958	2,250.5	18,649.7	2,867.6	2,483.8	26,251.6	0.0	43.3	26,294.9	10.7
1959	2,605.8	10,507.0	11,010.3	2,483.8	26,606.9	0.0	44.2	26,651.1	1.4
1960	2,900.2	9,059.7	12,481.3	2,543.1	26,984.3	0.0	53.3	27,037.6	1.5
1961	3,193.1	1,699.5	19,983.8	3,845.7	28,722.1	0.0	48.5	28,770.6	6.4
1962	2,442.0	13,181.9	10,717.3	4,136.8	30,478.0	0.0	52.6	30,530.6	6.1
1963	4,141.4	7,066.2	17,729.1	4,645.4	33,582.1	0.0	70.0	33,652.1	10.2
1964	6,044.3	0.0	25,187.5	5,274.5	36,506.3	0.0	58.9	36,565.2	8.7
1965	9,100.7	0.0	24,827.7	6,549.8	40,478.2	0.0	74.5	40,552.7	10.9
1966	11,803.7	4,351.0	21,302.0	6,198.8	43,655.5	0.0	69.1	43,724.6	7.8
1967	15,975.3	0.0	26,918.4	6,086.5	48,980.2	0.0	74.9	49,055.1	12.2
1968	18,756.2	0.0	28,706.1	5,474.5	52,936.8	0.0	57.7	52,994.5	8.0
1969	22,265.2	0.0	31,391.9	3,496.4	57,153.5	0.0	63.9	57,217.4	8.0
1970	25,964.9	0.0	33,236.3	2,940.3	62,141.5	0.0	57.5	62,199.0	8.7
1971	30,155.4	0.0	35,553.9	3,286.3	68,995.6	485.0	79.7	69,560.3	11.8
1972	29,664.7	0.0	36,681.4	3,462.4	69,808.5	1,311.4	70.5	71,190.4	2.3
1973	36,897.1	0.0	38,412.2	3,148.9	78,458.2	1,937.5	68.0	80,463.7	13.0
1974	36,764.5	0.0	40,009.3	3,283.4	80,057.2	4,702.1	579.0	85,338.3	6.1
1975	37,708.2	0.0	43,988.5	5,521.6	87,218.3	6,072.1	0.0	93,290.4	9.3
1976	38,571.6	0.0	47,971.8	6,725.2	93,268.6	6,793.8	0.0	100,062.4	7.3
1977	42,932.8	0.0	50,509.1	8,848.3	102,290.2	8,003.7	0.0	110,293.9	10.2
1978	43,802.9	0.0	54,854.9	12,464.8	111,122.6	7,895.6	0.0	119,018.2	7.9
1979	50,045.8	0.0	56,494.5	14,552.6	121,092.9	8,215.6	0.0	129,308.5	8.6
1980	46,993.9	0.0	58,718.3	16,892.5	122,604.7	8,739.3	0.0	131,344.0	1.6
1981	52,330.6	0.0	59,978.4	18,400.5	130,709.5	9,125.4	0.0	139,834.9	6.5
1982	58,028.5	0.0	62,625.9	18,555.7	139,210.1	8,936.9	0.0	148,147.0	5.9
1983	71,096.2	0.0	63,933.9	20,813.7	155,843.8	8,645.0	0.0	164,488.8	11.0
1984	74,875.3	0.0	65,236.8	22,951.0	163,063.1	8,389.3	0.0	171,452.4	4.2

Sources: For 1951-53 data: Board of Governors of the Federal Reserve System, "Banking and Monetary Statistics"; for 1954-96 data: Federal Reserve Bank of New York *Open Market Annual Reports*.

Note: Data exclude effects of RPs and MSPs.

[a] Figures may not sum to totals because of rounding.

Table 2. **System Open Market Account Holdings, 1951-96 (Post-Treasury–Federal Reserve Accord)**
Millions of U.S. Dollars

Year-End	Treasury Bills	Treasury Certificates	Treasury Notes	Treasury Bonds	Total Treasury Securities[a]	Federal Agency Securities	Bankers' Acceptances	Total Holdings[a]	Annual Growth Rate (Percent)
1985	89,471.2	0.0	67,646.6	24,726.4	181,844.2	8,227.4	0.0	190,071.6	10.9
1986	108,570.7	0.0	68,125.6	25,723.8	202,420.1	7,829.3	0.0	210,249.4	10.6
1987	112,475.3	0.0	82,973.4	28,241.5	223,690.2	7,553.1	0.0	231,243.3	10.0
1988	117,909.8	0.0	90,950.5	29,929.4	238,789.7	6,966.5	0.0	245,756.2	6.3
1989	106,647.0	0.0	91,381.1	30,813.6	228,841.7	6,524.6	0.0	235,366.3	-4.2
1990	119,694.8	0.0	91,406.5	31,163.2	242,264.5	6,341.6	0.0	248,606.1	5.6
1991	138,732.4	0.0	101,519.7	32,331.5	272,583.6	6,044.5	0.0	278,628.1	12.1
1992	150,218.7	0.0	118,179.1	35,037.2	303,435.0	5,412.6	0.0	308,847.6	10.8
1993	167,935.7	0.0	132,076.1	39,571.6	339,583.4	4,638.4	0.0	344,221.8	11.5
1994	185,419.8	0.0	144,143.3	42,997.5	372,560.6	3,636.7	0.0	376,197.3	9.3
1995	195,451.8	0.0	151,013.2	44,068.6	390,533.6	2,634.0	0.0	393,167.6	4.5
1996	205,352.5	0.0	150,921.7	49,338.9	405,613.2	2,224.7	0.0	407,837.9	3.7

[a] Figures may not sum to totals because of rounding.

the connections of free reserves and bank credit to the ultimate policy goals of economic expansion and price stability. Quantitative methods were increasingly applied to test the hypothesized relationships among operational, intermediate, and ultimate policy objectives. Some studies suggested that more attention should be paid to money growth and to the behavior of total reserves or the monetary base. In response, the FOMC expanded the list of intermediate guides to policy. The directives continued to focus on bank credit but added money growth, business conditions, and the reserve base. Free reserves continued to be the primary gauge for operations, although the Federal funds rate gained more prominence as an indicator of money market conditions.

Although the FOMC met every three to four weeks, it was concerned that developments between meetings might alter appropriate reserve provision. Consequently, in 1966 it introduced a "proviso clause" that set conditions under which the Trading Desk might modify the approach adopted at the preceding meeting. Bank credit data still were available only with a lag. After some experimentation, the FOMC adopted what it called the bank credit proxy, consisting of daily average member bank deposits subject to reserve requirements. If the proxy moved outside the growth rate range discussed at the FOMC meeting, the Desk would generally adjust the target level of free or net borrowed reserves modestly.[45] Sometimes the proviso clause permitted either increases or decreases in the objective for free reserves. Frequently, it allowed adjustments only in one direction.

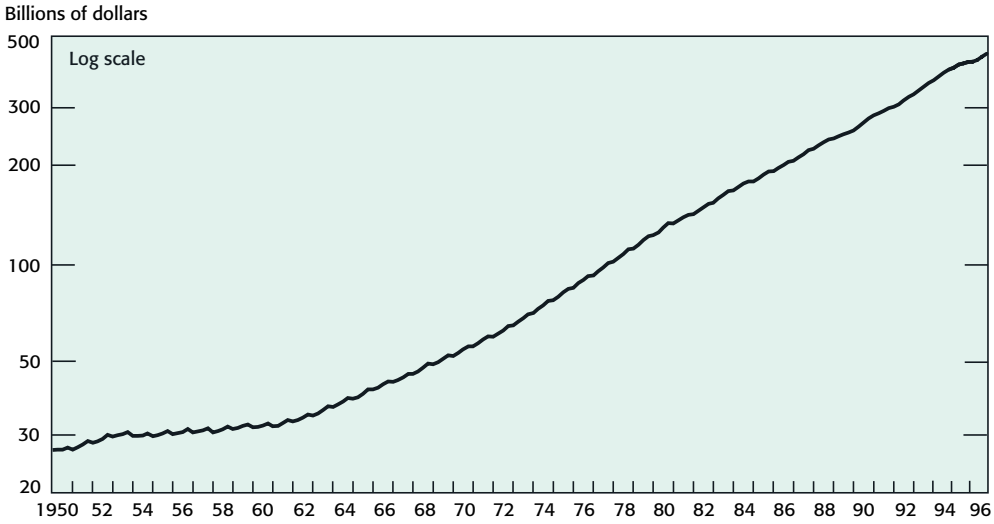
Targeting Money Growth and the Federal Funds Rate: 1970 to 1979

The inflationary pressures that developed in the late 1960s led to a number of policy initiatives in the early 1970s. Inflation in the United States encouraged outflows of official gold holdings and made the Bretton Woods system of pegged exchange rates progressively less viable. In 1970, the Federal Reserve formally adopted monetary targets with the intention of using them to reduce inflation gradually over time. In August 1971, the Nixon administration froze prices and wages and suspended gold payments.[46] The administration's actions on gold effectively ended the Bretton Woods exchange rate system and the last remnant of the gold standard. Over the next two years, the industrialized countries moved toward floating exchange rates. The official price of gold was raised in two steps to $42.22 a troy ounce by 1973, but because the Treasury did not make purchases or sales, the price ceased to have any role in constraining growth in money or inflation.

While numerous policy approaches were used to deal with inflation during the decade, the efforts proved unsuccessful, and prices almost doubled (based on the consumer price index) between 1970 and 1979; the rate of inflation was considerably higher at the decade's end than at the beginning. Potential inflationary pressures arose from sharp increases in the relative price of oil achieved by the Organization of Petroleum Exporting Countries and from continued expansion of the size of government. The inflationary pressures were not attacked with sufficient force to rein them in permanently, although on several occasions monetary policy tightening slowed inflation for a while. Efforts were repeatedly abandoned, however, before inflation was wrung out of the system because attention often turned toward addressing signs of weakness in the economy.

Policy procedures focused primarily on very short-term growth rates for the monetary aggregates. Over extended periods of time, the growth rate objectives were frequently exceeded. Partly in consequence, the Federal Reserve's portfolio grew rapidly over the decade as a whole. The System's securities portfolio rose by $67 billion, or at an 8.5 percent annual rate between 1970 and 1979 (Table 2). Much of the increase supported currency, which expanded rapidly when nominal income accelerated in the inflationary climate (Chart 1). Reserve balances grew sharply in the first half of the decade when deposit growth was strong, but then tailed off when the demand for money weakened (Chart 2). Money demand softened at least in part as a result of innovations in financial instruments that encouraged money substitutes. Because deposit rates were constrained, rising inflation and the

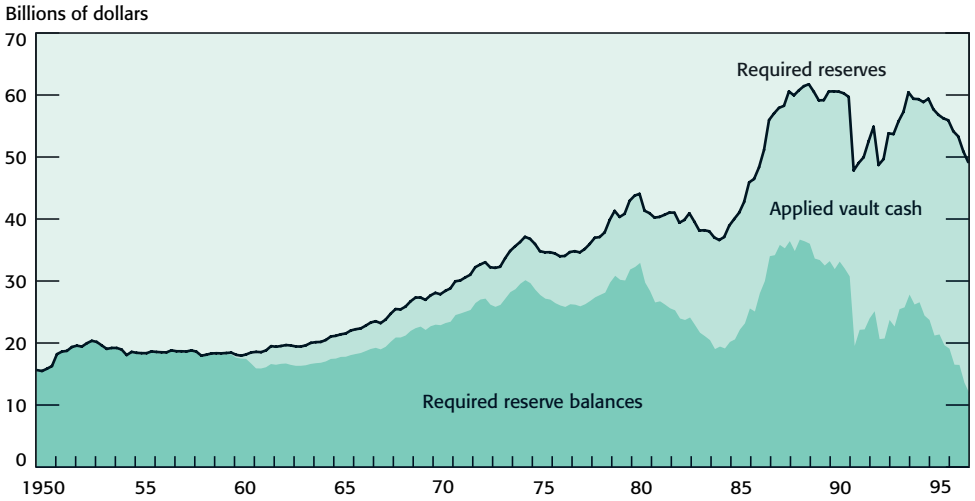
Chart 1. Currency in Circulation, Including Vault Cash



Source: Board of Governors of the Federal Reserve System.

Note: All figures are quarterly averages.

Chart 2. Required Reserve Balances and Applied Vault Cash



Source: Board of Governors of the Federal Reserve System.

Notes: All figures are quarterly averages. Before 1959 the Federal Reserve did not allow vault cash to count towards the fulfillment of reserve requirements.

resulting increases in nominal market interest rates made money substitutes attractive.

The Federal Reserve bought a mix of bills and coupon securities during the 1970s, so that the average maturity of the System portfolio began to lengthen in the mid-1970s. The average maturity of Treasury debt outstanding also began to lengthen after the Treasury gained authority to issue bonds through limited exemptions from interest rate ceilings beginning in 1971 and as the maximum permitted maturity of notes was increased from seven to ten years in 1976.[47] Indeed, for about a decade starting in the mid-1970s, the average maturities of debt outstanding and the Federal Reserve's holdings moved in tandem as the Trading Desk bought in the maturity ranges that were most plentiful in the market.[48]

Open market operations were the dominant monetary policy tool in this period, with reserve requirements and the discount window remaining in supporting roles. Reserve requirements were unpopular because they represented an indirect form of taxation. Reserve balances held to meet requirements are nonearning assets that reduce a bank's level of investable funds. As nominal interest rates rose, so did the effective tax. During the 1970s, the Fed's reserve requirement ratios were well above those applied by most states to state-chartered nonmember banks. Many banks, therefore, chose to withdraw from the Federal Reserve System despite its benefits, such as access to the discount window.[49] Even in the face of rising inflation, the Fed felt constrained in raising reserve ratios as a means of tightening policy. Requirements were lowered seven times and raised four times. The decline in bank membership was also addressed with a new structure of reserve requirement ratios in 1972. Ratios were steeply graduated to help the smaller banks that were most likely to drop their membership.

Membership worries were also behind changes in the discount window mechanism. In 1973, the Fed adopted a special seasonal borrowing privilege to accommodate small banks with large seasonal swings in loan demand and limited access to the national credit markets.[50] Other use of the window, referred to as adjustment credit borrowing, continued to be monitored by Federal Reserve authorities to discourage both persistent borrowing and borrowing to lend at higher rates. The temptation to engage in such arbitrage increased when operating procedures pushed the Federal funds rate above the discount rate.

The techniques for setting and pursuing money targets developed gradually during the decade, with frequent experimentation and modification of procedures taking place in the first few years of the 1970s. Nonetheless, until October 1979 the framework used by the FOMC for guiding open market operations generally included setting a monetary objective and encouraging

the Federal funds rate to move gradually up or down if money was exceeding or falling short of the objective. The Federal funds rate, as an indicator of money market conditions, became the primary guide to day-to-day open market operations, and free reserves took on a secondary role. An increasingly active market for Federal funds made the funds rate a feasible target, and the passage of time reduced the association of interest rate targeting with the rate-pegging episode of the 1940s.

Bank credit and its proxy remained for a while in the list of subsidiary intermediate targets, but they received decreasing attention. Free reserves served as an indicator of the volume of reserves needed to keep the Federal funds rate at the desired level. The Trading Desk used the forecasts of reserve factors to gauge the appropriate direction and magnitude for open market operations.

The FOMC selected growth targets for M1—and to a lesser extent for M2—that evolved into two-month growth rate ranges with the month before the FOMC meeting as a base.[51] The FOMC directed the staff to develop estimates of monetary aggregate growth aimed at gradually reducing inflation. In 1972, it introduced six-month growth targets designed to achieve that goal. Econometric models, supplemented by the judgments of the staff, were used to develop the six-month and one-year estimates. The estimates assumed that the demand for money depended on economic activity and interest rate behavior, with a range of technical factors also influencing short-run money demand. Specifically, the staff estimated what Federal funds rate would achieve desired money growth. The funds rate worked by affecting the interest rates banks both paid and charged customers and hence affected the demand for money.

The FOMC chose an initial Federal funds rate target, and also instructed the Trading Desk to raise the funds rate during the intermeeting period within a limited band if the monetary aggregates were significantly above the desired growth rates and to lower the funds rate within that band if the aggregates were below them. Decisions to change the funds rate were signaled to the market indirectly, mostly through temporary RP or MSP operations. An increase would be indicated either with an MSP operation undertaken when funds were trading at a previously acceptable rate or by failing to add reserves through an RP when rates rose above the previous target. Similarly, an RP operation undertaken at a previously acceptable rate or the absence of an MSP at a lower rate signaled an easing. The signals were noted immediately, but it sometimes took market participants a couple of days to gauge the extent of the move.

In 1972, the FOMC addressed criticisms of its efforts to control money from the demand side. It introduced a supplemental reserve operating

mechanism to influence money from the supply side. The development of a reserve guideline was based on the reserve-money multiplier model. The model implied that controlling total or required reserves would constrain money growth through the operation of the reserve requirement ratio. The reserve measure that the FOMC targeted was called reserves on private deposits, or RPD. It excluded reserve requirements on government and interbank deposits that were not in the money definitions.[52] Because of the widely differing reserve requirement ratios according to bank size and membership status, the linkage between RPD and Ml was not very close.

Using staff estimates of the various ratios, the FOMC set two-month growth target ranges for RPD designed to be consistent with the desired growth in Ml; it then instructed the Trading Desk to alter reserve provision in a way that was intended to achieve them. Because the FOMC feared that reserve targeting would raise the volatility of interest rates to levels it considered unacceptable, however, the FOMC also constrained the funds rate. In fact, the relatively narrow funds rate limits often dominated, and the Desk frequently missed the RPD target. RPD targets were considered to be unachievable, although the funds rate constraint precluded a true test. In 1973, RPD changed from an operational target to an intermediate target, taking its place with M1 and M2. Since information on the behavior of M1 was available almost as soon as information on RPD, RPD gradually fell into disuse. It was dropped as an indicator in 1976.

The monetary targets were modified further in 1975 in response to a congressional resolution. The Federal Reserve adopted annual target ranges and announced them publicly. A "cone" marking the range of acceptable growth rates was drawn from the base period, which was the calendar quarter most recently concluded. Every three months, the target range was moved forward one quarter. The procedure meant that by the time a given annual target period was completed, the original target had long since been superseded. Frequently, the targets were overshot, and complaints about upward "base drift" were legion. The Full Employment and Balanced Growth Act of 1978, known as the Humphrey-Hawkins Act, required the Federal Reserve to set monetary targets for calendar years and to explain any deviations.

During most of the 1970s, the FOMC was reluctant to change the funds rate by large amounts at any one time, even when staff estimates suggested that sizable modification was necessary to achieve the two-month or annual monetary goals. Part of that reluctance reflected a wish to avoid short-term reversals of the rate. Keeping each rate adjustment small minimized the risk of overdoing the rate changes and then having to reverse course. These priorities meant that the FOMC was handicapped at times when it sensed that a large rate move might be needed but was uncertain about its size. The adjust-

ments in the funds rate often lagged behind market forces, allowing trends in money, the economy, and prices to get ahead of policy.

At meetings, the FOMC frequently voted for a funds rate range that surrounded the most recent rate target. It also put relatively narrow limits on the range of potential adjustments that could be made between meetings if money growth went off course. In the early 1970s, the width of the intermeeting funds rate range was generally 5/8 of a percentage point to 1 1/2 percentage points. By the latter part of the decade, the width had narrowed to about 1/2 to 3/4 of a percentage point, and on a couple of occasions to only 1/4 of a percentage point. In addition, the specifications for the monetary aggregates were often set in a way that made it likely that the funds rate would be adjusted in one direction only, effectively cutting the range in half.

In implementing the funds rate targeting procedure, the Trading Desk responded to deviations of the funds rate from the target, primarily with the increasingly active use of temporary transactions. Occasionally, it signaled displeasure with the rate through an outright operation, but outright operations were used mostly to address protracted needs to add or drain reserves. Over time, the Desk became increasingly sensitive to preventing even minor short-term deviations of the funds rate from target. It generally added reserves by purchasing securities or arranging RPs in the market in a visible way when the funds rate exceeded the objective even slightly, and it absorbed reserves through sales or matched sale-purchase agreements when the funds rate fell short of the objective.

The Desk felt some constraint not to make reserve adjustments in an overt way when the funds rate was on target. At times when reserve estimates suggested that a large adjustment was needed but the funds rate did not confirm it early in a statement week, the Desk would worry about delaying the reserve adjustment and having to make an unmanageably large open market transaction late in the week. When the funds rate failed to confirm an estimated reserve excess or shortage, the Desk often made the reserve adjustments by arranging internal purchases or sales with foreign accounts that could not be observed by market participants. The introduction in 1974 of customer-related RPs—agreements on behalf of official foreign accounts—gave the Desk a tool for adding reserves when the funds rate was on target but a reserve need was projected.[53] (Market participants routinely assumed that outright transactions in the market for customers did not signal dissatisfaction with the funds rate, and they initially regarded customer-related RPs similarly.)

If the estimated need to add or drain reserves was too large for these techniques, the Desk often pounced on very small funds rate moves off target to justify an open market operation. For instance, when estimates suggested that additional reserves were needed, the Desk would often enter the market

to arrange an RP when the funds rate rose 1/16 of a percentage point above the preferred level. But if the funds rate fell despite the estimated need to add reserves, the Trading Desk typically allowed a 1/8 percentage point deviation to develop before it would arrange a small market operation to drain reserves. If the funds rate continued to trade off target after the Desk's first entry of the day, the Desk often arranged a second open market operation. There were operational limits to how late in the day transactions could be made to achieve a reserve effect on the same day. The cutoff was around noon for outright bill operations. (Coupon operations were never arranged for same-day delivery.) The deadline was supposed to be 1:30 p.m. for temporary transactions, but if the desired funds rate move occurred just after that time, the Desk often responded if it was anxious to conduct an operation. The end of its operating time was close to 2:00 p.m. by 1979.

The Trading Desk's prompt responses to even small wiggles in the Federal funds rate led banks to trade funds in a way that tended to keep the rate on target. Except near day's end on the weekly settlement day, a bank short of funds would not feel the need to pay significantly more than the perceived target rate for funds. Likewise, a bank with excess funds would not accept a lower rate. Rate moves during the week were so limited that they provided little or no information about reserve availability or market forces. Probably few, if any, in the Federal Reserve really believed that brief, small moves in the funds rate were harmful to the economy. The tightened control developed bit by bit without an active decision to impose it.

Targeting Money and Nonborrowed Reserves: 1979 to 1982

In October 1979, Paul Volcker, who had recently become Chairman of the Board of Governors, announced far-reaching changes in the FOMC's operating techniques for targeting the monetary aggregates. The acceleration of inflation to unacceptable rates over the preceding decade inspired a change in priorities. Chairman Volcker and other FOMC members realized that turning around these inflationary pressures, which had come to permeate economic relations, would involve costs. Interest rates would have to rise significantly beyond recent levels, although the extent of the increase could not be determined in advance. Increased rate volatility was also likely to accompany the efforts to halt inflation. The Federal Reserve's credibility with the public was low after previous efforts to slow inflation had been followed by further price acceleration. Chairman Volcker felt that only strong measures could rebuild public confidence.

Many analysts, both inside and outside the Fed, argued that using the Federal funds rate as the operational target had encouraged repeated overshooting of the monetary objectives. They contended that inertia or political concerns had caused the funds rate to be raised too slowly. Partly in response to such arguments, the FOMC began to target reserve measures derived to be consistent with desired three-month growth rates of M1. Reserve controls were expected to keep money growth from persistently exceeding (or falling short of) the target growth rate, although they would not prevent short-term deviations. The limits on the Federal funds rate were applied only to weekly averages, rather than to brief periods during the week as had been common in the 1970s. A band 4 to 5 percentage points wide allowed room for adjustments to achieve the monetary target.

Operationally, the FOMC chose desired growth rates for M1 (and M2) covering a calendar quarter and instructed the staff to estimate consistent levels of total reserves. The process resembled that used to estimate RPDs. The staff estimated deposit and currency mixes to derive average reserve ratios and currency-deposit ratios. The estimation technique employed a mix of judgment and analysis of historical patterns. It was complicated by the wide range of required reserve ratios applied to Federal Reserve member bank deposits and by the absence of reserve ratios, or even timely deposit data, from nonmember banks.[54]

From the total reserve target, the Trading Desk derived the nonborrowed reserve target by subtracting the initial level of borrowed reserves that had been indicated by the FOMC.[55] If money exceeded (or fell short of) its path, total reserves would also exceed (or fall short of) their path. Because required reserves were predetermined, the Trading Desk had limited means to change total reserves within the reserve period.[56] If the Desk only provided enough reserves to meet the nonborrowed reserve objective, banks would have to increase (decrease) their borrowing when money growth and total reserve demands were excessive (deficient).[57] Because banks were still discouraged from making frequent use of the discount window, the change in aggregate borrowing would affect the ease of obtaining reserves and interest rates. It would encourage the banks and the public to take actions that would accomplish the desired slowing or speeding up of money growth. If the pace of adjustment implied by the mechanism did not seem appropriate, instructions were occasionally given to accelerate or delay the adjustment to the borrowing objective. The FOMC could alter the basic mechanism at a meeting or direct the Desk to make adjustments between meetings under specified conditions.

To reduce overweighting of weekly movements in money, the total and nonborrowed reserve paths were computed for intermeeting average periods or, if the intermeeting period was longer than five weeks, for two subperiods.

(In 1979 and 1980, the FOMC met nine and eleven times, respectively; in 1981, it moved to the schedule of eight meetings a year in use today.) A consequence of this averaging technique was that achieving the average target level for nonborrowed reserves would have involved large swings in borrowing in the final weeks whenever there were large reserve target misses in the early part of the intermeeting period. Informal adjustments were sometimes made to smooth out these temporary spikes or drops in borrowing that were deemed inconsistent with the longer term pattern of borrowing levels and money growth adjustments to path growth. Although the adjustments were considered necessary to avoid severe short-term swings in reserve availability and interest rates, they gave the appearance of "fiddling" and caused considerable confusion for outside observers. Each week, the total reserve path and actual levels were reestimated using new information on deposit-reserve and deposit-currency ratios.

In implementing the policy, the Trading Desk emphasized that it was targeting reserves rather than the Federal funds rate by entering the market at about the same time each day—usually between 11:30 a.m. and 11:45 a.m., shortly after the reserve forecasts had been reviewed—to perform its temporary operations. The Federal funds rate was not ignored; it was used as an indicator of the accuracy of reserve estimates, although it was not always very reliable. On the margin, it could accelerate or delay by a day or so an operation to accomplish a needed reserve adjustment, but its role was greatly diminished compared with the preceding operation regimes.

Outright purchases or sales were used when estimated reserve needs or excesses extended several weeks into the future. The Trading Desk arranged outright operations early in the afternoon for delivery the next day or two days forward. Outright operations were undertaken in response to longer term reserve needs and not to signal the policy stance.

Under nonborrowed reserve targeting, policy actions were less immediately apparent to the market than they had been, although the general thrust of policy was clear. Market participants closely observed and forecast the behavior of M1 in order to anticipate the future course of the funds rate and other short-term rates. Because there was no rate target, market participants had to make judgments about the near-term course of rates, based upon their reading of money and other economic variables.[58]

The new procedures had been expected to induce considerably wider short-term swings in the Federal funds rate, although the actual changes exceeded most expectations and were accompanied by greater variation in money growth rates as well. The effective weekly average funds rate reached a low of 7.6 percent in 1980 and a high of 22.4 percent in 1981; right before the change in procedures in early October 1979, it was 11.9 percent.

In part, the sharp movements in interest rates and money may have reflected the difficulties in reversing strongly held beliefs that inflation had become a permanent phenomenon. Expectations about inflation and economic activity were being reshaped, with many people uncertain whether a new, lower inflation pattern would emerge or whether the inflation slowdown would be a temporary pause on the way to even higher rates. In this environment, people evaluated new information and judged whether the anti-inflation policies were likely to succeed. Some of the interest rate moves came in response to changes in expectations.

The control mechanism itself also appeared to play a role in the variation of money growth. It forced borrowing to move above the initial level whenever money was above the desired path. Consequently, the procedure caused enlarged borrowing until money was back on target. Since there were lags in the adjustment of money to borrowing pressures, money continued to weaken even after borrowing stopped rising. The result appeared to be a "damped cycling process."

These years also saw major regulatory and legislative changes that affected the climate for Federal Reserve policy. In 1980, Congress passed the Depository Institutions Deregulation and Monetary Control Act (MCA), which simplified the structure of reserve requirements and extended the requirements to nonmember commercial banks, thrift institutions, and credit unions with transactions deposits.[59] It eliminated requirements on personal time and savings deposits. Requirements were phased downward for member banks over a four-year period and upward for nonmember depository institutions over a seven-year period. In 1982, the Garn-St Germain Depository Institutions Act modified the MCA reserve requirements, establishing a zero requirement tranche. (These requirements are described in Chapter 6, Box A.)

Several motives were behind the changes in reserve requirements. As discussed above, reserve requirements were particularly burdensome when inflation and nominal interest rates were high. Numerous state-chartered banks had dropped their Federal Reserve membership, and largely unregulated nonbank institutions were competing for consumer funds.

The MCA also provided for interest rate ceilings to be phased out gradually on all but demand deposits. It permitted interest to be paid on consumer transaction accounts—called NOW and ATS accounts—outside the Northeast, where they had existed for some time. At the end of 1982, the Garn-St Germain Act introduced money market deposit accounts (MMDAs), which were free of interest rate ceilings.

The combination of burdensome reserve requirements and often binding interest rate ceilings had encouraged considerable economizing on deposit balances during the years with high inflation and market interest rates. Many

people had transferred liquid funds to money market mutual funds created by brokerage firms. Those funds were exempt from interest rate restrictions and reserve requirements. As the rate restrictions were eased in the early 1980s, people transferred liquid balances back into bank deposits, lifting the measured demand for money. The Federal Reserve attempted to deal with the distortions arising from regulatory and behavioral changes by redefining the monetary aggregates. All of the measures included deposits of nonmember banks and thrift institutions. The broader measures contained money market mutual funds. The Board also created two versions of M1: M1-A, which excluded the new rapidly growing NOW and ATS accounts, and M1-B, which included them. It estimated a shift-adjusted version of M1-B in an attempt to allow for the impact of the transfers. M1 (with appropriate adjustments) was close to target on average between late 1979 and mid-1982, although it varied considerably over shorter periods, falling below the target in 1981 and accelerating in 1982.

Reserve growth became quite variable during these years because of the regulatory changes and the policy procedures, but it was modest on average. In addition, currency growth slowed. Consequently, the growth of the System portfolio slowed as well.

As evidence mounted that the relatively close linkage between M1 and economic activity had broken down, the FOMC suspended its M1 target in late 1982. It had become apparent that the demand for M1 had strengthened relative to income more than had been anticipated, so that growth within the target range would have been more restrictive than seemed desirable. Some of the increase in the demand for money was attributed to the popularity of NOW accounts included in M1. In addition, the maturing that October of a large volume of special tax-favored "all savers" deposits was expected to add substantially to M1 holdings. The FOMC hoped that M2 would continue to be a reliable indicator, and for a few months at the end of 1982 it attempted to use it as a guide to building total and nonborrowed reserve targets. But MMDAs, first offered in December, proved very attractive, and the demand for M2 rose sharply.

Monetary and Economic Objectives with Borrowed Reserve Targets: 1983 to the Late 1980s

In the absence of a stable relationship between money and economic activity, the FOMC modified its procedures for guiding reserve provision in 1983. It focused on measures of inflation and economic activity and placed less

weight on the monetary aggregates. The FOMC targeted the borrowed reserve level directly, instead of computing total and nonborrowed reserve levels linked to a money measure and deriving a level of borrowing that moved with the deviations of that aggregate from target. The Committee considered whether to adjust the target up or down whenever money seemed to be deviating significantly from the desired growth path. In deciding whether an adjustment was appropriate, the FOMC allowed for any known distortions to the aggregates and also used supplemental indicators.

The monetary aggregates did not quickly resume their prior relationship with economic activity. Declining inflation made holding money more attractive. Because rates on some components of M1 were close to market rates but slow to change, interest rate sensitivity increased. The Board and Reserve Bank staffs continued in their efforts to explain movements in the monetary aggregates and interpret their significance for the economy. Remaining uncertainties caused money growth to lose its predominant position in the directive and join the list of factors shaping adjustments to the borrowing level. In view of M1's sensitivity to interest rates, the FOMC did not set targets for this aggregate. In most years during the 1980s, it gave the greatest weight to M2. While the short-term variation in demand was considerable, M2 demand relative to nominal income was fairly steady on average.

Policy decisions were also guided by information on economic activity, inflation, foreign exchange developments, and financial market conditions. The FOMC continued to set policy that was designed to be countercyclical, but at the same time anti-inflationary. Economic activity expanded in each year from 1982 to 1989, generally at a moderate rate, while inflation (measured by the consumer price index) was mostly in a 3-to-5-percent range (with a lower rate in 1986 when oil prices fell sharply).

The borrowed reserve targeting procedures introduced in 1983 persisted, with modifications, through most of the 1980s. The approach was discretionary, drawing from some of the techniques developed in earlier decades. The procedures allowed a much smaller degree of variation in the funds rate than the nonborrowed reserve procedures that had preceded it.[60] Nonetheless, the funds rate did experience some variation as a result of seasonal pressures and changes in reserve management procedures by the banks. Consequently, policy intentions were less transparent than with direct Federal funds rate targeting. Still, the borrowed reserve targeting procedures placed a relatively narrow range on the funds rate, and a policy action was usually apparent from published data and open market operations within a week or so of the change.

While the FOMC continued to target borrowed reserves through much of the 1980s, several developments changed the way the banks managed their reserve positions, which in turn affected the Trading Desk's operating

procedures. The ongoing phase-in of the MCA-mandated reserve requirement structure through 1987 meant that reserve balances swung rather sharply. In addition, banks developed an extremely cautious approach to use of the Federal Reserve's discount window in the wake of a series of well-publicized financial difficulties in the banking industry.

Relatively low levels of reserve balances, particularly in 1984, led banks to manage their day-to-day reserve positions more closely than before as they sought to avoid both overdrafts and excess reserves, reducing their flexibility to absorb routine variations in reserve levels. Working in the other direction, reserve management flexibility was increased when the reserve maintenance period was lengthened early that year from one to two weeks. (Most banks reported little impact on reserve management from the simultaneous move to quasi-contemporaneous required reserve accounting because the errors in estimates of their requirements were minor relative to the uncertainties about reserve levels stemming from customer transactions.) Reserve balances rose after 1984 because more nonmember banks and thrift institutions had to hold balances to meet requirements, but as discussed in Chapter 6, reserve management flexibility continued to be more constrained than it had been in earlier decades because reserve balance growth did not keep pace with the rising volume of interbank settlements.

Worries about the health of the banking system introduced considerable caution to the banks' approach to reserve management. In May 1984, Continental Illinois National Bank faced serious runs by uninsured depositors in the wake of large reported loan losses. To keep operating, the bank borrowed unprecedented amounts from the Federal Reserve discount window until close to year-end, when FDIC support measures were arranged.[61] Other banks became wary of using the discount window lest their borrowing be interpreted as a sign that they were also facing financial difficulties. (The Federal Reserve does not report the identities of the banks that borrow, but other banks can often guess from developments in the interbank markets.)

While Continental was borrowing in 1984, the FOMC found that maintaining the same borrowing target as before (excluding the Continental borrowing) resulted in a significantly higher range of Federal funds rate trading. It had to decide whether to accept this bank-generated tightening of money market conditions or lower the borrowing target until it was consistent with the previous funds rate range. Initially, the FOMC accepted the higher funds rates, in part because additional pressures seemed consistent with the ongoing strong economic expansion. When the economy showed signs of weakening late in the year, however, the borrowing target was lowered significantly, so that the funds rate fell.

The banks' reluctance to borrow from the discount window eased intermittently thereafter when concerns about the health of the industry receded. Several subsequent crises, however, particularly at Texas banks and at savings and loans in a number of regions, rekindled the uneasiness about borrowing. Consequently, it became harder to estimate the Federal funds rate range that would emerge from the borrowing target. The Trading Desk made informal adjustments to the borrowing target when it became clear before or during a maintenance period that pursuing the target would result in money market conditions that were significantly different from those discussed by the FOMC

The informal move away from borrowed reserve targets was speeded by the stock market break on October 19, 1987, when the Dow Jones industrial average fell 508 points, or by 22.6 percent, to 1,738.74. The Federal Reserve took a number of steps to make sure that adequate credit was available to the banks and the markets. While banks were encouraged to borrow if they faced a reserve shortage, reserve provision through open market operations was more effective because of the hesitancy of banks to use the window. The Federal funds rate was followed more actively for a number of weeks as an indication as to whether reserve levels were sufficient.

Early in 1988, it became apparent that the economy was growing rapidly despite the shock from the stock market, and the FOMC moved to be less accommodative. It discussed whether to return to borrowed reserve targeting and expressed a preference to do so. It found, however, that a stable relationship between the amount of borrowing and the funds rate did not reemerge. Consequently, it continued to give primary weight to the Federal funds rate in expressing its policy objectives. It did not manage the rate as closely as in the 1970s. Temporary open market operations continued to be conducted at a standard time each day, rather than whenever the funds rate deviated from the target. The FOMC also accepted some modest variation in the funds rate so long as the deviations did not give misleading indications of policy intentions. The return to effectively targeting the funds rate occurred gradually because other alternatives ceased to work as expected, rather than as a result of a specific decision by the FOMC.

Further Modifications in the 1990s

Effective Federal funds rate targeting continued into the 1990s. A move to announce FOMC policy decisions on the day they were made began as an experiment in 1994. The approach was formalized in 1995. Preferred funds rates are mentioned in the press releases, demonstrating the rate's key role.

Low levels of required reserve balances again became a constraining element in reserve management. The FOMC has given much greater weight than it had in the 1970s to the importance of containing inflationary pressures, and it has been able to keep them relatively low. It continues to look to a wide range of indicators in deciding where to set the funds rate.

Both the changes and the elements of continuity in Federal Reserve policy make this brief history a fitting prelude to the discussion of current policy in Chapters 5-7. First, however, we will turn our attention to two other subjects that bear on monetary policy in the middle of the 1990s: the structure of the U.S. banking system and the financial markets.

Chapter 3

The Role of Depository Institutions

Depository institutions play a key role in the transmission of monetary policy to the financial markets, to borrowers and depositors, and ultimately to the real economy. They hold a large share of the nation's money stock in the form of various types of deposits and provide for the transfer of those funds to effect the payments that keep the economy functioning. Depository institutions also lend these funds directly to consumers and businesses for a full range of purposes and lend them indirectly by investing in securities.

The United States has a wide variety of depository institutions—commercial banks, savings banks, savings and loan associations, and credit unions. Originally, only commercial banks accepted deposits upon which checks could be drawn, but during the late 1970s and early 1980s, checkable deposits developed at the other institutions as well. Among depository institutions, commercial banks are still a major force in commercial deposit-taking and lending activities, although their share of the business has dropped considerably.

The structure of the U.S. banking system, with many institutions of various sizes, reflects U.S. banking traditions. Until 1982, except for those exempted through grandfathering, bank holding companies were permitted to have offices only in one state. After a number of legal changes, by 1993, only Hawaii prohibited out-of-state holding companies to acquire banks within the state, prompting many banking institutions to expand operations outside their home state. Consequently, multistate or regional bank holding companies that are nearly as large as the major money center banking organizations have been formed.[1]

Despite these changes, the United States continues to have many more depository institutions than other countries: approximately 23,000 at the end of 1996, almost ten times more (per capita) than in the United Kingdom, for example.[2] Some of these institutions are large, multifaceted organizations that attract deposits from and make loans to a wide range of customers, while others specialize in corporate or retail activities.

For many years, commercial banks were unique in conducting all types of banking. Thrift institutions—savings banks and savings and loan associations—provided individuals with selected banking services, primarily savings accounts and mortgage loans.[3] Over time, the powers of thrift institutions have been expanded to overlap those of commercial banks. Although thrifts have aggressively accepted checkable deposits from individuals, to date most have entered the business of commercial lending and deposit taking only in a very limited way. At the same time, institutions have merged, particularly thrift institutions in areas of the country where regional problems or overexpansion have created financial difficulties. Ten years of failures, mergers, and takeovers by commercial banks have reduced the number of thrift institutions by more than 40 percent, from 3,700 in 1986 to only 1,900 in 1996.

The contraction of the thrift industry has left commercial banks, which numbered about 9,500 at the end of 1996, as the predominant depository institution.[4] Commercial banks still handle the bulk of the myriad daily commercial transactions. They also hold most of the reserve balances at the Federal Reserve Banks and play a major role in intermediating between borrowers and lenders. In addition, they are responsible for the lion's share of large-dollar payments over Fedwire, the Federal Reserve's electronic funds-transfer network.[5]

Thus, as the Federal Reserve formulates and implements policy, it must stay closely attuned to commercial bank behavior. Understanding the role of banks helps policymakers assess the linkages between monetary policy and growth in money and credit. More specifically, an understanding of the circumstances and behavior of individual institutions enables the Federal Reserve's Open Market Trading Desk to evaluate the reserve situation knowledgeably as it devises its operating strategy.

The Business of Banking

Although the core of banking—borrowing and lending money—has remained essentially the same since ancient times, banking in the United States has changed dramatically over the last fifteen years. Deregulation is

sometimes cited as the principal catalyst of the changes. Deregulation may be more appropriately regarded, however, as an outgrowth of the competitive pressures that have increasingly impinged on the banking franchise. Broader access to the money and capital markets, information, and technology have irrevocably altered the competitive landscape.

Banks historically have had a comparative advantage in acquiring the information crucial to credit analysis and thus in making informed credit judgments. However, several factors have diminished this advantage in recent years, including increasingly broad dissemination of information, the emergence of new markets, and other innovations. Computer-aided analytical techniques for investors borrowing directly in the money and capital markets have become accessible to more and more businesses. The development of secondary markets for mortgage and consumer debt has also enabled households to tap the capital markets, at least indirectly. Moreover, technological developments have greatly enhanced the cash management and funding sophistication of the banks' traditional client base. As a result, the relationships between banks and their customers that once formed the basis for profitable banking have yielded to price-sensitive competition and a more fickle clientele.

On the asset side of the ledger, banks have faced increased competition from the commercial paper market. Since the 1960s, growing numbers of large corporations have turned to this market for working capital. Finance companies, which compete with banks in lending to smaller corporate borrowers and to consumers, have also sidestepped banks by borrowing directly in this market. In response, banks began providing backup credit lines to commercial paper issuers and placing the paper as agent for the issuer. Facilitated by expanded authority granted by the Federal Reserve in the late 1980s, nonbank affiliates of banks began underwriting commercial paper and other corporate debt in competition with securities firms.[6]

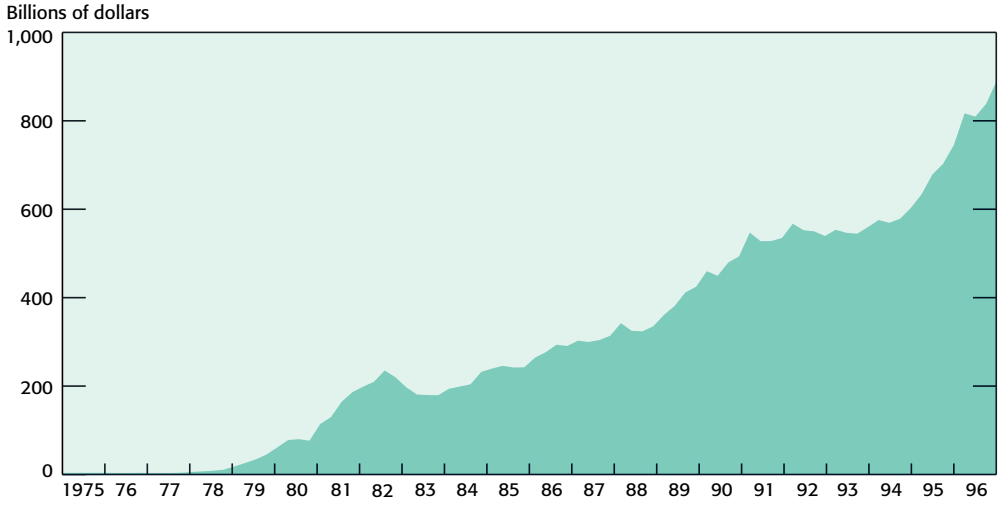
On the liability side, banks have faced competition for both commercial and retail deposits. Initially, competition from nonbank entities was spurred by a combination of high nominal money market interest rates in the 1970s and early 1980s and restrictions on rates that banks and thrift institutions could offer on time and savings deposits. As an alternative to these deposits, investment banks and brokerage firms began offering money market mutual funds (MMMFs). MMMFs paid market-based rates by investing the small sums gathered from many customers in short-term market instruments—primarily commercial paper and Treasury securities—and in large certificates of deposit that were exempt from interest rate ceilings. The MMMFs also provided easy access through limited check-writing privileges. Because of these features, the volume of MMMFs expanded rapidly—and bank deposits contracted—whenever market interest rates topped the deposit rates paid by

banks and thrifts. MMMFs have remained a popular alternative to bank deposits. Growth ceased for a while in the early 1980s when deregulation of deposit rates permitted banks to offer competitive products (discussed below). However, growth resumed in the latter half of the decade and has continued in the 1990s as brokers frequently offered more competitive rates than banks (Chart 1).

The effects of increased competition with banks for deposits and loans are apparent in Chart 2; measured in relative terms, the commercial banking industry's balance sheet has shrunk dramatically since the mid-1970s. By the mid-1990s, commercial bank deposits as a share of all household assets had fallen to the lowest levels in over forty years. Bank credit as a share of domestic nonfinancial debt has also declined sharply from the levels in the 1970s. These balance sheet trends have led some observers to pronounce the "decline" of banking.

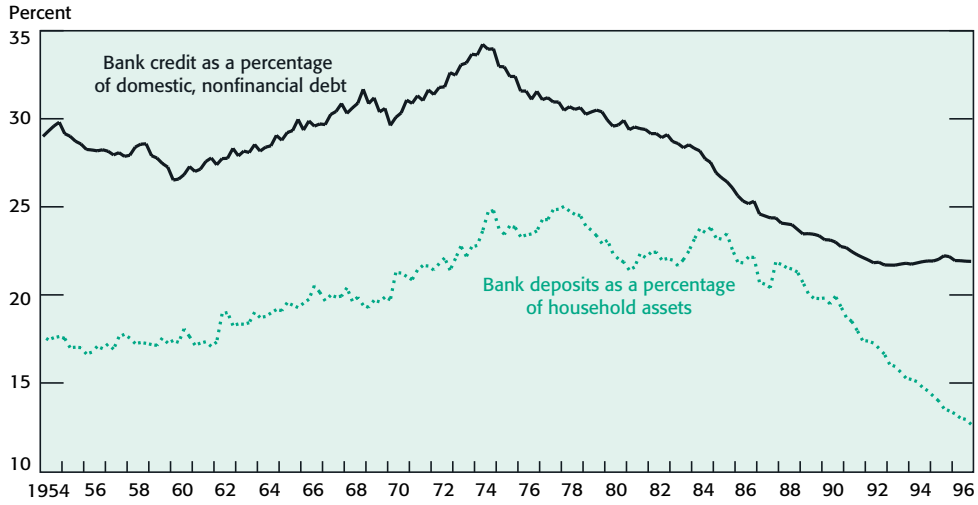
To improve banks' competitive position, bank laws and regulations have been relaxed. Restrictions on interest rates that could be paid by depository institutions on most types of deposits were removed gradually, enabling the institutions to offer directly comparable products.[7] In 1982, depository institutions were allowed to offer money market deposit accounts (MMDAs) paying competitive interest rates on small sums that were immediately withdrawable and federally insured. The Federal Reserve also lowered reserve requirements,

Chart 1. **Money Market Mutual Funds**
Quarterly Average Assets, Not Seasonally Adjusted



Source: Board of Governors of the Federal Reserve System.

Chart 2. **Bank Deposits and Credit**



Sources: Flow of Funds; Board of Governors of the Federal Reserve System.

Note: Household assets represent: currency, checkable deposits, savings deposits, and time deposits held by households and nonprofit organizations.

which are equivalent to a tax on bank deposits, in a series of steps over the early 1980s and again in the early 1990s.

Deregulation has not been the only response to changing conditions in the banking business. Regulatory capital requirements have been strengthened in recognition of the risks inherent in innovation, deregulation, and increased competition. In 1981, the federal bank supervisory agencies (the Federal Reserve, the Federal Deposit Insurance Corporation, and the Office of the Comptroller of the Currency) began to systematically raise the minimum requirements for bank capital-to-asset ratios. This development, in turn, encouraged banks to move business off their balance sheets, for example, by packaging and selling loans in the form of securities. This "securitization" of assets—in the form of mortgages, auto loans, and credit-card loans, for example—shifts bank loans to permanent investors, leaving the banks to service the loans for a fee. Origination, distribution, and servicing capabilities have therefore become increasingly significant elements of the banking business, while building up the balance sheet—once perceived as a measure of a bank's eminence—has diminished in importance. Ignoring this shift and focusing only on the balance sheet variables plotted in Chart 2 exaggerates the apparent decline in banking.[8]

In 1988, bank regulators from the Group of Ten (G-10) countries adopted risk-based capital standards, which classify assets according to

credit risk, with the riskier classes requiring larger amounts of capital.[9] The standards also extend to off-balance-sheet business. As a result, banks with large off-balance-sheet exposures (typically large banks) must maintain higher capital levels than under the old standards. Through 1997, the standards cover only credit risk, but as of 1998 the international agreement is being extended to cover price risk in banks' trading activities.

The upshot of these developments has been a greater premium on flexibility and innovation. Banks have lost their essentially captive markets for "rate-controlled" deposits and for loans. Now they must compete for market-priced liabilities and a wider variety of lending and investment products and services. These changes call for a more dynamic view of the balance sheet, increased levels of capital, and the expansion of fee-based operations.

In response, the banking industry has become more diverse. The cost of being all things to all people has grown more difficult with thinning profit margins, and most institutions have looked to specialize or to move into potential growth areas. The broad traditional distinction between "wholesale" and "retail" banks has been further refined. Some banks have withdrawn entirely from retail or branch banking to concentrate on serving corporate clients. Others have seen their advantage in the consumer sector and have expanded that part of their business. Some have pulled back from international operations while others have expanded abroad, and several larger organizations have begun arranging and financing mergers and acquisitions in direct competition with investment banks. The very largest banks have also become more active in derivatives; the notional value of foreign exchange contracts and interest swaps at the five largest bank holding companies increased to more than seven times their assets at the end of 1995.

Conversely, many smaller institutions have managed to retain some of the traditional character of full-service banks by serving a geographically limited clientele. In these cases, the banks' knowledge of their local communities and their relationships with depositors and borrowers distinguish them from the competition. Nevertheless, the consolidation trend over the last fifteen years has been accompanied by a reallocation of assets from smaller to larger banks. Between 1980 and 1996, the share of all domestic bank assets held at "small" banks (banking organizations with real gross assets of less than $100 million) fell by more than half, to about 6 percent, while the share at "megabanks" (banking organizations with real gross assets over $100 billion) more than doubled, to 25 percent.[10]

The U.S. activities of foreign bank branches and agencies have remained largely wholesale-oriented, focusing for the most part on the money markets, foreign exchange, and trade finance. Over the past fifteen years, however, foreign banks have also tried to establish a more broadly competitive presence in U.S. corporate banking by establishing new banking offices or by acquiring

existing U.S. banks. Between l980 and 1996, the share of debt owed by nonfarm and nonfinancial U.S. corporations to foreign-owned U.S. banks more than doubled, with the most rapid growth occurring before 1991.[11] In addition, foreign banks have increased their securities-related activities in the United States.

Although the distinctions among banking firms have grown, banks have increasingly overlapped other financial industries, such as the securities and insurance businesses, in the services they offer. For example, banking organizations in recent years have established and marketed mutual funds, packaged their loans and sold them as securities, entered the bond guaranty insurance and securities brokerage businesses, and begun to underwrite and trade corporate debt through their nonbank affiliates.[12] The Federal Reserve also permits subsidiaries of a limited number of large bank holding companies to underwrite corporate stock.

Securities firms and insurance companies, conversely, have successfully offered deposit-like products to consumers and businesses and provided financing for corporate expansion. Like the banks, they are testing the bounds of current law and regulation that generally prohibit affiliation between commercial banks and full-service securities firms. Securities firms have established or acquired special-purpose banks, such as Edge Act corporations (limited to an internationally oriented business), and nondepository trust companies in order to obtain access to Federal Reserve services. These developments represent significant inroads into banking's province—notably, the ability to maintain accounts at the Federal Reserve Banks and to have direct access to the Federal Reserve's electronic payments system.

Banking Risks

Because of their crucial importance to the economy, depository institutions are supported by a federal "safety net," composed of the discount window, federal deposit insurance, and an extensive framework of supervision and regulation. Other types of financial firms, such as securities houses and insurance companies, are also heavily regulated and supervised, and their investors and beneficiaries too are protected against a company's failure by pooled guaranty funds. Only depository institutions, however, have direct access to central bank liquidity to guard against the risk that the failure of one institution to settle its obligations on a given day will cause other institutions to default in turn. The potential social costs of a crisis of confidence in the banking system and the likely related money and credit dislocations are certainly large enough to warrant such safeguards. In the

extreme, a banking crisis could exacerbate an economic downturn by restricting the supply of money and credit.

Even with this framework of support, banking still involves considerable risk. Indeed, as we have observed, growing competitive pressures and deregulation have introduced new types of risk and complicated the business. In addition, the growth of markets now allows banks to trade risks traditionally held on the balance sheet, raising the possibility that bank risks can change rapidly.

The federal safety net is intended to safeguard the system as a whole, not individual banks. Nonetheless, the procedures aimed at avoiding systemic risk do provide some protection to the individual institutions, as well, creating the "moral hazard" that banks will take on excessive risk knowing that federal support exists. Bank supervision and regulation, therefore, look to minimize these moral hazards while maximizing systemic protection by letting the discipline of the marketplace work as much as possible. Recent legislative changes have led to risk-based capital adequacy standards, risk-based deposit insurance pricing, and explicit limits on the behavior of banks facing financial difficulties.

Although these changes have further mitigated the moral hazard problem, investors in bank or thrift stocks are still at risk, as are other creditors, including uninsured depositors. As a result, banks perceived to be risky may find it difficult to raise capital. But regardless of who ultimately bears the cost—bank investors, the federal support system, or depositors—the basic risks to bank solvency remain.

The Elements of Bank Risk

The fundamental elements of bank risk assume five major forms.[13] These are credit, price, liquidity, country, and payment and settlement risk.[14]

1. Credit Risk

Credit risk, perhaps the most notable form, centers on the possibility that a bank's customer will be unable to meet its interest or principal payments. A key function of bank credit officers is to assess the borrower's financial condition and evaluate the risk and return characteristics of the loan. Today, many banks also have significant off-balance-sheet credit risk. For instance, banks sometimes sell loans "with recourse," meaning that the risk of borrower default remains with the bank, even though the loan ceases to appear on the seller's balance sheet. Banks acting as dealers in the over-the-counter derivatives markets also face significant risk of counterparty default.

To an extent, loan and other credit losses are unavoidable. Among U.S. investments, only U.S. Treasury securities are considered free from issuer credit risk since they are backed by the full faith and credit (that is, the taxing power) of the federal government.[15] However, since banks must pay more than the U.S. government for a large portion of their liabilities, an investment strategy that concentrated on Treasury debt would generally not be profitable. Rather, bankers tend to look for the higher yields that can be obtained from relatively riskier loans and investments.

In managing credit risk, banks attempt to maintain a diversified portfolio priced both to absorb expected losses and to earn a satisfactory return on capital. Recent legislation directs bank regulators to take account of "concentrations of credit risk" in evaluating bank capital adequacy. The portion of a bank's capital that can be lent to a single borrower is also limited by law, and bank credit departments typically establish even more restrictive internal limits for specific borrowers. Moreover, the financial condition of the borrower is monitored on an ongoing basis as long as the loan or commitment is outstanding.

Collateral also plays a role in the management of credit risk. Important considerations are the liquidity of the collateral and the coverage (margin) of collateral value in excess of the amount outstanding on the loan. Clearly, the ability to foreclose on a property or a piece of machinery can be cold comfort to a bank if it cannot readily sell the collateral in the market at a price that will cover the balance due on the loan and the bank's related costs. In most cases, the cost of managing, insuring, and maintaining the collateral pending its sale must also be considered, as must the risk that a borrower will seek court protection under the bankruptcy laws. In this instance, the bank may not be allowed to liquidate the collateral.

2. Price Risk

A second form of risk facing banks is price risk—the risk that the value of a bank's assets, liabilities, or off-balance-sheet positions will change as interest rates or foreign exchange rates change.[16] Risks associated with changes in interest rates grew in importance in the 1970s and 1980s as interest rates became less regulated and more volatile. A bank could avoid exposure to interest rate risk by running a "matched book" of assets and liabilities with the same repricing dates or duration.[17] With such a position, movements in interest rates would not affect the bank's profitability because the rates paid on liabilities would change in lockstep with those earned

on the loans and investments they supported. But the earnings from such a strategy might not be sufficient to cover operating expenses and return a profit to shareholders.

Consequently, most banks mismatch or "gap" the repricing of their assets and liabilities to some degree with a view toward profiting from changes in the level of rates or in the shape of the yield curve. For instance, borrowing short and lending long may be profitable in an environment of falling interest rates because liabilities can be repriced at lower rates while assets lock in relatively high yields. Such a strategy may also be profitable if rates are stable and the yield curve maintains an upward slope. Banks generally vary their interest rate risk gaps in different maturity sectors if they expect changes in rates over time, but "bets" on interest rates are typically kept relatively small given the inherent difficulties of forecasting rates and the high cost of being wrong. Banks also employ interest rate swaps to manage their interest rate risk.

In addition, banks face significant price risk in the form of foreign exchange risk, long a major concern in international banking. Banks make markets in foreign exchange and hold assets and liabilities denominated in various currencies. Thus, they are exposed to gains or losses from movements in exchange rates. Some opportunities exist for hedging exchange rate risks through the use of futures, forwards, and swaps, as well as through balancing assets and liabilities on a currency-by-currency basis. Hedging can be accomplished in the market for foreign exchange derivatives, which has grown very rapidly in recent years. (In fact, the use of foreign exchange forward agreements worldwide has more than doubled since 1990.[18])

Banks have also begun employing statistical models to measure and manage price risk, particularly when that risk is held in the trading account. A typical model will indicate the "value-at-risk": the maximum amount under normal market conditions that the bank can expect to lose with a given degree of statistical confidence. These value-at-risk models provide banks with a single, bottom-line figure measuring risk. This approach is especially useful because price risk can be compared across different types of trading portfolios. As a result, international regulators working through the Bank for International Settlements have agreed to use banks' own value-at-risk models to enforce capital adequacy standards for price risk in the trading account.

3. Liquidity Risk

Liquidity risk, a third type of banking risk, involves a bank's ability to meet unexpected demands for cash in the form of withdrawals, funds transfers, or drawdowns of credit lines. In managing its liquidity, a bank must balance the cost of holding cash and short-term money market instruments against its ability to borrow in the market on short notice. Sales of longer term assets are another possible source of liquidity. Banks historically have been reluctant to incur the capital losses that may accompany such sales, while regulators and bank analysts recognize that capital gains may be misleading because banks have an incentive to sell their best assets to improve their balance sheet. Banks can also sell or securitize loans to obtain liquidity. Moreover, the Federal Reserve's discount window can help a bank meet unexpected liquidity needs discovered late in the day, but restrictions on prolonged use of the window make an alternative liquidity source necessary within a day or two.

Financial innovation has significantly affected how banks manage their risk exposures. Increasingly, banks can address liquidity and price risk issues separately because they can avail themselves of derivatives instruments—futures contracts; interest rate swaps; or options on U.S. Treasury securities, Eurodollars, and other primary instruments—and dynamic hedging techniques that use these tools to alter hedges as the rate relationships change. By using instruments such as futures, forwards, and options contracts, as well as interest rate swaps (described in Chapter 4), banks can synthetically alter their interest rate and foreign exchange rate exposures within a given funding profile, although they may incur new risks in the process.

4. Country Risk

Country risk relates to the possible difficulties in collecting from borrowers in another country as a result of some development there. For example, a revolution or coup may overthrow the foreign government that took out a U.S. bank loan and bring in a successor government that repudiates the loan. The typical form of country risk in the 1980s was effectively credit risk. Public and private sector borrowers in less developed countries (LDCs) borrowed heavily in U.S. dollars from the international banking community and found it difficult to generate sufficient dollars to service their loans. In the mid-to-late 1970s, the burgeoning revenues of oil-exporting countries had been recycled by banks in industrialized nations in the form of loans to LDCs. Conventional banking wisdom had been

that countries do not default on their obligations because doing so would cut them off from future access to international credit and seriously hinder further development. That assumption, however, did not recognize that the size of a country's debt could overwhelm its ability to accumulate the dollars necessary to service that debt. As foreign governments found it necessary to defer loan payments, declare moratoria on debt service, and negotiate reschedulings that extended repayment terms, U.S. banks' cross-border exposures became a focus of attention for bank management, regulators, analysts, and investors.

In the early 1980s, the Federal Financial Institutions Examination Council, a joint body of the three federal bank supervisory agencies, began to evaluate and monitor the cross-border risk of public and private sector debt in certain countries to permit consistent treatment of such debt in banks' loan portfolios. The International Lending Supervision Act of 1983 also provided a statutory basis for the federal bank supervisors to direct their information-gathering and supervisory responses directly at transfer risks. The supervisory agencies established criteria, comparable to those applied to domestic loans, classifying loans to foreign private or public sector borrowers according to their degree of transfer risk.

5. Payment and Settlement Risk

Finally, with the increasing globalization of financial markets and the rapid movements of huge volumes of funds and securities, payment and settlement risks have also emerged as key concerns. For instance, an institution that fails to receive an expected wire transfer of funds could be forced to acquire the funds in the market or at the discount window. Alternatively, it might itself fail to make a payment when it did not receive the expected funds. Securities, too, may not be delivered to a buyer when expected, who, in turn, might not be able to redeliver them. The implications of such problems for the liquidity of particular institutions, or even of the system as a whole, are significant. Moreover, the fact that the underlying transactions often occur across international boundaries raises the prospect of financial dislocations in one market being transmitted globally.

Accordingly, there has been a concerted effort among banks to manage such risks more explicitly by monitoring exposures to particular counterparties and clearing systems. Transaction netting and other exposure-limiting mechanisms are also being used increasingly to reduce risk.

Marketability of Bank Risks

Although the main elements of bank risks have not changed, market participants have increasingly found ways to trade in the markets. The growth of loan sales markets, for instance, has allowed banks to trade credit risk. We have even seen the emergence of credit derivatives, which allow banks to sell the credit risk associated with a particular loan while keeping the funding of that loan on the balance sheet. The growth of over-the-counter markets in interest rate swaps and foreign exchange forwards has also enhanced banks' ability to trade price risks.

The development of these markets clearly improves banks' ability to manage portfolio risk. By allowing an unbundling of risks, the markets permit banks to manage credit, price, and liquidity risks separately. For example, a bank can now split a loan's interest rate risk from its credit risk by entering into an interest rate swap. Trading in derivatives similarly facilitates separation of interest rate and foreign exchange risks.

Nonetheless, new difficulties for bank management, bank supervisors, and investors have arisen from these growing markets. Relatively junior traders may have the means to increase a bank's risk profile significantly in a very short time. Good internal control and oversight of personnel have therefore become more important. The growth of markets raises similar problems for bank supervisors. Since banks can now alter the nature of their portfolio risks virtually overnight, periodic bank examinations of the balance sheet reveal less information. As a result, bank supervisors now emphasize more than ever the importance of the internal controls of bank senior management. Finally, increased marketability of bank risks raises problems for investors and creditors in need of accurate and timely financial information. Traditional balance-sheet and income statements have become less useful with the advent of off-balance sheet positions and trading in derivatives. To address this problem, the Financial Accounting Standards Board and the bank supervisory agencies have enhanced disclosure and financial reporting requirements to make bank risks more transparent.

Strategic Considerations

In most banks, the overall management of risk is highly centralized. Central control is necessary to prevent fundamentally different strategies from offsetting one another to the detriment of a bank's profitability. Typically, a committee sets the bank's strategic direction and provides guidelines for managing interest rate and liquidity risks. Senior officers on the committee represent

the bank's major business areas, such as loans, investments, and funding. In addition, the bank's chief economist normally sits on the committee, providing forecasts of the real economy, interest rates, and monetary policy that are crucial to the institution's strategic planning.

The committee meets periodically to review the bank's financial position against the backdrop of the economic and market outlooks. Committee members focus on recent material changes in the consolidated global balance sheet and expected future projects. The outlook for loan demand is reviewed, both as it would flow from the firm's economic forecast and as it would reflect particular business considered likely to develop over the planning horizon. Upcoming maturities of assets and liabilities are also reviewed, since they will generate funding needs and liquidity. Committee members then take up questions of pricing and funding, considering the implications for liquidity, interest rate exposure, capital adequacy, and, ultimately, expected profitability. For example, the members might decide if the bank should alter its asset allocation, enhance or reduce liquidity, mismatch its book in certain maturity sectors, reduce its asset size and hence its required capital, or raise equity or debt capital.

As noted earlier, banks generally take some position on the direction of interest rates over periods of a few months or so. For example, if a bank expected rates to rise over the next three months, although the yield curve did not reflect this pattern, the bank might plan to be somewhat long-funded out to three months, so that its assets would reprice at increasing interest rates while its fixed-term funding would protect it against rising costs over the period. Although some "gapping" of this sort is common at most banks, such exposures are generally kept relatively modest given the perils of interest rate forecasting and the attendant downside risk of "betting the store" on a particular outlook. Nonetheless, the relatively narrow profit margins inherent in simply matching the maturities of assets and liabilities generally provide an incentive to mismatch the book to some extent.

Tactical Considerations[19]

Once the committee managing risk exposure sets the overall strategy for the bank's balance-sheet structure, the money desk plays an important role in implementing the strategy in the market. The money desk will consider the longer term perspective in deciding on the maturity mix to fund near-term cash needs if regular business flows do not fully fund the bank. If the bank is routinely overfunded from its normal business activities, it will allow for the committee's perspective in planning near-term lending.

The liquidity management team will usually cover some portion of the bank's funding need (or effect some of its near-term net lending) with instruments maturing in more than one business day. The desk may be able to borrow through repurchase agreements (RPs) by using a portion of the bank's portfolio of U.S. government securities if those securities are not all pledged as collateral against balance sheet liabilities. (RP lending augments the portfolio.) The desk may issue certificates of deposit (CDs) for the bank. It will also track commercial paper sales by the parent bank holding company. Other desk responsibilities include directing the acquisition of Eurodollar funds for the head office through offshore branches and carrying out some of those branches' funding operations. In addition, the desk handles the funding of the bank's U.S.-based international banking facilities, through which the bank can conduct offshore business without incurring U.S. taxes.

The funding process has seen tremendous innovation over the past few decades. As indicated above, exchange traded options and futures and over-the-counter forward contracts have become widely used to hedge exposures in the cash market, and interest rate and currency swaps have emerged as vehicles for synthesizing a particular "risk" profile. In addition, "caps," "collars," and "floors" have evolved in the derivative product markets, allowing interest rate exposures to be shaped as desired. In all, the funding operation has become more complex; banks have faced variable interest rates on an increased share of their balance sheets and have had to manage the associated risks. As such, they have had to be flexible and ready to adapt to new products and conditions.

1. Day-to-Day Reserve Management

At most large banks, the money desk arranges the day-to-day buying and selling of funds. The desks need to make sure their banks avoid ending the day with overdrafts in their reserve accounts because they would be fined. These banks also aim to achieve daily reserve levels that are consistent with meeting reserve requirements for the maintenance period as a whole with as little uninvested or "wasted" excess reserves as possible because they earn no interest on excess reserves.

Reserve requirements must be met over a statement period ending every other Wednesday. Requirements are based on daily average transaction deposits held for the two weeks ending two days earlier.[20] Either reserve balances held at the Federal Reserve or vault cash held one computation period earlier count toward meeting requirements. Some reserve excesses from the previous period can be carried over into the current period. Deficiencies up to a limit can be carried forward for one period but then must be covered.

Although banks conceptually could meet their average requirements with a range of daily reserve balance levels, the Federal Reserve's policy of strongly discouraging overnight overdrafts limits their feasible options. Many banks no longer have much flexibility to allow excesses or deficiencies to build during a maintenance period because in recent years required reserve balances have declined to levels that are very low relative to the activity in their reserve accounts. The difference between a costly, unusable excess reserve position and an even more costly end-of-day overdraft is small for many banks. Thus, they may not benefit from accumulating an excess reserve position early in the reserve maintenance period and will risk an overdraft penalty if they aim for a reserve deficit.[21] To the extent banks retain any flexibility, they may modify their daily reserve management strategy in consideration of near-term interest rate expectations. If a bank expected rates to fall within the maintenance period, it might attempt to delay meeting reserve needs relative to its normal pattern; conversely, it might build a small excess reserve position if it expected rates to rise.

Even when money desk managers intend to run a position short of required levels, they will target a sufficiently large positive reserve balance at the end of each day to guard against last-minute unexpected outflows that could cause overnight overdrafts. Improved tools for monitoring reserve positions have allowed banks to reduce somewhat the minimum end-of-day reserve levels they feel comfortable targeting, but they still aim for significant positive balances to minimize the risk of an inadvertent overdraft. If a bank found that it was overdrawn at day's end, it could cover the overdraft by borrowing from the Federal Reserve's discount window. (The discount window is available for several hours after Fedwire closes if a bank alerts the Fed of a potential need to borrow.) If the overdraft was not discovered in time to borrow, forcing it to remain on the books overnight, the bank would face a stiff penalty and would have to make up the overdraft on another day.

To adjust overnight reserve positions, banks can use several markets: the interbank Federal funds market, which operates through brokers and directly from bank to bank in the United States; the Eurodollar market, which operates among offshore branches and foreign-based banks; and the RP market, which deals in secured borrowing and lending. (Banks may also be able to access surplus liquidity generated by their holding company.) Banks choose among the markets based on relative rates. Only a subset of banks can use all of the markets; Eurodollar borrowing requires at least one offshore facility, and RP borrowing requires unpledged collateral.

The daily funding officers of major banks usually start each day with information on the previous night's closing positions at the Federal Reserve, receipts and payments definitely scheduled for that day (such as asset and liability maturities), and likely receipts and expenditures that are not yet definite (such as anticipated repayments and drawdowns of loans and likely deposit flows). Large banks that provide correspondent services will also predict activity by respondent banks that place excess funds with them and rely on them for other services. From that information, these banks can gauge whether they are likely to be net borrowers or lenders in the overnight funding markets and will have tentative ideas of the size of the borrowing or lending required.

Banks with overseas branches may begin funding in the Eurodollar markets before their U.S. headquarters opens for the day. If the officials at the headquarters had been confident the night before of large reserve needs for the next day, they might have given instructions to their offices in Asia or Europe to borrow overnight Eurodollars if the rates were attractive. Trading activity in the overnight Eurodollar market winds down after European markets close, although there is some afternoon offshore activity before the close of the Clearing House Interbank Payments System (CHIPS), which specializes in international settlements, at around 4:30 p.m. eastern time.[22] Generally, RPs can be arranged for delivery only before the midafternoon close of the securities wire system, although later transactions are possible when both parties keep securities in custody accounts at the same commercial bank.

Many banks begin borrowing or lending in the Federal funds market early in the day based upon their tentative estimates of their deficiency or excess. They will refine these estimates during the day as new information is received. For instance, wire transfers of funds for customers or deposit withdrawals that were unanticipated by the money desk could force a bank to replace those reserves in the overnight funding markets to avoid being overdrawn in its reserve account at day's end. Or an unexpected inflow of reserves could provide a bank with unwanted excess reserves that it would try to sell. Routinely, Fedwire—the interbank wire system run by the Federal Reserve—closes at 6:30 p.m. eastern time, allowing Federal funds trading to continue after settlement systems for other markets have closed. Hence, the Federal funds market is the only option available for making reserve adjustments near the close of business. In the last half hour of trading, the wire system cannot be used for so-called third party transactions—those made on behalf of bank customers (including other banks). Limiting flows during the final half hour of trad-

ing to transactions initiated by the banks directly means that the banks control the flows, simplifying the management of reserve positions.

In planning the day, the funding officers try to gauge whether overnight rates are likely to rise or fall during the day by using broker comments, experience with direct Federal funds trades, and projections of aggregate reserve supplies made by money market economists. Expectations may slightly affect the timing of operations, although if a large need to borrow or lend is expected, most banks would make part of the adjustment in the morning when the market can best handle large-volume trades.

Money desk managers are limited in their ability to be both borrowers and lenders in the overnight markets on the same day. Two-way operations enlarge gross asset positions, increasing capital requirements. While some banks are more constrained than others, they all face restrictions. Consequently, apparent arbitrage opportunities sometimes persist, with rates differing modestly between two overnight markets. The opportunities may not always be exploited because the banks that could potentially make offsetting trades in both markets may consider the spreads too small to justify the use of capital. These balance sheet constraints also limit banks' willingness to bet on rate movements over the day. For instance, when reserve managers believe that rates will rise near the day's close, they may hesitate to overfund their positions in the morning in order to have funds to sell later because the potential gains may not justify the use of scarce capital. (These transactions are not truly arbitrages. The expected firming may not in fact occur, in which case the transactions could earn nothing or even result in losses.)

Some days are more challenging to reserve managers than others because flows of reserves are particularly heavy and uncertain. Many more financial transactions occur than usual on those days when the Treasury delivers new securities, retires maturing securities, and pays interest on outstanding securities. The Treasury routinely engages in these transactions at the middle of each quarter and at the end of each month or at the beginning of the following month if the month ends on a weekend. (Treasury bill settlements, which occur each Thursday, seem to have less impact than coupon settlements.) Ends of quarters and payment days for social security checks are also subject to heavy flows. These days often experience relatively high volatility in the Federal funds market as banks struggle to make reserve adjustments in an uncertain environment.

The final day of the reserve maintenance period has also traditionally been subject to rate volatility. On settlement Wednesdays,

funding managers have to bring the Fed balance to the level needed to meet the average level required for the two-week maintenance period, after allowance for any excesses or deficiencies carried in from the previous period. Reserves in the banking system may be either overly abundant, encouraging the Federal funds rate to fall, or in short supply or poorly distributed, producing upward rate pressure. The managers' success in contributing to their banks' profits is enhanced by their winding up on settlement Wednesdays short of reserves when the funds rate is low and with adequate reserves when the funds rate is high.

When banks are suddenly short because of unexpected transactions and funds are not available in sufficient volume before Fedwire closes, their option is to turn to the Federal Reserve discount window. Traditionally, banks were willing to use the window on such occasions as long as they had not recently borrowed to the limits of their perception of Federal Reserve tolerance for such borrowing. In the 1980s, however, many banks became especially reluctant to use the window because borrowing had come to be associated in the public's mind with an institution's being in financial difficulty. While those concerns eased during the 1990s, some reluctance to borrow has remained. Banks have sometimes gone to extraordinary lengths to avoid discount window borrowing, occasionally bidding the Federal funds rate up to very high levels. The highest rate observed was 100 percent, but the circumstances were very unusual. Peaks of 20 to 30 percent are more common. When the funds rate falls sharply, it usually stops just short of zero since selling reserves involves incurring a brokers' fee.

The Federal Reserve's Trading Desk routinely observes how the large money center banks and various groupings of smaller banks and thrifts are managing their reserve positions. Members of the Desk staff speak with money desk managers of large banks and monitor daily statistics on reserve positions of groups of other institutions by size and type. What they learn can clarify the behavior of aggregate excess reserves and of the Federal funds rate. It may also help Desk officials to understand instances when reserve and Federal funds rate behaviors do not seem consistent. This knowledge often helps the Desk when planning a strategy for reserve management.

2. Daylight Overdrafts

In addition to managing the day's flows with a view toward producing a desired end-of-day position, the large banks must also monitor their intraday positions in accordance with Federal

Reserve policies regarding payment system risk. The huge volumes of daily payment flows over Fedwire and the payments arising out of the Federal Reserve's Book Entry Securities System (BESS) currently cause overdrafts in a number of banks' reserve accounts during the day—referred to as daylight overdrafts.

Daylight overdrafts arise because the Federal Reserve generally honors instructions from a bank to transfer reserves out of its account to another bank's account even if the reserve balances in the paying bank's account are insufficient to cover the size of the transfer.[23] Daylight overdrafts may be generated from direct transfers of funds over Fedwire and from securities transfers over BESS, which is a delivery-versus-payment system. When a bank instructs the Federal Reserve to deliver securities from its account to another bank's account, the movement of securities simultaneously results in an offsetting transfer of funds from the bank receiving the securities. Although this procedure eliminates payment risk from the securities transfer system, it does mean that the bank receiving the securities will lose reserves without having taken any specific action and thus has no direct control over the loss.

The small number of banks that manage clearance for government securities dealers are particularly vulnerable to large reserve losses, primarily because of the conventions that prevail in the RP market. Dealers often borrow money overnight in that market, using their inventories of securities as collateral. The dealers and their clearing banks receive money when they send out the securities being used as RP collateral, traditionally in the late morning or early afternoon. Most commonly, when an RP contract matures, the custody bank for the entity that loaned the money (and thus holds the securities) returns the securities when Fedwire opens, currently 8:30 a.m. eastern time. The banks that manage dealer accounts lose reserves when the securities come back and do not regain them until the dealers instruct the banks to deliver securities to a customer or the securities are again financed through an RP.

Daylight overdrafts represent unsecured credit from the Federal Reserve to the banks that generate them. Although a bank can normally cover an overdraft before the close of business, it could fail to do so, which would leave the Federal Reserve vulnerable to loss. That credit risk became a source of serious concern to the Federal Reserve System during the 1980s, as rising transaction volumes on its funds and securities transfer systems contributed to ballooning daylight overdrafts. A wide range of studies sought to determine the best way to address the problem.

Simply forbidding such overdrafts was not considered feasible by those assessing the issue. Reserve balances at the Federal

Reserve Banks were too low to permit the large volume of transfers to occur smoothly without overdrafts. (By 1996, the average daily volume of Fedwire money transactions was close to $1,000 billion, $700 billion for securities wire transactions. In contrast, average reserve balances at the Federal Reserve Banks were only around $26 billion.) The analysts feared that an attempt to eliminate overdrafts would cause "gridlock" as banks would delay transfers until they received sufficient funding; however, such funding would not be forthcoming since the banks owing money would likewise delay transfers. In addition, the RP market would have required major restructuring.

Instead, a series of limits on the peak and average volumes of daylight overdrafts were introduced during the 1980s, with the limits based upon the capital of the bank. Review and planning for explicit charges continued for a number of years, and in April 1994, the Federal Reserve introduced charges equal to 10 basis points.[24] The fee was raised to 15 basis points in April 1995.

The response to the charges was dramatic for overdrafts arising from RP transactions. The banks that clear securities for dealers informed the dealers before the fees took effect that they would have to pay for any overdrafts they generated. Dealers responded by speeding up the process of arranging RPs so that they could send out securities being used as collateral earlier in the day, and thus receive their money sooner. The overdrafts generated by funds transfers declined much less; the overdrafts were substantially smaller to begin with and most banks did not consider the costs incurred to be large enough to develop monitoring procedures needed to pass them on to customers. Peak daylight overdrafts from both systems dropped from a daily average of $124 billion in the six months prior to the introduction of charges to $70 billion over the balance of 1994. In 1996, they averaged $70 billion.

The Federal Reserve's Open Market Trading Desk had been concerned that pricing of daylight overdrafts might reduce the late-morning liquidity in the RP market, at the time when it typically carried out its RP operations. To make its RPs more attractive, the Desk delayed the time at which it returned collateral on maturing RPs from early morning until 11 a.m., a step that gave the participants more reserve balances during the morning. In practice, the Desk did not experience a significant change in participation rates.

Procedures in the brokered Federal funds market changed only slightly. Brokers reported more complaints about funds being sent or returned late, but no new conventions developed to more closely control the times funds were sent or returned.[25] Furthermore,

though much anticipated, no intraday Federal funds market has developed. Brokers have indicated that some banks have preferred to arrange more overnight transactions through the Eurodollar market, which involves only one late afternoon net settlement on Fedwire and therefore is less likely to generate daylight overdrafts.

Chapter 4

The Financial Markets

The existence of broad-based, active financial markets in the United States is very important to Federal Reserve policy implementation. The markets provide a place where the Federal Reserve can buy and sell Treasury debt instruments in carrying out open market operations. The Federal Reserve uses such transactions to make large-sized reserve adjustments quickly. If active markets in financial instruments did not exist, the Federal Reserve would not be able to make open market operations its primary policy instrument, and a very different, less efficient set of monetary policy procedures would have developed. Moreover, without large-scale financial markets, the economic conditions addressed by Federal Reserve policy would barely resemble the complex system that has evolved in the United States, since the variety and efficiency of means of borrowing and lending have affected the course of economic development.[1]

The financial markets encompass a vast array of techniques and instruments for borrowing and lending that facilitate investment, consumption, saving, and the convenient timing of purchases and sales of goods and services. The borrowers are mostly businesses, individuals, and governmental units with a variety of needs for funding. Lenders are businesses and individuals with savings or excess cash to invest. Many entities fall into both categories. Financial institutions, including commercial banks, investment banks, and insurance companies, intermediate between borrowers and lenders. In addition, a wide variety of financial instruments have been developed that permit borrowers to sell their own securities, usually with

the assistance of investment banks, without relying on the intermediary services of commercial banks.

Active financial markets help potential borrowers and lenders find the most advantageous terms and interest rates. The market-making processes allocate savings to the uses offering the highest return and search out the interest rates that bring supplies and demands into balance. The determination of the overall level and the structure of interest rates according to the maturity of the instrument is a complex process (see the discussion in Chapter 8). For any maturity, rates will differ among instruments if they are perceived to have different credit risk, tax, or marketability characteristics, or if they are available to different classes of purchasers (lenders). The spread between interest rates on two financial instruments of the same maturity may change if perceptions about such characteristics change.

The highly developed nature of financial markets in the United States and the wide range of choices for borrowing and lending have facilitated a massive expansion of outstanding debt. The large volume of debt can be seen as a sign of economic and financial vigor, but at times it can also be worrisome. Servicing the debt could be a problem in a period of economic retrenchment, when corporate profits and personal income tend to weaken. In addition, with market development has come increased integration among the various financial instruments, an outcome that may speed the transfer of credit problems from one part of the financial markets to another.

Market participants often distinguish financial instruments with maturities of a year or less from those with longer initial maturities. The market in which instruments with shorter maturities are issued and traded is referred to as the money market. The money market is really a market for short-term credit, or the option to use someone else's money for a period of time in return for the payment of interest. The money market helps the participants in the economic process cope with routine financial uncertainties. It assists in bridging the differences in the timing of payments and receipts that arise in a market economy. Borrowers rely on it for seasonal or short-term cash requirements; lenders use it to offset uneven flows of funds. By providing a means for funds to be placed temporarily, the money market also permits borrowers to time their issuance and lenders to time their purchases of bonds and equities in accordance with their forecasts of stock prices and long-term interest rates. (Table 1 lists characteristics of a number of money market instruments.)

Markets dealing in instruments with maturities that exceed one year are often referred to as capital markets, since credit to finance investments in new capital would generally be needed for more than one year. The time division is arbitrary. A long-term project can be started with short-term credit, with

additional financing arranged at a later date. Furthermore, two- or three-year credit instruments may need to be renewed before a project is completed. Debt instruments that differ in maturity share other characteristics. Hence, the term "capital market" could be—and occasionally is—applied to some shorter maturity transactions. (Table 2 gives examples of capital market instruments.)

A distinction is also made between primary and secondary markets. The term "primary market" applies to the original issuance of a credit market instrument. There are a variety of techniques for such sales, including auctions, posting of rates, direct placement, and active customer contacts by a salesperson specializing in the instrument. Once a debt instrument has been issued, the purchaser may be able to resell it before maturity in a "secondary market." Again, a number of techniques are available for bringing together potential buyers and sellers of existing debt instruments. They include various types of formal exchanges, informal telephone dealer markets, and electronic trading through bids and offers on computer screens. Often, the same firms that provide primary marketing services help to create or "make" secondary markets. The development of active secondary markets has increased the attractiveness of debt instruments to potential purchasers.

Table 1. **The Money Market**

Instruments	Typical Maturities	Principal Borrowers	Secondary Market
Federal funds	Chiefly 1 business day	Depository institutions	Active brokers' market
Negotiable certificates of deposit (CDs)	1 to 6 months and longer	Depository institutions	Modest activity
Bankers' acceptances	90 days	Financial and business enterprises	Limited
Eurodollars			
Time deposits (non-negotiable)	Overnight, 1 week, 1 to 6 months, and longer	Banks	None
CDs (negotiable)	1 to 6 months and longer	Banks	Moderately active
Treasury bills	3 to 12 months	U.S. government	Very active
Repurchase agreements	1 day, and terms of 2 days to 3 months typical; 6 months less typical	Banks, securities dealers, other owners of securities, nonfinancial corporations, governments	None, but very active primary market for short maturities
Federal agencies		Federally sponsored agencies:	
Discount notes	30 to 360 days	Farm Credit System, Federal Home Loan Banks, Federal National Mortgage Assn.	Active
Coupon securities	6 to 9 months		Active
Commercial paper	1 to 270 days	Financial and business enterprises	Moderately active
Municipal notes	30 days to 1 year	State and local governments	Moderately active for large issuers

Firms can keep some of their liquid working balances in short-term instruments, which they can then sell before maturity if they need cash. This source of liquidity has affected money and bank credit because it has reduced firms' needs to keep funds on deposit and to obtain short-term loans from the banks.

In addition to making outright purchases and sales in the secondary market, entities with money to invest for a brief period can acquire a security temporarily, and holders of debt instruments can borrow short term by selling securities temporarily. These two types of transactions are repurchase agreements (RPs) and reverse RPs, respectively. In the wholesale market, banks and government securities dealers offer RPs at competitive rates of return by selling securities under contracts providing for their repurchase from one day to several months later. Finally, a variety of derivative instruments, including

Table 2. **The Capital Market**

Instruments	Typical Maturities	Principal Borrowers	Secondary Market
U.S. Treasury			
Notes	2 to 10 years	U.S. government	Very active
Bonds	30 years (currently)	U.S. government	Very active
Federal agencies			
Bonds	3 months to 10 years	Farm Credit System, Federal Home Loan Banks, and related institutions	Moderately active for recent issues, less active for older issues
Debentures	2 to 30 years	Federal National Mortgage Assn., Federal Home Loan Mortgage Assn.	Moderately active depending on maturity
Master notes	Up to 10 years—negotiable	Federal National Mortgage Assn., Student Loan Marketing Assn.	Active
Zero coupons	Long-term	Federal National Mortgage Assn., Student Loan Marketing Assn.	Limited
Fixed- and floating-rate swaps	2 to 10 years	Student Loan Marketing Assn.	Active (see swaps below)
Corporate bonds	2 to 30 years	Financial and business enterprises	Active
Municipal bonds	2 to 30 years	State and local governments	Active
Derivative products			
Futures contracts	Contracts mature every 3 months out to 2 years	Dealers, banks (users)	Very active (arbitrage with cash market)
Options	Exercise at strike price on or before prearranged expiration date	Dealers, banks, nonbanks	Very active
Swaps	Exchange of interest streams over the lives of underlying debt issues	Dealers, banks, nonbanks	Very active (sales termination, reverse swaps)
Strips	Semiannually on each coupon date and bond maturity date out to 30 years	U.S. government (indirectly—stripping done by dealers)	Active

swaps, futures, and options contracts on various financial instruments, can be used for hedging interest rate risk or for speculating.

The financial markets are international in scope. Banks of many nations bid for deposits and make loans throughout the world. Foreign borrowers may raise funds in the U.S. credit markets and U.S. borrowers can raise money abroad by issuing securities denominated in U.S. dollars or in other currencies and then swapping them into dollars. Foreign central banks and others hold U.S. dollar securities in large volume as part of their dollar reserves. U.S. Treasury securities trade virtually around the clock in major financial centers in Europe and Asia as well as in the United States. The U.S. dollar is the main international currency, although some financial instruments are denominated in other currencies or occasionally in a basket of currencies. Currency risk can be managed through various hedging techniques, encouraging investments in many currencies.

Financial Intermediaries and the Financial Markets

The development of financial markets has allowed large, creditworthy commercial entities to avoid traditional intermediaries and to borrow directly from investors, either through investment banking firms or by direct placement. Corporations and municipalities can often borrow by issuing unsecured commercial paper at rates lower than those charged by banks.

Commercial banks, nonetheless, continue to play several important roles in the financial markets. In addition to providing traditional deposit transfers and loans, they create and deal in financial market instruments. Large U.S. banks are particularly active in the money market. They figure importantly in the markets for Federal funds, Eurodollars, RPs, and bankers' acceptances (BAs). They also deal in certificates of deposits (CDs), deposit notes, and some short-term derivative products. Their holding companies issue commercial paper. Money center banks are typically the principal domestic traders in the worldwide foreign exchange market. They also furnish the transfer, record keeping, and credit facilities needed by nonbank participants. Many banks act as dealers in money market securities, while others meet customer investment needs through a short-term investment desk. A handful of banks serve as clearing agents for dealers. Most specialize in certain types of instruments. They deliver and receive securities and make related payments. A number of large banks meet the residual financing needs of money market dealers. American affiliates of foreign banks are active, too, in trading Federal funds and other money market instruments. These affiliates also provide access to the U.S. money market for their head offices abroad, for

their global branch networks, and for the U.S. operations of their overseas clients. Most depository institutions participate in the capital markets through purchases and sales of government securities for their investment portfolios. In some instances, subsidiaries of bank holding companies serve as dealers in U.S. government securities and as underwriters of other securities.

Descriptions of the various financial instruments follow. The instruments are classified as primarily bank or primarily nonbank instruments, although the differences between these two categories are becoming blurred.

Bank-Related Financial Markets

1. The Federal Funds Market[2]

The Federal funds market is the market for immediately available reserve balances at the Federal Reserve.[3] Depository institutions that maintain accounts at the Federal Reserve, either directly or through a correspondent, can borrow (buy) or lend (sell) reserve balances.[4] Depository institutions hold reserve balances at the Federal Reserve to meet their reserve requirements—on average over a two-week maintenance period—and to cover any overnight overdrafts that may arise from transactions with other depository institutions. Because the Federal Reserve does not pay interest on reserve accounts, depository institutions have an incentive to hold their reserve balances to the minimum levels necessary to meet their various needs.

Regular flows of business to a bank are unlikely to leave it with the desired level of reserves. A bank that is short of reserves has a number of adjustment options, including purchasing enough Federal funds to offset the shortage (see Chapter 3). Such borrowings are not classified as deposits, so they are subject neither to reserve requirements nor to the statutory prohibition against paying interest on demand deposits. A bank with reserve balances in excess of its needs may lend them in the Federal funds market.

Most banks tend to be routinely either net buyers or net sellers of funds although some shift back and forth. Large banks may be either net buyers or net sellers. Small commercial banks, thrift institutions, and credit unions are more often sellers.[5] The institutions that are routine sellers often view the monies sold in the Federal funds market as part of their liquidity.

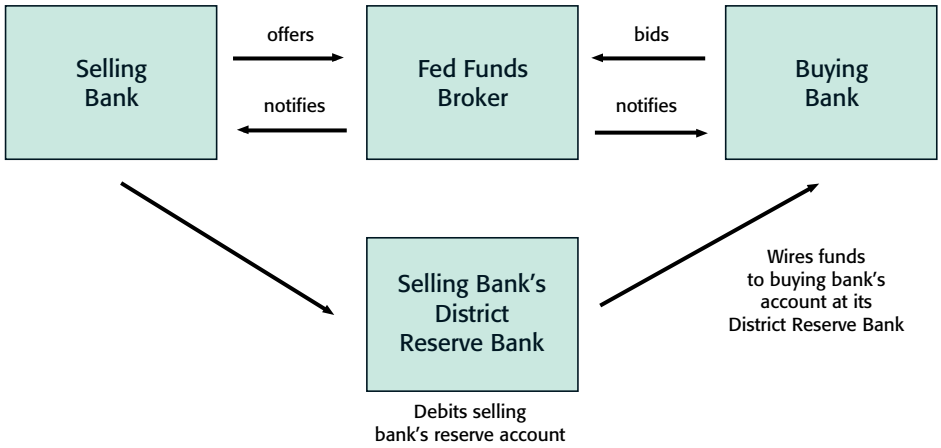
There are two methods for buying and selling Federal funds. Depository institutions can deal directly with each other, or brokers can bring together financial institutions with shortages and those

with excesses of reserves. Direct transactions most commonly consist of sales by small-to-medium-sized institutions to larger correspondent banks. Small institutions rarely generate reserve excesses large enough to allow them to participate in the brokers' market. Instead, they arrange to have a correspondent bank buy from them directly. Often these transactions take place on a regular basis: if the respondent institution routinely generates more reserve balances in its business than it needs, it may make daily sales to its correspondents through an automatic mechanism. Usually, the transaction takes place at the opening rate, at a discretionary rate based on brokers' market trading, or at the average effective rate set in the brokers' market the day before less a fraction. Some large-sized direct transactions do take place when two institutions are aware of each other's likely status as a buyer or seller.

A substantial share of large transactions are arranged in the brokers' market. Trades through the brokers are typically for $25 million or more, although smaller trades may be executed on occasion. Brokers provide an essential service to the thousand or so financial institutions that are regular participants. The Federal funds brokers do not take positions themselves but bring together potential buyers and sellers. They take bids and offers from banks by phone, charging each party to the trade a commission of 50 cents per $1 million. Generally either 1/16 or 1/8 percentage point separates the bid from the offer (with occasional spreads of 1/32). If the market is very one-sided or rates are changing rapidly, the spread may be much greater, as large as several percentage points. Since these loans are unsecured, depository institutions establish credit limits for each potential buyer. Once the terms of the exchange are agreed upon, the selling institution notifies its District Reserve Bank to debit its account and wire the funds to the buying bank. The banks entering into the contract, rather than the broker, are responsible for making sure the transactions are completed. Typically, the transaction is reversed and the interest is paid the next business day (see diagram).

Participants in the Federal funds market can get an idea of the rates at which funds are trading by looking at on-line information screens provided for a fee by various financial service firms. Brokers report the current bid and offer rates for Federal funds and the rate at which the most recent transactions took place. Participants phone the brokers to get their views on the market and to place bids or offers. Brokers will indicate whether the market is "better bid" or "better offered." They will try to get bidders to step up their rate or sellers to accept a lower rate when they observe a concentration of bids or offers.

Federal Funds Transaction with Broker



Note: The transaction is reversed the following business day.

Staff members at the Trading Desk of the New York Reserve Bank also watch the news screens and telephone the brokers routinely during the day to keep abreast of the rates, the volume of activity, and the balance between supply and demand. In 1996, the daily volume of Federal funds trades arranged through the brokers reporting to the Federal Reserve Bank of New York averaged around $45 billion. No measure is available of the total volume of Federal funds transactions—that is, both brokered and direct trades. The Federal Deposit Insurance Corporation (FDIC) call reports, which cover all insured banks, report only the sum of overnight Federal funds and repurchase agreements.[6]

Although most activity in the market involves purchases and sales for that day's delivery with the return the next business day, trades for future delivery and for extended terms also take place. Trading for future delivery is most common ahead of quarter ends. Heavy flows of funds through the banking system on those days inflate cash needs and increase uncertainty about cash needs; some banks may be anxious about their ability to borrow large amounts if their financial position is uncertain. (Quarter-end balance sheets are published.)

The market for "term" Federal funds is a wholesale market in unsecured interbank lending. Maturities range from a few days to more than a year, although most transactions mature in six months or less. The term funds market is considerably smaller than the overnight market; the volume of activity varies, but the amount of term Federal funds outstanding is probably on the order of one-tenth of the amount of overnight funds arranged on a given day. The term market is less liquid than the overnight market. On occasion the broker may need hours or even days to find a counterparty willing to meet the rate bid or offered. For a bank with an extended need for funding, buying funds for a specified term is similar to issuing a time deposit, except that such borrowing is not assessed for deposit insurance. Banks can thus afford to pay a higher rate than they would be willing to pay on a time deposit. The sellers in the term market are members of the same group that participates in the overnight Federal funds market. Some banks situated abroad lend term Federal funds whenever the rate is sufficiently above that available on term RPs to compensate them for the lack of collateral against the loan. Savings and loan associations and the supervising Federal Home Loan Banks also use the term funds market to invest liquid reserves. Term Federal funds transactions are not subject to early termination except in unusual circumstances when both parties agree.

2. Certificates of Deposit

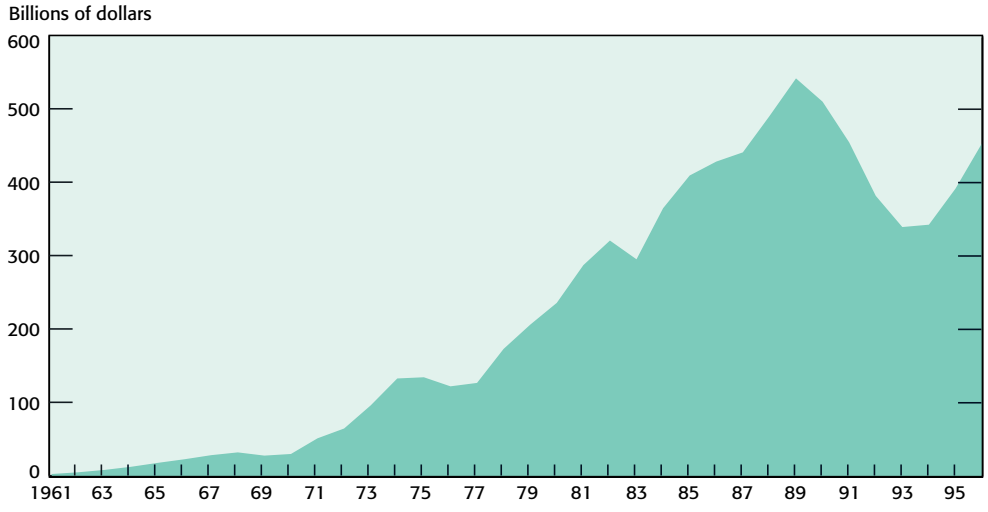
After its introduction in 1961, the large negotiable bank CD grew rapidly in importance and often served domestic banks as a major source of funds. Banks could borrow by issuing CDs, principally to nonbanks. The CD, like a U.S. Treasury bill, could be sold before maturity. Its secondary market, however, was never as liquid as the bill market and became less liquid in the mid-1980s. CDs became more like nonnegotiable large time deposits, and data collection ceased to distinguish between them. Because a CD carries some credit risk and earnings are subject to state and local taxes, it must offer investors a higher rate of interest than a Treasury bill of the same maturity. The initial success of the domestic CD was followed by the growth of an active market for Eurodollar CDs, or dollar-denominated CDs issued by banks or branches located outside the United States, primarily in London (see section 3). Dollar-denominated CDs are also issued by foreign banks located in the United States and are known as Yankee CDs.

The domestic CD and time deposit markets have grown rapidly, with a few notable interruptions (Chart 1). During the 1960s, rates were subject to interest rate ceilings specified under

Federal Reserve Regulation Q. When market rates rose above the ceiling rates in 1966 and again in 1969, demand for domestic CDs dropped. In both instances, the Eurodollar market, which was exempt from the ceilings, got a boost. Then, in 1970, the collapse of the Penn Central Transportation Company caused a crisis in the commercial paper market. To ease the resultant liquidity problems, the Federal Reserve took the first in a series of steps to remove interest rate ceilings: it eliminated ceilings on short-term time deposits of $100,000 or more in value. Growth in large CDs resumed, with growth becoming particularly rapid whenever market rates significantly exceeded ceiling rates on consumer deposits.

In December 1982, depository institutions were able to begin issuing money market deposit accounts (MMDAs) and Super NOW accounts, which paid unrestricted interest rates on consumer deposits with no minimum maturity. The rapid inflows to these accounts reduced many banks' needs for wholesale funding, and they cut back on their issuance of large domestic CDs. Issuance subsequently climbed again until the late 1980s, then declined for several years before a recent pickup. Volume has been heavily influenced by the banks' needs to fund their lending activity, by periodic concerns about the health of many banks and the public's

Chart 1. **Large Time Deposits**
Annual Averages



Source: Board of Governors of the Federal Reserve System.

consequent discomfort with holding largely uninsured deposits, and by the temporarily high costs of paying FDIC insurance premia between 1991 and early 1995.[7]

Most primary market sales of large CDs are negotiated between banks and their customers. Most banks still post the rates at which they are prepared to accept deposits for the most popular maturities—generally one to three months—although they will post attractive rates only when they are anxious to issue CDs. In many cases, dealers will act as brokers, finding customers for a bank's CDs but not taking them into their own positions. Sales handled through dealers tend to be in round lots of $25 million or more, although smaller pieces are occasionally placed. In addition to issuing short-term CDs, primarily with fixed interest rates, banks offer a considerable volume of longer term variable-rate CDs priced off a variety of short-term interest rate indexes such as the London interbank offered rate (LIBOR) and the Federal funds rate.

The intermittent worries about the health of large banks, which began with the Continental Illinois National Bank crisis in 1984 (discussed in Chapter 2), effectively eliminated the active secondary market in large CDs that had existed previously. Active trading had depended on market participants' willingness to consider the CDs of a group of large banks to be interchangeable, so that the seller could deliver CDs of any member of the specified group. Once the public concluded that some banks were riskier than others, potential buyers would no longer accept such an arrangement. Even though concerns about the health of the banking system eased after the early 1990s, an active secondary market has not reemerged.

Banks also issue what are known as deposit notes or CD notes, a hybrid of ordinary CDs and corporate bonds. Most of these notes mature in eighteen months to about five years. Like deposits, they are free of the Securities and Exchange Commission (SEC) registration requirements that apply to bonds. Banks must pay insurance premiums on deposit notes, although some of the notes do not use the term "deposit" and thus avoid the insurance premium. Although the FDIC does not collect insurance on such notes, it could do so if it believed conditions warranted. The notes would be subject to reserve requirements if positive requirements were reimposed on time deposits. Banks must report their deposit note volume to the Federal Reserve as part of their total large time deposits. Like bonds, deposit notes pay interest semiannually, and they are often purchased by traditional bond buyers. Sizable issuance began in l985, the year CD notes were first rated by major bond rating services.

3. The Eurodollar Market

Eurodollars are U.S. dollar deposits at banking offices in a country other than the United States. Eurodollars came into existence in the 1950s when Soviet bloc governments placed dollar deposits in London in order to conduct transactions in Europe and avoid the potential risk that the U.S. government might, for political purposes, freeze deposits held in the United States. Eurodollar deposits soon proved attractive to a wide range of depositors, including banks and internationally oriented corporations. Unlike U.S. deposits, they were not subject to interest rate ceilings, reserve requirements, or FDIC insurance premiums. The Eurodollar market—the process through which banks solicit these deposits and place the proceeds—grew spectacularly in the 1960s. Negotiable Eurodollar CDs were introduced in 1966 and quickly grew in popularity. U.S. money market mutual funds (MMMFs) were major purchasers of Eurodollar CDs during their period of greatest expansion, in the late 1970s and early 1980s.

Although regulatory restrictions were important to the early expansion of the Eurodollar markets, they have played a declining role in recent years. Interest rate restrictions were gradually removed from domestic time deposits beginning in 1970 and reserve requirements were dropped at the end of 1990; insurance premiums remained a factor until the end of 1995. Nonetheless, the Eurodollar market has continued strong. The dollar finances international trade and investment, so investors have found it convenient to hold deposits in the time zones where trade-related dollar transactions are taking place.

Eurobanks—banks dealing in Eurodollar or some other non-local currency deposits, including foreign branches of U.S. banks—originally held deposits almost exclusively in Europe, primarily London. While most such deposits are still held in Europe, they are also held in such places as the Bahamas, Bahrain, Canada, the Cayman Islands, Hong Kong, Singapore, and Tokyo, as well as other parts of the world. International Banking Facilities (IBFs) located in the United States also deal in Eurodollars for nonlocal customers. Eurodollar deposits may be either nonnegotiable time deposits or negotiable CDs, but nonnegotiable deposits predominate. Both types of deposits come in a broad range of maturities, from overnight to several years or more in the future. Although the majority are from one week to six months, multiple-year maturities are considerably more common than in the domestic market. There are no Eurodollar transactions deposits. The banks bid for the deposits of international corporations, investors, and governmental units to fund the loans being

made to businesses and governments. They also bid for the deposits of other banks or place funds with them, using the huge interbank market to manage the balance between the maturities of their assets and their liabilities. Loans and interest rate swaps are frequently priced against various maturities of LIBOR.

U.S. banks and resident foreign banks help keep Eurodollar rates closely parallel to rates in the domestic money market. Changes in Federal funds and other short-term U.S. rates rapidly affect Eurodollar rates. Interest rate differentials between Eurodollar and domestic funds that are not based on differences in regulations or other characteristics are quickly eliminated through arbitrage and substitution among funding sources. Same-day settlement of Eurodollar transactions, introduced in the l980s through the clearing house interbank payments system (CHIPS), has reduced arbitrage costs.

U.S. banks may place domestically generated funds in the Eurodollar market for varying terms when interest rate relationships favor such actions. They may simultaneously lend term Eurodollars and borrow overnight Eurodollars to use in their domestic banking operations if rate relationships encourage such transactions.

4. The Interest Rate Swap

The interest rate swap, developed in the early part of the 1980s, allows lenders and borrowers to transform the nature of their interest payments or receipts. For example, two bond issuers can exchange commitments to make interest payments over the lives of the debt instruments that they issue, although each remains responsible for its own bonds. It would have to pay its own interest if the other party failed to pay and is obligated to redeem its bonds at maturity. One borrower issues fixed-rate debt while the other issues floating-rate debt with similar maturities. Under the swap, the borrower that issued the fixed-rate debt will pay the floating-rate interest and receive the fixed-rate payments, while the party that sold the floating-rate debt will pay the fixed-rate interest and receive the floating rate payments.

Swaps can be profitable because of inconsistencies between fixed- and floating-rate debt market rates. Potential lenders at floating rates may differ from potential lenders at fixed rates in their credit evaluation of borrowers. Sometimes borrowers find it cheaper to borrow in the fixed-rate market when the revenue streams they will use to service the debt are more closely related to a floating rate; in other instances, the reverse may be the case. Swaps

bring together borrowers with opposite revenue patterns. They allow each to borrow in the sector permitting the lower rate option and to hedge the interest rate exposure.

A commercial bank is often the intermediary in a swap, acting as counterparty to two borrowers with opposite mismatches in their borrowing and cash flow structures. In this role, the bank assumes potential credit risks, which become actual risks if interest rate changes unmatch the payment commitments in the offsetting deals. Banks can avoid this interest rate risk by astute offsetting of swap agreements or by hedging with Eurodollar futures or Treasury securities. Sometimes they do not achieve precise matches and therefore assume some residual rate risk.

According to call report data as of fourth-quarter 1996, the notional amounts of interest rate swaps on the books of commercial banks in the United States amounted to $7.6 trillion. Although the notional amount can be a useful benchmark, it overstates the economic value of swaps because it is only a reference amount used to determine the cash flows in swap contracts. The market value of outstanding swaps, which is the value of the cash flows between counterparties over the life of a swap, typically amounts to only 2 to 3 percent of the notional amount. According to the call report data, the outstanding interest rate swaps that had positive market values to commercial banks in the United States had a market value of $123 billion, while the contracts with negative values amounted to $117 billion. (These numbers should not be added together because doing so would involve some double counting.) Although these numbers are large, they fall far short of $17 trillion, the principal amount of outstanding credit market debt in the United States.

5. Bankers' Acceptances

The Federal Reserve Act authorized U.S. banks to engage in acceptance financing of the domestic and foreign trade of their customers. As described in Chapter 2, the Federal Reserve nurtured the market and was an active buyer of BAs from the beginning of the Federal Reserve System through the early l930s and again after World War II until the mid-l970s (although in the postwar years, BAs met only a small proportion of reserve needs since Treasury issues had taken over the dominant role). The Federal Reserve gradually reduced and then ended its involvement in the BA market in the 1970s and 1980s when it concluded that the acceptance market had become self-sufficient. In 1977, the Fed discontinued outright purchases. In 1984, it discontinued purchases of acceptances under RPs because the volume of government securities available was sufficient to

meet reserve management objectives. Federal Reserve regulations still govern the issuance of most acceptances, limiting their use to short-term, self-liquidating commercial transactions.

The BA market was a major means of financing trade denominated in dollars in the United States and foreign countries for many years, but recently, it has become relatively inactive. A series of developments diminished the attractiveness of BAs, including the introduction of asset-backed and Euro-commercial paper, the narrowing of spreads between rates on Eurodollar deposits and rates on acceptances, and the ending of favorable reserve-requirement status.

The BA available from banks or in the dealer market is a prime short-term investment because both the bank and its customer are legally obligated to pay it at maturity. Acceptances are written in varying amounts based on the underlying transaction, but they are put together for sale in round lots of $1 million to $5 million. The odd lots remaining, in pieces down to about $50,000, are sometimes sold to individual investors and sometimes held by the accepting bank. About a half dozen firms currently make markets in these instruments, buying acceptances from the accepting banks and retailing them to corporations, government agencies, foreign investors, banks, and other financial institutions. The spread between the prices at which they buy and sell is typically 2 to 4 basis points. (A basis point is 1/100 of a percentage point.) Dealers finance their positions with bank loans or RPs arranged with a wide variety of investors.

BAs trade in a tiered market at rates reflecting the size of the accepting banks, market perceptions of the banks' creditworthiness, and the perceived liquidity of the paper in the market. Membership in the tiers changes from time to time as market conditions and perceptions of credit risk and liquidity are altered. The spread between the top names and the final group is 10 basis points or more and depends on market conditions.[8]

Nonbank Financial Instruments

1. The U.S. Treasury Debt Market

A. The primary market

The U.S. Treasury is the dominant issuer of debt instruments in the financial markets. It sells both marketable and non-marketable debt, the former representing the larger share of

its issuance. It sells bills that mature within a year, notes that mature in two to ten years, and bonds with maturities out to about thirty years. The Treasury's regular issuance of securities is an important part of its program for managing the U.S. public debt, which stood at $5.3 trillion at the end of 1996. Of this amount, just over $3.4 trillion was in the hands of the public, while almost $0.4 trillion was held by the Federal Reserve and about $1.5 trillion was held in Treasury trust accounts. Treasury debt issues are purchased by a wide range of investors who are attracted by the securities' perceived freedom from credit risk, ready marketability, exemption from state and local taxes, and wide range of maturities. Banks, thrift institutions, foreign central banks, other financial and nonfinancial businesses in the United States and abroad, and individuals buy marketable Treasury securities. As of December 1996, the Treasury estimated that of the Treasury debt held by the public, 10 percent was held by banks and mutual funds, 10 percent by individuals, 14 percent by private nonfinancial businesses (including insurance companies), 33 percent by foreigners, 10 percent by state and local governments, and 21 percent by other miscellaneous investors.

The Treasury has sold bills at competitive auctions since bills were introduced in 1929. Beginning in the early 1970s, auctions became the predominant sales technique for notes and bonds as well. Nonmarketable debt is sold to specific purchasers under prearranged terms.[9] The Treasury auctions bills most frequently, offering three- and six-month bills each Monday for settlement that Thursday when existing bills mature. It sells fifty-two-week bills (referred to as year bills) every fourth week, also with Thursday maturities and settlements. In time, they become interchangeable with three- and six-month issues with the same maturity date. The Treasury also sells cash management bills of varying maturities to bridge cash low points, often ahead of major tax dates.

Bills are discount instruments for which the purchaser pays an amount below the face, or par, value. The Treasury repays the face value at maturity. The interest earned, referred to as the rate of discount, is computed approximately as the amount below the face value divided by the fraction of the year that the bill is outstanding.[10]

To obtain bills at an auction, bidders must submit tenders on a timely basis to the Treasury Department or to any Federal Reserve Bank or Branch serving as fiscal agent for the Treasury. Tenders can be either competitive or noncompetitive.

Currently, noncompetitive tenders are due before noon and competitive tenders before 1:00 p.m. eastern time on the day of the auction. The maximum size for a noncompetitive bid is $1 million in a bill auction. Bidders receive the full amount of their tender at the average rate that emerges in the competitive bidding. Bidders cannot submit both competitive and noncompetitive tenders in the same auction. The minimum tender size is $10,000, with additional amounts permitted in $1,000 increments.

Competitive tenders must show both the amount being tendered for and the rate of discount that the bidder is willing to accept. The Treasury limits both the maximum bid size at any one rate and its issuance to any one bidder or related bidders to 35 percent of the amount of the auction available to the public (exclusive of awards to the Federal Reserve and foreign official institutions). This restriction is designed to prevent any one party from taking so much of an issue in the primary market that it would be in a position to manipulate the price in the secondary market.

Most tenders are submitted electronically to the Federal Reserve Banks and branches. The computer sorts the bids in ascending rate order. Questionable bids are reviewed and any needed modifications are made. Next, each Federal Reserve Bank electronically forwards the tenders it received to the Treasury, where the figures are combined. The Treasury accepts all tenders at the rates that are bid, starting with the lowest rate, until it covers the preannounced amount of the auction. If there are more tenders than needed at the highest accepted rate—referred to as the stopout rate—the Treasury makes partial awards, proportionate to the sizes of the bids.

Treasury notes and bonds pay principal at maturity and interest in the form of a semiannual coupon. To date, all notes and bonds have paid both interest and principal in nominal terms set at the time they were initially issued. In January 1997, the Treasury also began issuing notes with a coupon rate set at the time of sale that is applied to principal that is indexed to the consumer price index. These new securities are intended to give investors a means of protecting themselves against the risk of unexpected inflation. In addition, the difference between rates of indexed and nonindexed notes should provide an indication of the market's expectation for inflation.

Notes and bonds are auctioned in a similar way to bills, except that the bidder indicates a yield to maturity rather than

a rate of discount on the tender, and yields are expressed to three decimals rather than two. Currently, two of the note series—the two- and five-year maturities—are handled as single price auctions, sometimes referred to as Dutch auctions, with all winning bids awarded at the stopout rate. Tenders below the stopout rate are awarded the full amount, with those at the stopout rate receiving partial amounts. The other maturities are sold in multiple price auctions, with winning bidders paying a price equivalent to the yield they bid. The minimum tender size is $5,000 for maturities of three years and less and $l,000 for longer maturities (both with increments of $1,000 after that). The Treasury generally sets the coupon rate at the nearest 1/8 percentage point that produces an average auction price at or slightly below par. The maximum noncompetitive tender is $5 million for notes and bonds.

The Treasury announces the results of the auction as soon as they are computed. Considerable efforts were made in the early 1990s to shorten the time between the bidding deadline and the release of results. Bidders are at particular risk from yield changes during that interval because they do not know their awards and are therefore not sure how to hedge. In the late 1980s, it could take up to two hours to announce the auction results. Today it generally takes about 30 minutes. Depository institutions and primary dealers must pay the full amount on the delivery date, usually a few days later. Others must either have a bank or dealer guarantee their payment, or submit full payment with the tender.

Dealers can judge what rates to bid for a new issue by talking to customers and by trading in the secondary market. Trading begins in new Treasury securities as soon as the Treasury announces the details of an upcoming auction, normally about a week before the auction.[11] Dealers trade the securities between the formal announcement and the issue date in the so-called when-issued market. Instead of the usual settlement a day or two after the trade, settlement of such trades takes place on the day that the Treasury delivers the security. The when-issued market allows dealers to sell "short" to customers (that is, to pre-sell) ahead of the auction date and to cover the sale in the auction.[12]

B. The Secondary Market

The secondary market for Treasury securities consists of a network of dealers, brokers, and investors who effect transactions either by telephone or electronically. Telephone trades are

generally between dealers and their customers. Electronic trading is arranged through screen-based systems provided by some of the dealers to their customers. It allows selected trades to take place without a conversation. When dealers trade with each other, they generally use brokers. Brokers provide information on screens, but the final trades are made by telephone.

The market was essentially unregulated until 1986, when the Government Securities Act (GSA) introduced regulation setting financial responsibility and custody rules for brokers and dealers in government securities. The rules were designed to preserve the efficiency of the market and to encourage wide participation. The oversight authority given to the Treasury under the GSA expired in October 1991. Before measures were taken to renew that authority, however, some significant developments triggered intense scrutiny of the market for government securities. In August of that year, Salomon Brothers, a large securities dealer, disclosed that it had discovered irregularities in connection with certain Treasury auctions. In that and in subsequent announcements, the firm acknowledged that it had submitted unauthorized customer bids in Treasury auctions during 1990 and 1991. In certain instances, these actions resulted in Salomon Brothers' being awarded more than 35 percent of the auction amount, a violation of auction rules.

In this atmosphere, various administrative and regulatory reforms were approved to address a broad range of issues that arose from these events. These reforms included steps aimed at broadening participation in auctions, stronger enforcement of auction rules, more formal surveillance of the Treasury market, changes to Treasury auction policies, and modifications of requirements for primary dealers.[13]

Competition is keen in the trading of Treasury bills. The spread between the bid and asked rates quoted to customers is generally only 1 to 2 basis points—$25 to $50 per million dollars on a three-month maturity—while the most recently auctioned "on-the-run" bills may trade with a 1/2 basis point spread. Coupon issues trade on a price basis (except for pre-auction when-issued trading, which is on a yield basis). Prices are quoted relative to the par value of 100 and in increments of 1/32 of a point—frequently 1/64 in the shorter maturities. A price of 99 31/32 means that the issue is 1/32 point below par. As the price falls, the yield rises. The amount of yield increase associated with a 1/32 drop in price is largest for short maturities: for example, it is close to 2 basis

points for a note maturing in two years. By contrast, a 1/32 drop in price lifts the yield on a thirty-year bond by only 1/3 of a basis point.

Bid-ask spreads on coupon issues depend on how actively the issue trades and when it matures. Market spreads tend to widen with maturity because the risk of price fluctuation increases. Spreads generally range from 1/32 to 1/8 point or so, with small, older issues at wider spreads. For on-the-run issues, spreads may be narrower, around 1/64 point. The spreads also depend somewhat on recent market volatility. Trades can be for any size, although transactions smaller than $1 million face value are considered odd lots and subjected to an extra charge. Most dealers will "make markets" to customers on the telephone for amounts that are routine in size at that time. Generally, larger orders will be accommodated, but occasionally the dealer may need time to assess the market before quoting a price, particularly right after the release of key economic data.

The dealers trade actively with each other to achieve inventories consistent with customer demands and with interest rate expectations. Most interdealer trading is arranged through half a dozen brokers specifically serving the dealer community. Dealers post anonymous bids and offers through the brokers on issues they wish to trade. Even after the trade is completed, the dealers do not know their counterparties; they know only that they must be members of the group that has access to the broker. The broker is compensated by the dealer that hits a bid or takes an offering.

Trades are most commonly for settlement the next business day (regular delivery), with about 10 to 20 percent settling two days later (skip-day delivery); some same-day transactions (cash delivery) are arranged for bills in the morning. Treasury securities are held in computerized "book entry" accounts. The transfer of ownership between two parties using different banks for clearing or custody services is effected by depository institutions through the Federal Reserve's Fedwire transfer network. (Treasury securities may be moved between accounts within a bank if both parties to the trade have accounts at the same bank.) Other owners must arrange to have a depository institution, generally a large bank, make transfers for them. Securities are transferred in one direction and reserve balances in the other direction simultaneously so that the party selling the securities does not give up possession until payment is assured and the

party buying the securities does not give up the money until the securities are transferred.

Foreigners are major participants in the U.S. Treasury debt market. Interest by Europeans in owning and trading U.S. securities encouraged the expansion of trading in London. Japanese participation fostered a market in Tokyo. Trading also occurs to a lesser extent in Australia, Singapore, and many western European centers. The international trading in U.S. Treasury issues has led to expanded participation by foreign-based dealers and lengthened trading hours. Trading hours have never been strictly controlled. Convention currently holds that normal trading in the United States takes place between 7:30 a.m. and 5 p.m. eastern time, although trading often continues later if significant developments encourage it. Securities now trade in some markets almost around the clock, with trading beginning in Asia shortly after it winds down in the United States. Brokers operate during the Asian and European trading days to serve those markets, and U.S. firms can make trades through the brokers by way of their Tokyo or London operations.

Government securities dealers perform a variety of tasks. In addition to buying or selling securities at the request of customers, they provide information, analysis, and advice to stimulate trading activity and customer loyalty. To meet customer needs, they maintain inventories of government and other securities. Thus, financing of positions (described below) is a sizable part of the operation. They manage their securities positions with a view to profiting from both short- and long-term swings in interest rates. They also engage in "arbitrage" transactions by making offsetting purchases and sales to take advantage of price disparities. For example, dealers can capitalize on the price differences between securities of varying maturities or on price differentials between cash markets and futures and options markets (discussed below).

Profitability for a dealer firm potentially arises from several sources. A firm can realize a financing or "carry" profit when it earns a return on securities owned that exceeds its costs to finance the securities. A firm may make a position profit from having sold short (sold securities it did not own and borrowed securities to make delivery) in falling markets and having gone long (held inventories of securities) in rising markets. A firm may, in principle, make a trading profit from the spread between bid and offer prices in trading

with customers and other dealers, although the business is sufficiently competitive that bid-ask spreads are generally too narrow to serve as a significant source of profit. Arbitrage transactions can produce profits or protect against losses. Such transactions are often quite complicated, involving offsetting transactions in the cash, futures, and options markets. Dealers generally have in-house traders who specialize in arbitrage. Such transactions are often kept separate from the trading positions of those making markets to customers.

Achievement of substantial profits involves taking risks, since competition limits the returns from risk-free operations. Hedging strategies can be used to manage that risk, but implementing those strategies can be costly. Consequently, dealer operations inevitably show sharp fluctuations in returns, making it necessary for firms to be well capitalized if they are to succeed under a variety of market conditions.

Government securities dealers are extremely sensitive to the interest rate outlook because their positions at risk can be very large relative to their equity. A multiple of securities held to capital as large as fifty (aside from the matched book described below) is not uncommon for a dealer expecting a decline in interest rates. A 1 percent rise in the price of securities held in such a situation would increase the dealer's capital by 50 percent; a similar drop would wipe out half of present capital. In practice, dealers tend to make substantial gains by acquiring and financing an outright position when rates are declining. When interest rates are choppy or rise persistently, however, dealers sometimes encounter moderate-to-large losses, in part because maintaining effective markets for customers while holding a sizable net short position is difficult. Moreover, borrowing securities to sell short requires using scarce capital.

For most dealers, maintaining a sizable customer base is essential to success in the business. Knowing what customers prefer, what securities they hold, and what they are doing (or thinking of doing) enables the dealer to make markets intelligently, to anticipate the likely market impact of news developments, and to manage the firm's own positions profitably. The key people in the effort are the traders, who bid and offer close enough to the competition to do business; the sales staff, who keep the firm in touch with its customer base; and the money market economist, who keeps the traders informed of recent and prospective economic developments and the likely implications for the market.

Many dealer firms have branches in important domestic and international centers to maintain close personal contact with both large and small customers; some of the major stock brokerage firms also draw in retail customers through registered representatives in their large network of stock-oriented branches. Other nonbank dealers and most of the banks rely principally on direct telephone or telex contacts, followed up with periodic personal visits. Leased wire information systems, which keep the customer abreast of the latest market and news developments, have greatly reduced the need for routine informational calls by sales staff. The sales effort has shifted toward providing computerized information on trading spreads and arbitrage possibilities, as well as up-to-the-minute analyses of economic developments and the Federal Reserve's policy posture. The rapid availability of information and analysis has eroded the dealers' comparative advantage in day-to-day trading.

C. Short-Term Financing of Securities: RP Markets

The financing of dealer positions has developed into a market all its own. Years ago, the dealers searched out the cheapest source of financing to increase the positive interest rate carry earned on their positions. The dealers tried to minimize the negative carry in periods when short-term financing rates were higher than the longer term rates being earned on the security. To improve their returns, dealers developed the sale of government and federal agency securities to corporations and other lenders under agreements to repurchase the securities a day, a week, or several months later at an agreed rate of interest for the period. Such RPs enabled investors to earn a return above the risk-free rate available from Treasury securities over very short intervals. Most lenders allowed the dealers the right to substitute collateral, so that the dealer could sell securities on demand, replacing them with others.

The mechanics of this market are best illustrated with an example. Suppose a government securities dealer purchases a particular Treasury security. The dealer then needs to finance that position. It may use its own capital, issue term debt, or borrow from a bank. More commonly, however, the dealer uses the RP market to obtain financing. The dealer can use the Treasury security as collateral for a loan at the specified term and rate of interest. At the same time, a customer of the dealer may have excess funds that it is willing to "lend" under those terms. The dealer then agrees to deliver ("sell") the security to

the customer for an amount determined by the RP rate and buy ("repurchase") the same security from the customer when the term of the loan expires. When the term is one day, the agreement is referred to as an overnight RP (or "repo" in common parlance); a loan for more than one day is called a term repo. (About 70 percent of RP activity is for contracts maturing within a month, and a large portion of that percentage consists of overnight contracts.) The advantage to the dealer of using the RP market for borrowing on a short-term basis is that the rate is generally lower than the cost of bank financing. Meanwhile, from the customer's perspective, the RP market offers an attractive yield on a short-term secured transaction.

A variety of institutional investors, including banks and thrifts, nonfinancial corporations, mutual funds, pension funds, and state and local government authorities use the RP markets. In addition to providing the opportunity to earn attractive yields without sacrificing liquidity, RPs also allow greater flexibility than other money market instruments because their maturities can be tailored precisely to meet the irregular cash flow patterns often experienced by many of these investors.

Steps have been taken in the RP market to prevent losses from the transaction itself. Safeguards have been put in place to ensure that collateral is sufficient and that promised collateral actually exists. These procedures were developed after a series of fraudulent operations during the early and mid-1980s led to serious losses.

Dealers use the RP market to run so-called matched books, a practice introduced in the 1950s and widely used beginning in the 1970s. They buy government securities for an extended period under a reverse RP from a holder in need of funds. Then they lend the securities on RP for an equivalent period at an interest rate lower than the one they charge the seller. The matching of maturities minimizes risks from price fluctuations. In effect, dealers have gone into the banking business, taking care that the credit standing of both customers ensures the reversal of the transaction. Dealers also protect themselves by taking a greater margin of collateral on the securities acquired than they give when lending the securities.

Dealers may also run an "unmatched book." In this case, dealers finance securities acquired under reverse RPs with shorter (or longer) term RPs to increase the interest rate spread

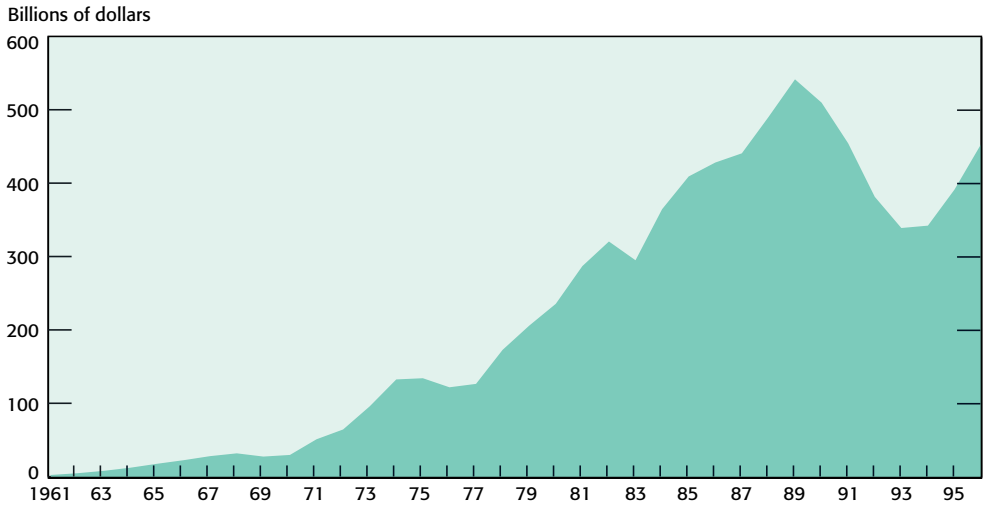
earned. Such activity runs the risk, of course, that financing costs may rise (or fall) in the interim and result in a loss rather than a profit. Just as dealer position taking is basically a bet on the future course of interest rates, the unmatched book is a bet on future financing costs. The resale value of the securities is fixed in the original contract, the reverse RP. In a straightforward position play, a dealer may purchase six-month Treasury bills at auction, expecting to finance at a positive carry for three months and then sell the bills at three months to maturity for a gain that, over time, should equal the average difference between three- and six-month bill rates over the cycle. If interest rates fall over the interval, the carry earned and the yield-curve-based sales gain will both be larger. But if interest rates rise sharply, the carry can become negative at the same time the bill's price is declining.

Although most of the parties lending money on RP are indifferent as to which issue they receive, some seek particular securities to fulfill sale or loan commitments. A specific issue or "specials" RP market has developed to handle this situation. When an issue is in heavy demand, holders of that issue may be able to borrow against it at a rate below the "general collateral" RP rate. Occasionally an issue may become very scarce, prompting participants to lend money for little or no interest to obtain that security.

For many years, the overnight RP rate for financing general collateral Treasury debt was almost always below the Federal funds rate. RP rates were lower because a lender using an RP contract has a security that can be liquidated if the loan is not repaid, while a lender of Federal funds has no such protection. During the 1980s, however, several events changed the relationship between RP and Federal funds rates. (Chart 2 shows average spreads between overnight RP and Federal funds rates.) Large cumulative Federal deficits greatly enlarged the total amount of Treasury debt outstanding, tending to expand the amounts in trading inventories. The consequent enlarged needs for financing of dealer positions lifted RP rates relative to the overnight Federal funds rate.

Commercial banks can participate in both markets, so they should have been in a position to arbitrage between them, borrowing Federal funds and lending under RP until the rates came at least into line. In the late 1980s, however, banks were facing increased capital requirements, and such arbitrage would have expanded the size of their balance sheets, thus

Chart 1. **Large Time Deposits**
Annual Averages



Source: Board of Governors of the Federal Reserve System.

further raising their need for capital. While some shifting of funding did occur in response to the rate differentials, the capital constraint kept it from being sufficient to end the anomalous rate relationship quickly. During the early 1990s, capital was rebuilt to the point where the constraints on banks eased, and the RP and funds rates have remained closer together. Dealers have also made increased use of other types of funds, such as issuing their own commercial paper.

D. Derivative Products

Financial innovations during the past twenty years have provided new means of hedging interest rate risk or speculating on the future course of interest rates. The instruments have helped dealers to manage their positions and have enabled a wide variety of businesses to lock in costs or returns consistent with expected cash flows.

Financial futures markets began to develop in the mid-1970s and expanded in the early 1980s as interest rate volatility rose. They were patterned after existing futures contracts in agricultural products and other commodities. The first financial futures were in Treasury securities. A host of new financial futures have appeared since, ranging from

contracts on Federal funds and other money market instruments to stock index futures. Today, financial futures rank among the most actively traded of all futures contracts. The growth of financial futures market activity has spawned so much arbitrage and trading between cash and futures that the two markets function as a unit most of the time. Futures markets provide a means of hedging against the effects of volatility, but by making speculative bets easier, they may contribute to volatility at times. Treasury bill and Eurodollar futures trade on the International Monetary Market of the Chicago Mercantile Exchange. Futures on Treasury notes and bonds and Federal funds trade on the Chicago Board of Trade.

Futures contracts help increase liquidity and flexibility. They allow dealers to offset the positions they must maintain to service customers—or to establish short positions—by entering futures contracts to deliver the specified securities on a limited number of specified dates over two years. The commission cost is very small—as low as $5 per contract on a "half turn," or single side of the futures transaction. The futures exchanges, which are private corporations of exchange members, issue contracts to buyers and sellers, each of which must meet the low initial margins set by the exchange.[14] Initial margins are in a range of 1 to 5 percent of the value of the instrument to be delivered. As the price of the futures contract fluctuates, the value of the investor's equity in the position changes accordingly. At the close of each trading day, a clearing corporation marks each contract to market to determine the net change in an investor's equity position. Should the position fall below the required maintenance level, which is somewhat lower than the initial margin amount, additional margin would be required. If, on the other hand, an investor's equity increases, funds could be withdrawn.

Options on Treasury securities and options on Treasury futures contracts have been available since the latter part of 1982. They expanded the range of hedging strategies that could be used to manage interest rate risk. Call options give the purchaser the right, but not the obligation, to purchase from the seller the indicated security or futures contract at a specified (strike) price at any time before the maturity of the contract (a process known as exercising the option). The purchaser benefits if the security or contract price rises above the contract strike price, while the risk from price declines is limited to the price of the option contract itself. Put options give the purchaser the right, but not the obligation, to sell the

security or the futures contract at a set price within the period of the contract; thus they benefit the purchaser in a falling market. Put options are like a short sale, but with limited downside risk for the purchaser. Options on futures contracts are much more actively traded than the straight options on securities. The writers of options contracts take open-ended risks from a price rise in the case of a call or a price fall in the case of a put. Writers may hedge this risk through diversification or other techniques, but these techniques may have costs that offset the gains from writing options.

Another form of derivative product based upon Treasury debt instruments is the stripped security. Stripped notes and bonds are zero-coupon instruments created by separating the coupons from the "corpus," or principal, of a security and trading them separately. Zero-coupon debt instruments are sold at a discount to par. The return to the investor comes from increases in price until maturity, when the instruments pay the face amount. (As interest rates rise and fall, the actual price of stripped securities will fluctuate around a rising trend line.) With no periodic interest payments to reinvest, these securities have an assured yield to maturity that is not dependent upon a reinvestment return on intervening interest payments. They are often attractive to pension funds and other entities with known future payment commitments. Nevertheless, because all the return is deferred to the maturity date, larger price changes will result from a given change in the general level of interest rates than would occur if the security returned interest periodically. Consequently, stripped securities can be attractive as a vehicle for speculation.[15]

Stripping of Treasury notes and bonds began during the 1970s. Initially, dealers physically removed the coupons from the corpus, since at the time coupon issues could be bought in definitive (paper) form. Because stripping reduced tax revenues, the Treasury discouraged the practice until 1982, when the tax laws were changed. The revised tax laws forced holders of zero-coupon and stripped Treasury securities to pay taxes each year on the portion of the accrual representing the movement toward the par value to be paid at maturity. The changes also required new coupon debt to be sold only in book entry and not definitive form. Physical stripping of older issues expanded once the practice was no longer discouraged. The holding of stripped issues mostly attracted entities that were not heavily taxed, because the revised laws made the tax burdensome.

Since the new book-entry securities could not initially be stripped, a number of government securities dealers created derivative instruments; they purchased Treasury issues, then placed them with a custodian and sold separate rights to the various coupons and the corpus. These receipts, called by a variety of proprietary names, were popular for a time. Although the receipts created from the coupon-stripping process were not a direct obligation of the U.S. Treasury, the underlying bond deposited in the bank custody account was, so the cash flow from the underlying security was considered certain.

In 1985, the Treasury began what is known as the STRIPS program (Separate Trading of Registered Interest and Principal of Securities). It permitted separate registration of the coupons and corpus of the book-entry securities and thus allowed dealers to sell them to different purchasers. All new Treasury notes and bonds with maturities of ten years and longer were eligible. Later, the Treasury provided the means to reconstitute a complete security if a party had accumulated all the needed pieces. The STRIPS form soon came to dominate the zero-coupon market. Its popularity has varied with the interest in zero-coupon products generally, which rises and falls with perceptions of the future course of interest rates.

2. Federally Sponsored Agency Securities

A. Markets for Direct Debt of Federally Sponsored Agencies

A number of special-purpose agencies with varying degrees of federal government sponsorship sell debt to finance their support of designated sectors of the economy, primarily agriculture and housing. As of fourth-quarter 1996, regular debt outstanding (excluding mortgage-backed pass-through securities, described in the next section) totaled about $897 billion in more than 200 issues. The principal agencies are the Farm Credit System (FCS), the Federal Home Loan Bank System (FHLB), the Federal Home Loan Mortgage Corporation (FHLMC, or "Freddie Mac"), the Federal National Mortgage Association (FNMA, or "Fannie Mae"), the Government National Mortgage Association (GNMA, or "Ginnie Mae"), and the Student Loan Marketing Association (SLMA, or "Sallie Mae"). Except for mortgage-backed securities and some special issues noted below, agency debt obligations are not explicitly backed by the full faith and credit of the U.S. government, even though the agencies are federally spon-

sored. Other government agencies have access to the Federal Financing Bank (FFB), which is funded by direct Treasury borrowing. These agencies have raised funds through the FFB since 1974, and most of them do not sell debt in their own names.

The FCS consists of a number of regionally based institutions that provide credit to farmers. It issues primarily short-term debt. Financial difficulties at a number of these institutions in the mid-1980s disrupted the system, leading to new legislation to recapitalize and restructure the Federal Farm Credit Bank System.[16] As part of this legislation, Congress created the Farm Credit Financial Assistance Corporation (FACO) in 1987, which issued government-guaranteed debt until 1992 to assist financially troubled Farm Credit Banks. The banks that borrowed from the agency are obligated to repay the loans in full, although interest payments on the loan are paid in part by the Federal government.

The FHLB, supervised by the Federal Housing Finance Board, provides loans to member institutions as a means of fostering the flow of funds into home mortgages; the FHL Banks are owned by the member associations. The FHLB system sells mostly short- and medium-term debt to finance itself. The thrift institution crises of the 1980s resulted in substantial restructuring.[17] Deposits of savings and loans were once insured by the Federal Savings and Loan Insurance Corporation (FSLIC), an entity supervised by the Home Loan System. But in 1987, when difficulties surrounding the savings and loan industry raised concerns about FSLIC's ability to insure deposits, the Financing Corporation (FICO) was established to provide funding for FSLIC by issuing debt. Originally, the primary source for FICO interest payments was to be the insurance premiums paid by members of the thrift industry. The amount of deposits held by these insured institutions has declined, however, as some thrift institutions have merged with banks while others have closed. In consequence, doubts have arisen over FICO's ability to continue satisfying its obligations. Proposals to restructure FICO's escrow account and identify additional funding sources are being evaluated.

FNMA is the nation's largest supplier of funds for American home mortgages and the second largest corporation in the United States, with a net portfolio, as of December 1994, of about $220 billion in mortgage loans. The corporation purchases government-insured and government-guaranteed

mortgages and conventional mortgages in the secondary market. It issues its own debentures and notes. (It also participates in the pass-through market described in the next section.) FNMA sells mostly intermediate-term debt with an occasional long-term issue. It also sells short-term discount notes. Now fully owned by private investors with shares publicly traded on the New York Stock Exchange, FNMA operates with guidance from the Secretary of Housing and Urban Development.

SLMA provides a variety of support services to institutions making loans to students. Before l982, it borrowed directly from the FFB, but since then it has borrowed in the market under its own name. It issues primarily floating-rate debt. Occasionally it sells fixed-rate debt, then converts its payment stream to a floating-rate obligation through the use of swaps. Currently, SLMA is pursuing a charter restructuring under which it would give up its status as a government-sponsored entity and become a state-chartered corporation. The administration has voiced support for the rechartering of SLMA and has stated its intention to introduce such legislation. In addition, SLMA may enter into additional lines of business related to the higher education market.

In recent years, federal agencies have increasingly issued so-called structured notes. Agencies issue medium-term notes (MTN) and simultaneously enter into one or more swap agreements to satisfy the terms of the specific cash flow obligations. For example, an agency might issue a three-year floating-rate MTN that pays LIBOR plus some premium on a semiannual basis. At the same time, the agency negotiates a swap transaction in which it agrees to pay a fixed rate of interest semiannually for three years in exchange for receiving LIBOR from a swap counterparty. As a result of the swap, the borrower has synthetically created a fixed-rate note because the floating-rate payments are offsetting. Many structured transactions originate when an investor has demand for a security of one type while the potential issuer prefers an obligation with different characteristics.

Most agencies also borrow short term through a discount note program. The federal agency discount note market is very liquid. Current daily programs range in size from $150 million to more than $5 billion. Discount note securities offer attractive opportunities for investors who want yields above Treasury issues as well as liquidity.

Federal agencies generally use a designated fiscal agent to manage sales to investors.[18] The fiscal agents sell

their coupon securities to the public either through selling groups, currently composed of about thirty to eighty-five members, or through private placements. The fiscal agents rely on members of their selling group for advice in choosing the maturities to be offered and the interest coupons necessary to sell the securities. Because of the long-term profitability of this relationship, members of the group characteristically agree to sell the securities even when they think the pricing is aggressive.

Agency issues have attracted wide investor participation during periods when their credit quality has not been a source of concern. Because of their government sponsorship and supervision, the securities of the sponsored agencies generally trade at yields only modestly above those on comparable maturity Treasury issues. Within the past several years, the range of spreads has been anywhere from 5 to 35 basis points for noncallable securities with maturities of one to five years and 15 to 40 basis points for longer maturities. The yield differentials also reflect a number of other factors, including structure, size of the issue, shape of the yield curve, level of interest rates, tax treatment, and overall market trends. Income from the FCS, FHLB, SLMA, and FICO issues is exempt from state and local taxation, while income from FNMA, GNMA, and FHLMC issues is not.

Most dealers in government securities make secondary markets in these issues, although trading in many outstanding issues is inactive. The size of some issues is small—as little as $200 million. Bid-ask spreads are related to the amount of activity in the secondary market. They are generally wider than those on Treasury securities of corresponding maturity.

B. Mortgage-Backed Securities

Techniques for mortgage finance have changed dramatically in the last twenty years, contributing to explosive growth in mortgage-related market instruments. Traditionally, banks and thrift institutions made long-term fixed-rate loans for the purchase of real estate and financed them mostly with short-maturity deposits. The rising and volatile interest rate patterns of the 1970s made this maturity imbalance costly and encouraged the development of alternative techniques for mortgage finance. One approach was to create variable rate mortgages, which adjusted more or less in line with the depositories' cost of funds. Another was to "securitize" the loans, allowing the depositories to "sell" them. Securitization

of mortgages has come to be the dominant practice in the industry.

GNMA and the FHLMC were created to promote a secondary market in mortgage products. GNMA is a government corporation that functions principally by guaranteeing pass-through securities. These securities pass through to the purchaser the interest earned and principal (which may be prepaid) on pools of government-guaranteed mortgages. The holder of the securities receives a pro rata share of the principal and interest payments earned on the mortgages. The FHLMC buys conventional residential mortgages to foster a secondary market for them; it sells pass-through securities and other bonds to finance its activities. The FHLMC's voting capital stock used to be held solely by the FHLB, but under the terms of the Financial Institutions Reform, Recovery and Enforcement Act of 1989 (FIRREA), its voting stock has been publicly issued.

The development of mortgage-backed securities meant that the mortgage originators were no longer committed to hold an illiquid asset. Depositories and mortgage bankers could sell the loan to one of the specialized government agencies as long as the loan satisfied certain conditions specified by the agencies to limit credit risk. The agencies created pools of the mortgages and used them to issue the mortgage-backed securities on which they guaranteed the interest and principal payments. Servicers—sometimes the mortgage originator but often specialized institutions—collected interest and principal from the borrowers and passed it to the holders of the securities (less a servicing fee).

Mortgage-backed securities do have a feature that tends to make them more volatile than regular debt issues. While they carry a nominal maturity date based upon the maturities of the underlying mortgages, the effective maturities are considerably shorter and highly uncertain because mortgages are often prepaid. The number of prepayments rises when interest rates fall, which means that what investors thought was a long-term instrument may be paid off rapidly just when falling rates makes reinvestment relatively unattractive. Prices of mortgage-backed securities are consequently much more sensitive to changes in interest rate patterns than are prices of other types of securities, and spreads to Treasuries are variable. Not surprisingly, the market has developed many derivative products to hedge or speculate on interest rate movements.

Mortgage-backed securities are held by a range of large and small investors, with most small investors making purchases through mutual funds.[19] The market is huge; according to FNMA, around $1.7 trillion of securitized mortgages was outstanding in the fourth quarter of 1996.

3. Corporate Debt Instruments

A. Commercial Paper

One of the most rapidly growing sectors of the money market in the last twenty years has been the market for the short-term promissory notes of creditworthy financial and other business enterprises.[20] The smallest denomination for dealer-placed paper is $100,000; blocks of $20 million to $25 million are more common, especially on directly placed paper. Corporate issuers with good credit ratings can often borrow at lower cost in the commercial paper market than from banks. Investors are attracted by the yield premium offered over Treasury issues. To be exempt from registration with the SEC, such notes must mature in 270 days or less and be issued for working capital purposes, such as financing inventories and accounts receivable. The most popular maturities depend somewhat on the rate structure at the time of issuance. Generally, most commercial paper matures between five and forty-five days, with the one-month area being most common.

Commercial paper is sold to money market investors either directly by a firm's own sales force or through a dealer that makes sales on behalf of many borrowers. Direct placement is characteristic of large finance and credit companies, which are often affiliates of automobile and other manufacturers, and of bank holding companies. About 30 to 35 percent of the approximately $779 billion of commercial paper outstanding in the fourth quarter of 1996 was placed directly. The remainder was placed by a small number of dealers with specialized sales forces. Approximately 1,000 companies issue through dealers, including industrial companies, public utilities, bank holding companies, smaller finance companies, foreign banks, and a few foreign government agencies.

Most commercial paper is sold by companies with strong credit ratings. Some small-to-medium-sized firms obtain a letter of credit from a bank—in most instances a foreign bank—that will allow the firm to achieve a good credit rating. The credit rating companies—Standard & Poor's (S&P),

Moody's, and Fitch's—assign numerical ratings to a company's debt after a careful review of the company's balance sheet and operations.[21] In recent years, around 60 percent of all paper sold has carried the top grade (including both A-1+ and A-1 for S&P). Money market mutual funds, which are large purchasers, have been restricted by the SEC since June 1991 to hold no more than 1 percent of assets in lower rated paper.

Commercial paper issuers generally maintain backup liquidity through bank credit lines that will cover the amount of any paper outstanding. Increasingly, backup lines of credit are structured in terms of multiyear revolving agreements in which a bank commits to loan funds to a firm at a floating base rate tied to some predetermined rate such as the prime or LIBOR rate. The spread over the base rate is negotiated at the time of the agreement. The length of the commitment varies, but the trend recently has been toward shorter terms, typically around three years. Compensation for the commitment involves various fees to the bank, generally a certain percentage of the credit line.

Commercial paper is sold at a discount and is redeemed at par at maturity. Dealers generally distribute the paper immediately after receiving it from the issuer and therefore do not hold large amounts in inventory. Dealers will, however, temporarily hold commercial paper when an issuer's needs are pressing. Inventories tend to grow when financing rates are below the return on paper. When financing rates exceed the return, dealers attempt to minimize inventories. Spreads between the rates at which paper is bought and sold are around 10 basis points.

Commercial paper is increasingly being issued in book-entry form. The Depository Trust Company, a New York limited-purpose trust company, has been providing a book-entry system for commercial paper since 1990. To a limited extent, some commercial paper is still issued in physical form. Such paper is lodged by the company with a New York bank, which countersigns and delivers the notes to the commercial paper dealer for payment that same day.

B. Corporate Bonds

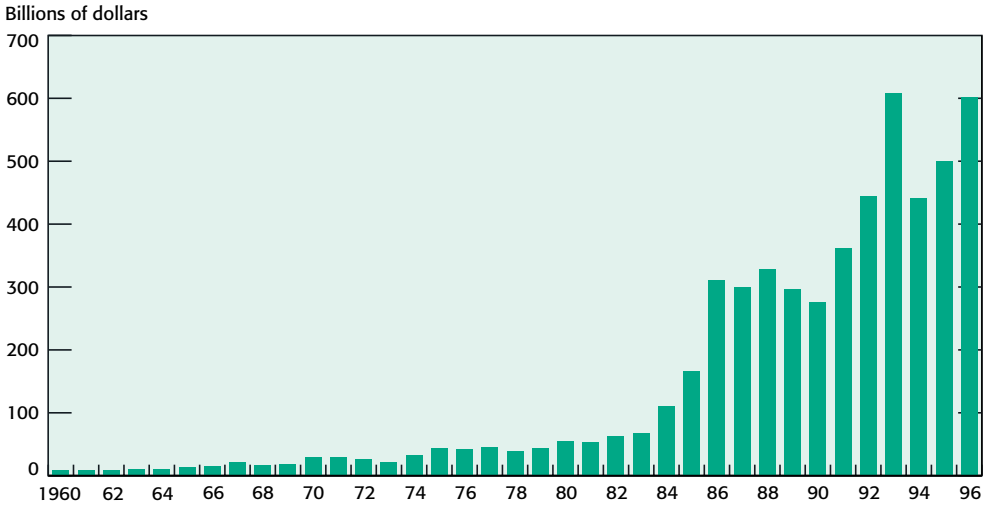
While commercial paper helps satisfy the short-term borrowing needs of many firms, corporate bonds are issued to provide longer term financing. They are often classified by the type of issuing firm: public utility, transportation, industrial, financial, or real estate. Sales by foreign governments in the

U.S. market are treated like corporate debt because they are sold in a similar fashion. Issuance has grown irregularly but rapidly on average; it is sensitive to yields (Chart 3). In the fourth quarter of 1996, $3.1 trillion of corporate debt was outstanding.

Corporate bonds may carry a significant risk of default. The risk for a particular issue depends primarily on the perceived creditworthiness of the issuer but also on how the issue is secured: mortgage bonds are secured by a first lien on property or equipment, collateral bonds by the holding of securities, and debentures by whatever unpledged assets remain at the time of liquidation.[22] Investors may make their own judgments, but generally they rely on the credit ratings assigned by major ratings agencies such as Moody's and S&P. These ratings range from Moody's Aaa (or S&P's AAA) for prime-grade issues down to C for the poorest prospects (or S&P's D for issues actually in default). Issues assigned higher ratings are naturally offered at lower yields.

Corporate bonds have been sold in recent years in maturities ranging from one to a hundred years, although relatively little debt is sold with maturities beyond thirty years. So-called medium-term notes, with maturities of nine months to thirty years, have become increasingly popular in recent years. The majority of the longer maturity issues can be called by the issuer at a prearranged price, typically after an

Chart 3. **Issuance of Investment-Grade Corporate Debt**



Source: Merrill Lynch Government Securities, Inc.

initial period of three to ten years. The issuer will usually call a bond if interest rates have fallen far enough to allow refinancing at lower yields or if the issuer's credit rating has risen significantly since the initial sale. Even if an issue has no call feature, some of it may be retired before the bond reaches its nominal maturity by means of a "sinking fund" provision. The provision requires the issuer to retire gradually a specified portion of the issue each year; in some cases, the provision requires retiring all of the issue by maturity, but in other cases, a single "balloon" payment at the end may be necessary to retire the remaining debt. Sinking fund provisions are characteristic of industrial bonds but are almost never attached to financial issues. Most corporate bonds pay interest semiannually, although a relatively small volume of zero-coupon corporates has been issued as well.

Corporate bonds are usually sold to the public through underwriting syndicates formed by investment banking institutions that have corporate bond divisions. In l989, a Federal Reserve Board ruling gave commercial banks limited authority to underwrite corporate debt through their securities subsidiaries. The firm acting as lead manager recommends the maturities and types of issues believed to be consistent with the issuer's financial needs and tests market appetite through conversations with potential large buyers. Each member of the syndicate will be allocated securities to place with its customers. In some cases, a whole issue may be placed privately with a large investor, generally an insurance company, and never be sold publicly.

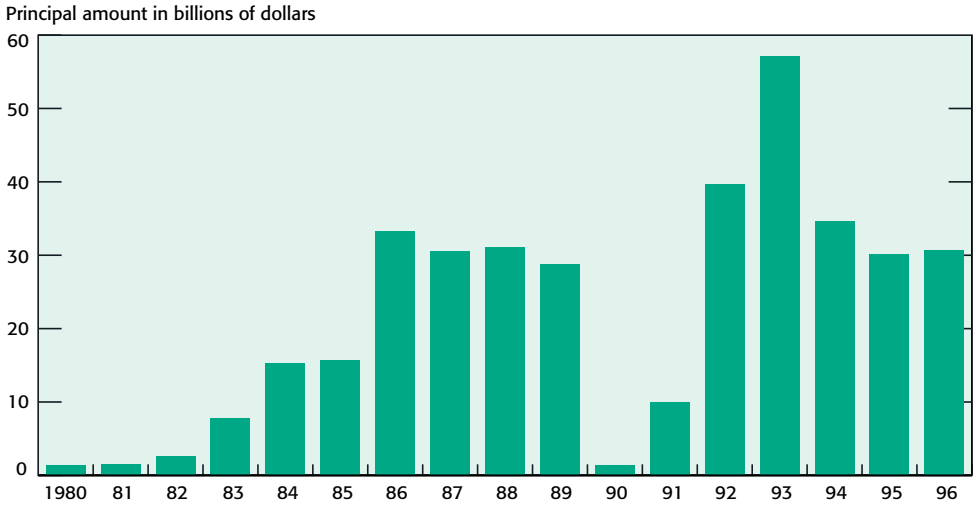
Public offerings must be registered with the SEC, which requires the corporation to report actual and potential obligations that might affect the ability of the corporation to repay the debt. The commission permits "shelf registration," which allows corporate issuers to register their intent to issue debt any time within the upcoming three years without prespecifying issuing dates or amounts (Rule 415). Consequently, issuers can bring the debt to market relatively quickly once the decision is made to offer it. Major purchasers of corporate debt vary over time but generally include insurance companies, pension funds, households, commercial banks, and foreign investors.

Nearly all secondary market trading of corporate bonds takes place in the over-the-counter market, with the residual occurring on organized exchanges such as the New York Stock Exchange. The over-the-counter market is made by securities dealers who trade directly with other dealers and with large

institutional investors. Given the vast number of outstanding corporate issues, the market for most individual issues is illiquid, although the market for particular types of bonds may be fairly broad. Since corporate bonds are less liquid than Treasury securities, the bid-ask spreads quoted by dealers normally exceed those on Treasuries; investment-grade corporate spreads typically range from 1/8 to 1/2 percent, while spreads for lower rated issues are larger. Issues listed on an exchange are more liquid than otherwise similar unlisted issues.

In the 1980s, the market for relatively risky bonds, generally referred to as high yield or junk bonds—carrying Moody's ratings of Ba1 or less and S&P ratings of BB+ or less—grew explosively. Growth was interrupted on several occasions in the face of failures by prominent issuers and a major market maker. After rapid expansion between 1982 and 1986, issuance remained at high levels through the rest of the decade. Then, in 1990, it practically disappeared with the collapse of Drexel Burnham Lambert, previously the largest underwriter and market maker in junk bonds. Issuance rose sharply over the next several years as the economy recovered and other firms became active underwriters. (Chart 4 shows annual issuance.)

Chart 4. **Issuance of Below-Investment-Grade Corporate Debt**

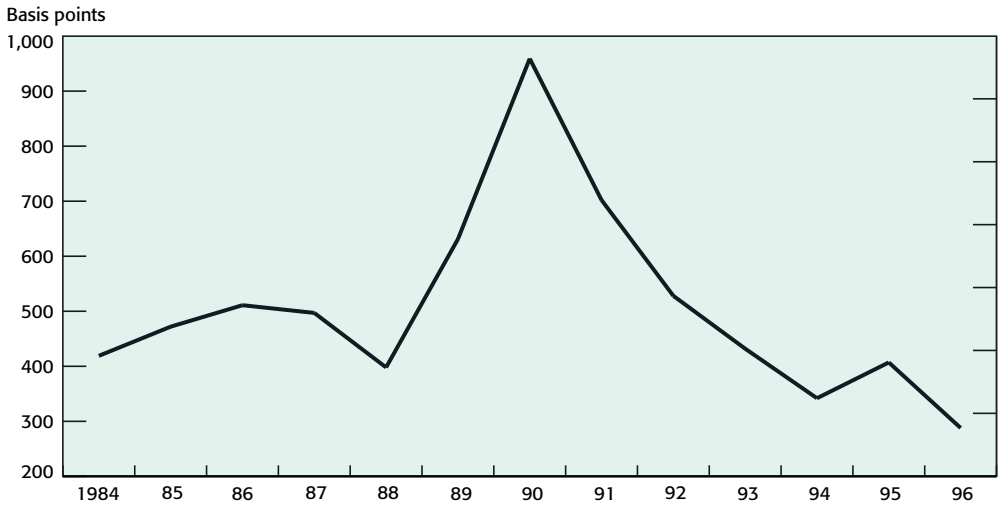


Source: Merrill Lynch Government Securities, Inc.

Issuers saw such debt as an attractive means of financing risky corporate acquisitions; after the acquisition, the corporation would often sell off some assets to fund interest and principal on the debt. To some extent, the expansion of junk bond issuance represented a substitute for private placements of unrated bonds, primarily with insurance companies. (Unrated private placements remain a popular means of finance.) To a greater extent, it represented conversions, from equity finance to debt finance, undertaken at least partly for the tax benefit. In some cases, the company's management bought outstanding common stock, financing the purchase through sales of bonds. In other cases, the conversions were accomplished in a takeover by an outside interest.

Junk bonds have appealed to investors attracted by yields considerably above those on Treasury issues of comparable maturity.[23] The higher yields offered on junk bonds relative to investment-grade issues are intended to compensate for the greater risk of default. The market has had some difficulty determining appropriate yield spreads. Spreads have risen sharply in the face of publicized defaults, then narrowed with the passage of time. Drexel's collapse led to a prolonged period of elevated spreads. Nonetheless, in 1992, spreads had returned to their earlier range (Chart 5).

Chart 5. **Yields on Below-Investment-Grade Bonds versus Treasury Debt**
Spreads of Market-Weighted Yields to Maturity



Source: Merrill Lynch Government Securities, Inc.

Note: Data are year-end figures.

C. Eurobonds

The Eurobond market, centered in London, is an offshore market in intermediate- and long-term debt issues. It serves as a source of capital for multinational corporations and for foreign governments. It developed after the United States instituted the interest equalization tax in 1963 to stem capital outflows inspired by relatively low U.S. interest rates.[24] The tax gave European corporations an incentive to issue dollar-denominated bonds in Europe rather than in New York. Efforts in the 1960s to limit U.S. direct overseas investment prompted U.S. corporations to raise capital for overseas operations in the Euromarkets as well. Moreover, bonds issued by subsidiaries of U.S. corporations chartered outside the United States were exempt from the U.S. withholding tax on interest paid to foreigners. Non-U.S.-dollar Eurobond issues began to be sold in the mid-1960s, soon after the establishment of the Eurodollar bond market.[25]

The Eurobond market was well established when the interest equalization tax was removed in 1974, and it faltered only briefly before resuming its growth. Issuance of foreign currency Eurobonds picked up at times in the 1970s, but it soared after the dollar's exchange value began to decline in 1985. Bonds denominated in European currency units (ECUs) became popular. The liberalization of national markets and the growth of currency swaps added momentum to foreign currency Eurobond issuance. A currency swap allows a U.S. borrower, for example, to issue an Australian dollar bond in the Euromarket and transform the exposure to U.S. dollars. The major foreign currencies, especially the yen, accounted for most of the growth in nondollar Eurobonds, but currency swaps have promoted issuance in several other currencies.

4. Municipal Securities

Municipal securities are issued by state and local governments and by special authorities providing services such as housing, education, transportation facilities, and industrial development. Issues maturing in one year or less are generally referred to as "notes," while longer term obligations are known as "bonds"; the great bulk of funds raised in the municipal market take the form of bond offerings.[26]

Many municipal bonds are exempt from federal income taxes; in addition, for investors residing in the state in which the securities were issued, the bonds are exempt from state and local taxes.

Restrictions on tax-exempt status for private-purpose and industrial development bonds mandated by tax legislation passed in 1986 reduced somewhat the scope of the tax-exempt portion of the market and led to the creation of taxable and partially taxable municipal bonds. Periodic discussions of the possibility of a "flat tax," which would exempt recipients of interest income from taxes regardless of the source, tend to narrow the yield advantage because investors cannot be certain if the tax-exempt feature will have value throughout the life of the security.

Like corporate debt, municipal bonds involve varying degrees of risk. Substantial help in assessing the likelihood of default is offered by Moody's and S&P.[27] These firms base their ratings on their assessment of each issue's security. Generally, municipal bonds can be secured in one of two ways: "revenue" bonds are issued to finance specific projects, and the proceeds of those projects, normally in the form of user fees, are used to service and retire the debt; "general obligation" bonds are backed by the full faith and credit of the issuer, which can use its taxing authority to raise funds to pay interest and principal on the bonds.[28] Some issues are hybrids of the two types, and a sizable proportion of new debt is independently guaranteed by firms specializing in municipal bond insurance.

Investors in municipal bonds were traditionally drawn by the tax-exempt feature. The three major groups of investors have been households (including mutual funds), commercial banks, and property and casualty insurance firms. The 1986 tax reforms resulted in households becoming dominant. Although lower marginal tax rates and the alternative minimum tax reduced the attractiveness of municipal bonds to households, other tax shelters were curtailed as well. The legislation also eliminated the deductibility of carrying costs for commercial banks, a change that greatly diminished the banks' participation. Property and casualty insurers have generally invested in municipal securities when they have had profits to shelter. Thus, their investment has varied considerably from year to year.

New public offerings of municipal bonds may be marketed either by competitive bidding among underwriters or through directly negotiated underwritings. Underwriting is done by investment and commercial banks. Most general obligation issues are competitively offered, while revenue issues may be underwritten through either method. Once distributed, issues trade in a reasonably active secondary market maintained by a group of dealers nationwide. The relative shrinkage in the tax-exempt portion of the market in recent years has encouraged a number of

firms to drop out of municipal bond market-making activities. Because, municipal issues are not listed on formal exchanges, transactions are generally carried out by phone. They are advertised through both the *Bond Buyer*'s "munifacts" teletype system and S&P's *Blue List* publication. Typical bid-ask spreads quoted by dealers for retail investors are about 2 points, while spreads for institutional investors tend to run around 1/2 point or less.

Chapter 5

The FOMC Meeting: Developing a Policy Directive

At each of its eight scheduled meetings a year, the Federal Open Market Committee (FOMC) develops its policy priorities and writes a directive containing guidelines for implementation. At the February and July meetings, the FOMC also shapes decisions to be covered in the Chairman's semiannual testimony before the House and Senate Banking Committees as required by the Humphrey-Hawkins Act.[1] At those two meetings, the FOMC by law must choose annual growth ranges for specified monetary and credit aggregates. It also has adopted the practice of setting forth the range and central tendency of expectations among FOMC members and other Reserve Bank presidents for nominal GDP, real GDP, inflation, and employment.

At all of its meetings, the FOMC develops policy specifications to guide the open market operations carried out by the Federal Reserve Bank of New York. The FOMC discusses the outlook for economic activity, inflation, financial market conditions, and the monetary and credit aggregates. It weighs information from a variety of sources and considers the likely consequences of alternative policy prescriptions. The table presents a typical FOMC meeting agenda.

sample agenda for federal open market committee meeting

1. Approval of minutes of actions taken at the last meeting of the Federal Open Market Committee.
2. Foreign currency and domestic open market operations.
   A. Report on market developments and operations since the last meeting.
   B. Action to ratify foreign currency transactions, if any, since the last meeting.
   C. Action to ratify domestic open market transactions since the last meeting.
3. Economic situation.
   A. Staff report on economic situation.
   B. Committee discussion.
4. Longer run ranges for monetary and debt aggregates.*
   A. Staff comments.
   B. Committee discussion and actions on longer run ranges.
      1. Review of ranges for year in progress.
      2. Establishment of tentative ranges for the following year (July meeting).
5. Current monetary policy and domestic policy directive.
   A. Staff comments.
   B. Committee discussion.
   C. Action to adopt directive.
6. Confirmation of date of next meeting.

* At the February and July meetings.

Preparation

In advance of each FOMC meeting, documents are prepared and circulated to those who will attend and to other staff members at the Reserve Banks who brief their presidents. Three of these documents are described by the colors of their covers—the green book, the blue book, and the beige book.

The green book, prepared by staff members at the Board of Governors, presents the staff's interpretations of a wide range of economic and financial variables. The book is divided into two parts: the first summarizes recent events and presents a series of forecasts, while the second offers detailed, sector-by-sector descriptions of recent economic developments.

The first part of the green book describes and interprets significant developments in U.S. economic activity, prices, interest rates, flows of money and credit, and the international sector that have occurred in recent months or

quarters. It presents a series of key baseline assumptions concerning likely monetary and fiscal policy over the next one or two years that are used in making the forecasts. Typically, the baseline assumes a continuation of the existing monetary policy stance, although it may include policy changes if economic and price developments would give strong support to such moves. The section presents forecasts of a number of variables for the next six to eight quarters using the baseline assumptions. The textual descriptions of economic and financial variables are supplemented by extensive tables showing past data and forecasts. It also briefly presents alternative policy scenarios—usually one more restrictive and one less restrictive than the baseline—along with indications of how such policy choices would be expected to change the forecasts for economic activity, unemployment, and prices.

The second part of the green book provides additional information about recent developments. It describes trends in employment, production, and prices and the factors influencing them. The second part also includes sector-by-sector analyses, commenting on such areas as housing, motor vehicle production, inventories, and spending by federal, state, and local governments. It reviews a range of developments in domestic financial markets, including credit patterns for banks, other financial intermediaries, nonfinancial businesses, and consumers. Finally, international developments are reviewed, with commentary on trade statistics, international financial transactions, foreign exchange markets, and economic activity in a number of foreign countries.

The blue book provides the Board staff's view of recent and prospective developments related to the behavior of interest rates, bank reserves, and money. The blue books written for the February and July meetings contain two extra sections to assist the Committee in its preparation for the Humphrey-Hawkins testimony. The first of these sections provides longer term simulations, covering the next five or six years. One of these simulations represents a judgmental baseline, while two or three alternative forecasts use a Board staff econometric model to derive the deviations from the judgmental baseline under different policy approaches. Typically, at least two scenarios are explored: one incorporates a policy path that is designed to bring economic activity and employment close to their perceived long-run potential paths fairly quickly, and another is intended to achieve a more rapid approach to stable prices. The section also offers estimates of how different assumptions about such factors as fiscal policy, the equilibrium unemployment rate, or the speed of adjustment to changed inflationary expectations would affect the predicted outcome.

The second additional section in the February and July blue books sets out alternative annual ranges for growth of the monetary aggregates. The

section alludes to the well-publicized difficulties in forecasting the relationships between monetary growth rates and economic activity and prices (described in Chapter 1). In keeping with the Humphrey-Hawkins requirements, the FOMC has continued to set annual ranges for M2, M3, and domestic nonfinancial debt, even though the measures have suffered considerable variability, with sharp deviations from expectations that have not been captured by the staff's models. Nevertheless, efforts continue to extract useful information from the measures and to derive growth rate forecasts that are consistent with the policy priorities emerging from the long-run scenarios.

The February and July blue books then provide forecasts of the aggregates based on the green book's baseline and alternative policy scenarios for the year in progress and the next year. The assumptions and risks underlying the forecasts are explained. The blue books present two or three alternative annual growth ranges for M2, M3, and debt and offer comments on the logic for each. For February, the blue book presents alternatives for the year just beginning, and in July it presents potential revisions to the ranges adopted in February and preliminary ranges for the following year.

All eight blue books present the Board staff's view of monetary and financial developments for the few months surrounding the meeting in question. Each book first reviews recent developments in policy variables, including the Federal funds rate, reserve measures, and the monetary aggregates. It often comments on the behavior of these variables relative to what the Committee had expected and explains any deviations.

Each blue book presents two or three alternative policy scenarios for the upcoming intermeeting period. Generally, the middle alternative, labeled Alternative B, retains the existing Federal funds rate. Alternative A is associated with a lower funds rate, and Alternative C a higher funds rate. For each alternative, the blue book presents expectations for the key monetary aggregates. The blue books present reasons why the Committee might want to adopt each of these alternatives. The staff also presents estimates of the likely interest and exchange rate responses to the alternatives. Sometimes, either Alternative A or Alternative C may be omitted if recent developments make it appear highly unlikely that the FOMC would contemplate a move in that direction.

The beige book, made available to the public almost two weeks before each FOMC meeting, presents reports on regional economic conditions in each of the twelve Federal Reserve Districts. The reports are compiled from conversations with local business contacts and analyses of statistical reports for the area. The beige books begin with a summary of the conditions described by each Reserve Bank.

Before every FOMC meeting, a series of briefings and discussions is held. Members of the Board staff review their economic forecasts with the governors at a regular briefing held shortly before the FOMC meeting. The Reserve Bank presidents also meet with selected staff members. Research officers present their own review of economic and financial developments and forecasts, delineating any differences they may have with the Board staff's outlook. Other staff presentations illuminate new developments or underlying relationships among economic and financial variables.

The Meeting

The FOMC meetings take place in the boardroom of the Board of Governors in Washington, D.C. The seven governors and twelve Reserve Bank presidents gather around a conference table along with the Secretary of the FOMC, Board staff members serving as advisers to the FOMC, and one or two officers from the area of the New York Reserve Bank that manages domestic and foreign open market operations. Senior research officers of the Reserve Banks and other senior Board officials are seated along the sides of the room.

1. Preliminaries

The Chairman generally opens the meeting by seeking approval of the minutes of the previous meeting. At one meeting, however, usually the initial meeting of the year, the first order of business is the election of the officers of the FOMC. The Chairman of the FOMC, who is also the Chairman of the Board of Governors, and the Vice Chairman of the FOMC (traditionally the President of the New York Federal Reserve Bank) must be elected by the members. The membership of the FOMC changes each year because the presidents from the Federal Reserve Districts other than New York serve on a rotating basis. (The new member presidents will have already taken their oaths of office.) Senior officers, generally the Directors of Research from the voting members' Districts, are elected as staff officers of the FOMC along with several Board staff officers. The Manager or Managers of the System Open Market Account are also elected. A number of procedural items are reviewed at the meeting. The FOMC also renews authorizations for the New York Federal Reserve to carry out open market operations and reviews guidelines for those operations.

2. Report of the Manager

Typically, the next order of business is the report of the Manager of the System Open Market Account at the New York Federal Reserve. (In some years, two separate Managers have had responsibility for the domestic and foreign exchange portfolios; currently one person oversees both portfolios.) The report describes domestic open market operations, any foreign exchange intervention, and the reasons for them. It reviews developments in both domestic financial markets and foreign exchange markets. The presentation at the meeting highlights key elements from a more detailed written report, which is prepared and distributed in advance by the staffs who are responsible for domestic open market and foreign exchange operations at the Federal Reserve Bank of New York.

In discussing domestic operations, the Manager reports on the implementation of monetary policy through open market operations since the last Committee meeting. The Manager indicates how reserve measures and the Federal funds rate behaved in relation to expectations and explains significant deviations. The Manager reports on other factors that are of particular interest at the time, for example, financial market participants' expectations concerning the interest rate outlook, economic activity, prices, and the likely course of Federal Reserve policy. The presentation also describes domestic market reactions to items of current interest, such as budgetary and foreign exchange developments.

If an unusually large need to add or drain reserves is expected to develop in the period before the next meeting, the Manager may ask the Committee to amend the authorization for domestic operations to permit a larger than normal net change over the period in the System's portfolio of government securities. As of 1996, the standard intermeeting "leeway" for the net portfolio change was $8 billion, an amount that is usually adequate to handle needed reserve adjustments.[2] (Chapter 7 describes the authorization for domestic operations.)

Recently, intervention by U.S. monetary authorities in the foreign exchange markets has occurred only a handful of times a year. When intervention has taken place since the last meeting, the Manager explains the reasons for the intervention and indicates the exchange market response. The Manager also describes exchange market developments more generally and may comment on other countries' exchange market activity. In contrast to domestic monetary policy, foreign exchange policy is primarily the responsibility of the U.S. Treasury as part of its overall role in formulating international financial policy. Nonetheless, the Federal Reserve, through the FOMC and the New York Reserve Bank, plays

important roles. Specifically, it monitors foreign exchange developments and participates in decisions of whether to intervene in the markets. Exchange rate policies and operations are the subject of frequent conversations between Treasury and Federal Reserve officials. The actual intervention operations and the investment of foreign exchange reserves on behalf of both the Federal Reserve System and the Treasury are carried out by the Federal Reserve Bank of New York.[3]

The FOMC is also responsible for monitoring operations under the Federal Reserve "swap" network. The swap network actually comprises individual bilateral facilities between the Federal Reserve and fourteen central banks and the Bank for International Settlements. A swap is an exchange of currencies between two central banks for a fixed period of time, after which the transaction is unwound or extended by mutual agreement. The swap network was created in 1962 to allow central banks to supplement their holdings of foreign currencies for intervention in the foreign exchange markets. The Federal Reserve last drew on the network in 1980. During the early part of the 1980s, there was essentially no intervention. Thereafter, the Federal Reserve's foreign currency holdings were built up to levels that were adequate to finance intervention activity. Drawings by other central banks to help finance intervention have also trailed off.

Before agreeing to a swap transaction, the FOMC will seek to satisfy itself that the other central bank has assured means of repayment to unwind the swap at maturity. Swap drawings are typically arranged for three-month periods and can be renewed for additional three-month terms by mutual consent, but they typically do not extend beyond one year from the date of the initial drawing. The Manager reports on any recent swap line activity and alerts the FOMC to upcoming renewals of outstanding swap lines.[4]

Following the Manager's report, FOMC members have the opportunity to comment on or raise questions about operations or market developments. They may ask about market expectations concerning future monetary policy or the exchange market's likely reaction to a policy action. Finally, the Committee is asked to ratify the operations conducted over the interval.

3. Sizing up the Economic Situation

A. The Board Staff Presentation

Members of the Board staff then review current and prospective economic and financial developments, presenting highlights of the material in the green book. Typically, the

forecast horizon includes both the current year and the following year. The domestic staff presentations explain the green book's forecasts and comment on estimates of a number of measures, including output, employment, and prices. The staff members examine factors underlying the forecasts. The analysis may touch on specific issues that are important at the time, such as debate within the federal government about the appropriate size and scope of government activity and the best ways to reduce the federal deficit.

The international staff presents its expectations for the behavior of output, prices, and interest rates abroad in relation to U.S. performance. The staff analyzes the implications for trade and current account balances and for the exchange rate of the dollar relative to currencies of its major trading partners.

Following the staff presentation on the economy, FOMC members generally ask a number of specific questions about the assumptions underlying the forecasts. For example, they may ask how economic forecasts would change if certain factors behaved differently. They often ask senior staff members about their perception of the risks of different outcomes.

B. Discussion of the Economy

The Committee members (and the nonvoting Reserve Bank presidents) then present their views on the outlook for the economy. At the February and July meetings, they will have submitted in advance their individual estimates of nominal and real economic growth, inflation, and unemployment. They may defend or modify those forecasts as a result of the discussion. The ranges and central tendencies of these forecasts are included in the Humphrey-Hawkins report.

Much of the commentary uses the Board staff's green book forecasts as a benchmark. In giving their assessments of economic activity and the outlook for prices, the governors and presidents typically note the areas of agreement or disagreement with the staff. The speakers employ a range of analytical approaches. Some build their conclusions on the economy from the spending dynamics they observe in the consumer, business, and government sectors. Others may give special weight to particular indicators that they believe to be especially important to understanding economic and price developments. For instance, a policymaker may emphasize estimates of real interest rates, the behavior of commodity prices, or the exchange value of the dollar. Some may cite monetary or credit expansion, taking into account any known distorting factors.

The Reserve Bank presidents generally remark on developments in their regions, often highlighting key points from their District's beige book section and offering insights from recent conversations they may have had with industry leaders. They may suggest that developments in their District are illustrative of those in the nation as a whole, or they may emphasize differences from the national economy related to the mix of local industry.

4. Preparation for Humphrey-Hawkins Testimony

A. Presentation

Generally at this stage of the February and July meetings, the Committee turns its attention to the longer run outlook and prepares to set annual ranges for money and credit growth. At the start of the discussion, a senior Board staff member, usually the Director of the Division of Monetary Affairs (the key staff member responsible for dealing with monetary policy issues), highlights the various multiyear scenarios that were described in the blue book and assesses how the different annual growth rate ranges for the money and debt measures correspond to the Committee's policy goals. In reviewing the alternative long-run scenarios, the Director may amplify certain characteristics of the model used to derive them, possibly describing the model's response to shocks and to the effects of making different assumptions about underlying relationships. The Director may remind the Committee of the risks inherent in this type of exercise, since a small distortion to a one-year forecast can become magnified in later years.

The Director then turns to the specific alternative annual growth rate ranges for the monetary aggregates presented in the blue book and reviews the arguments for each. The Director describes staff procedures used to develop the ranges, including analysis of special factors that may have caused the aggregates to deviate from earlier patterns, and evaluates the likelihood that the different annual ranges will encompass the contingent risks to the forecasts.

After the presentation and before the general discussion of longer run policy decisions, meeting participants may ask the Director specific questions about the aggregates. For instance, a member may ask how inflows to bond and stock mutual funds are expected to affect the growth rate of M2 in coming quarters.

B. Developing a Policy Strategy

Following the staff presentation, the Chairman may start off with a general discussion of policy priorities, presenting some concerns and preferences. (Policy priorities may be discussed at any meeting.) The subsequent deliberations generally draw from both the Chairman's remarks and the blue book's multi-year scenarios. Discussions have often focused on the best approach for dealing with inflationary pressures. When inflation was relatively high, members generally favored strong measures to combat it because of the distortions that rising prices were imposing on economic decision making and resource allocation. At times when relatively low rates of inflation have been expected to prevail, however, views have often differed on how to proceed.

Some members have supported a policy strategy that aggressively sought price stability, arguing that an economic climate promoting efficient resource allocation and sustainable economic expansion depends on expectations of reasonably stable prices. Others, however, have cited studies suggesting that forcing the inflation rate down further when it was already modest would result in only a small long-run benefit for the economy. These policymakers have argued that in fact the costs of pushing for an additional reduction in inflation could be significant, including a prolonged period of below-trend economic expansion. The latter group has generally supported a less restrictive monetary strategy, so long as it did not seem to risk rising inflation.

In addition to differences concerning the relative costs and benefits of working toward lower inflation, views have differed about the potential rate of growth in economic activity that could be sustained without accelerating inflation. Some participants have argued that seeking growth rates above the recent trend would be risky, while others have cited a belief that productivity or labor force growth could support more rapid expansion. Discussion of the topic has often focused on the nonaccelerating inflation rate of unemployment (NAIRU). At times when the actual unemployment rate has been above the estimated value of NAIRU, members were generally more willing to support an accommodative monetary policy than when the unemployment rate was already at or below NAIRU. The value of NAIRU, which depends upon a number of structural and expectational characteristics of the labor force, has itself been open to debate. Thus, members have sometimes disagreed as to how close actual unemployment was to

NAIRU. In discussing these issues, the Committee has attempted to identify areas of agreement about the general direction of policy.

C. Choosing Annual Ranges for the Aggregates

After the broad discussion of policy priorities, the FOMC must select the annual growth ranges for the monetary and debt aggregates. The participants want the message conveyed by the choice of objectives consistent with the desired future performance of prices. Because the relationships between the aggregates and economic outcomes are uncertain, at least over the one- to two-year horizons for which monetary targets are set, a particular policy direction does not lead directly to one set of monetary target ranges. The FOMC must evaluate the staff's assessment of the most likely trends in the velocity of the aggregates and then choose growth rate ranges that seem to best reflect policy intentions.

At this point, if the discussion points to a consensus or a near consensus, the Chairman may suggest adopting the blue book's formulation of annual growth rates for the monetary and debt aggregates that most closely captures prevailing preferences. The Chairman then calls for a vote of the FOMC members. At the February meeting, only the current year's ranges must be chosen. At the July meeting, the current year's ranges must be modified or reaffirmed and tentative ranges selected for the following year. The members usually vote separately for each year's specifications.

Once long-run ranges have been approved by a majority of members present, the FOMC considers how to express its choices in the policy directive. The blue book contains suggested wording for the paragraph on the longer run aggregates. Generally, the Committee uses that wording, but occasionally it may make some modifications to highlight a particular concern. (Box A presents wording from two past directives.)

5. Short-Run Policy Alternatives

A. Presentation

The Monetary Affairs Division Director then discusses alternatives for policy over the five to eight weeks preceding the next FOMC meeting. The presentation draws upon and amplifies the material presented in the blue book. The Monetary Affairs Division Director may review the recent

behavior of the aggregates, giving particular attention to any factors that have been upsetting the forecast relationships. The Director may also discuss noteworthy developments in the financial markets.

The Director refers to the two or three alternative specifications presented in the blue book and explores their strengths and shortcomings. The Director describes likely financial market responses to each policy option. For short-term rates, the response is reasonably predictable. Rates typically adjust in line with the move in policy action when the policy step is not anticipated. When the action is widely anticipated, however, rates will often complete most of the adjustment in advance of the action and show only slight additional movement as a result of the policy decision.

Box A

Paragraphs from Directives Describing Annual Monetary Ranges

From the meeting held July 5-6, 1995

The Federal Open Market Committee seeks monetary and financial conditions that will foster price stability and promote sustainable growth in output. In furtherance of these objectives, the Committee reaffirmed at this meeting the range it had established on January 31-February 1 for growth of M2 of 1 to 5 percent, measured from the fourth quarter of 1994 to the fourth quarter of 1995. The Committee also retained the monitoring range of 3 to 7 percent for the year that it had set for growth of total domestic nonfinancial debt. The Committee raised the 1995 range for M3 to 2 to 6 percent as a technical adjustment to take account of changing intermediation patterns. For 1996, the Committee established on a tentative basis the same ranges as in 1995 for growth of the monetary aggregates and debt, measured from the fourth quarter of 1995 to the fourth quarter of 1996. The behavior of the monetary aggregates will continue to be evaluated in the light of progress toward price level stability, movements in their velocities, and developments in the economy and financial markets.

From the meeting held January 30-31, 1996

The Federal Open Market Committee seeks monetary and financial conditions that will foster price stability and promote sustainable growth in output. In furtherance of these objectives, the Committee at this meeting established ranges for growth of M2 and M3 of 1 to 5 percent and 2 to 6 percent respectively, measured from the fourth quarter of 1995 to the fourth quarter of 1996. The monitoring range for growth of total domestic nonfinancial debt was set at 3 to 7 percent for the year. The behavior of the monetary aggregates will continue to be evaluated in the light of progress toward price level stability, movements in their velocities, and developments in the economy and financial markets.

For long-term rates, the likely market response is less straightforward. The market reaction would depend on how the policy decision is perceived and on its implications for future policy and economic developments. For instance, if a tightening move is interpreted as a precursor of many more such steps, long-term rates may build in this expectation and move up in line with or possibly even more than short-term rates. In contrast, if a tightening is not considered sustainable, long-term rates may actually fall as the markets build in an anticipated policy reversal. Rates may remain volatile for a few days as market participants sort through their thoughts about the implications of the policy action.

Once the Director's presentation is completed, Committee members may ask questions about the behavior of the aggregates or other issues.

B. Choosing a Policy Option

Generally, the Chairman opens the discussion of the short-run specifications by offering some remarks designed to provide focus. The Chairman may discuss specific economic indicators that seem to be pointing to future developments in the economy or in prices. Possible topics include the behavior of credit demands and supplies, inventories, and commodity prices and the implications of the budget process. The Chairman may review the pros and cons of the policy choices that seem most consistent with the indicators, sometimes expressing a preference for a particular option while at other times leaving the question more open.

Decisions must be made in two areas. First, the FOMC has to decide whether to take some action to change the Federal funds rate at the meeting; if a change is selected, the Committee must then decide on the appropriate size of the move. Second, the FOMC chooses whether to express in the operating paragraph of the directive a predisposition to make a move between meetings. In some instances, Committee members do not expect conditions before the next scheduled meeting to call for a policy change. In those cases, the members generally choose what is referred to as symmetric wording for the directive. Such a directive does not preclude a move if significant unexpected developments make such an action appropriate. In other cases, a leaning to move in one direction between meetings is expressed through a so-called asymmetric directive. The members discuss the conditions that would call for such a move.[5] (Potential wording of alternative directives is discussed in the following subsection.)

After expressing thoughts concerning policy issues and the general form of the directive, the Chairman asks the other eleven members of the FOMC and the seven nonvoting presidents for their policy preferences. The speakers may, for example, indicate that they favor an unchanged policy stance consistent with the specifications contained in the blue book's Alternative B. Sometimes, speakers prefer an action that falls between two of the blue book alternatives. For example, they may want to see the Federal funds rate rise slightly, but by less than the amount suggested in Alternative C. If the Chairman has expressed a clear preference for one policy formulation, the others may phrase their choices by indicating agreement or disagreement with the Chairman's suggestion.

Sometimes, when the FOMC is considering a change in the Federal funds rate, the question may arise as to whether the discount rate should also be changed. During the 1980s, when the FOMC was encouraging specific amounts of borrowing, it expected the funds rate to be above the discount rate by a spread determined from the specified amount of borrowing. If policy was set in a way that resulted in the funds rate being at or below the discount rate, keeping the funds rate relatively steady would have been more difficult, as was discussed in Chapter 2. The relationship between the funds and discount rates is less critical when the funds rate itself, rather than borrowed reserves, is the primary target, but the FOMC still prefers the two rates to be reasonably in line.

As discussed in Chapter 1, the FOMC does not have the authority to change the discount rate. The Boards of Directors of the twelve Reserve Banks must initiate requests for a change in the discount rate, and the change must be approved by a majority of the members of the Board of Governors. In recent years, the Board members have generally reviewed recommendations for discount window changes before the FOMC meeting to discover their preferences if the FOMC were to take a step consistent with a discount rate action. The leanings of the Board may be indicated at the FOMC meeting. In most cases, the FOMC proceeds with its policy decisions in the expectation that the Board will approve a discount rate change after the FOMC meeting if such a change seems appropriate. Recently, public announcements of FOMC and Board actions have been combined in a single press release. (See the first example in Box B.)

Once the FOMC members and other presidents have completed their comments on policy preferences, the Chair-

man summarizes the results and offers an informal tally of voting members. If there is a clear preponderance of support for a particular approach, it is noted, and the Committee proceeds directly to the language of the directive. However, if a range of views is expressed, with members pushing for different policy prescriptions, the Chairman may have to explore several alternatives to see if any intermediate position can command broad support. If, for example, some members want to cut rates immediately while others do not, the Chairman might suggest choosing Alternative B with an asymmetric directive. In other words, specifications would

Box B

Press Releases Announcing Changing Reserve Pressures

Announcement made on February 1, 1995, following the January 31-February 1, 1995, FOMC meeting

The Federal Reserve Board approved on February 1, 1995, an increase in the discount rate from 4 3/4 percent to 5 1/4 percent, effective that day.

In a related move, the Federal Open Market Committee agreed that this increase should be reflected fully in interest rates in the reserve markets.

Despite tentative signs of some moderation in growth, economic activity has continued to advance at a substantial pace, while resource utilization has risen further. In these circumstances, the Federal Reserve views these actions as necessary to keep inflation contained, and thereby foster sustainable economic growth.

In taking the discount action, the Board approved requests submitted by the Boards of Directors of the Federal Reserve Banks of Boston, New York, Richmond, Chicago, St. Louis, Kansas City, and San Francisco. (Subsequently, the Boards of Directors at the other Reserve Banks submitted requests that were also approved.)

Announcement following the FOMC meeting held on December 19, 1995

Chairman Alan Greenspan announced on December 19, 1995, that the Federal Open Market Committee had decided to decrease slightly the degree of pressure on reserve positions.

Since the last easing of monetary policy in July, inflation has been somewhat more favorable than anticipated, and this result along with an associated moderation in inflation expectations warrants a modest easing in monetary conditions.

This action is expected to be reflected in a decline in the Federal funds rate of 25 basis points, from about 5 3/4 percent to about 5 1/2 percent.

remain the same initially but would point toward a possible easing between meetings.

Most policymakers view the monetary policy process as one of evolutionary adjustments and therefore are willing to accept a prescription that moves in the direction they favor even if at a modestly faster or slower pace than they would prefer. Consequently, it is usually possible to find some shading that captures the support of most members. On rare occasions, however, the divisions may be deep and the views strongly held. In such cases, a number of options must be suggested before a majority of members give their support to a particular policy prescription.

C. Preparing the Directive

Once the general outlines of the near-term specifications for reserve conditions have been established, the FOMC addresses the wording of the directive that will guide open market operations at the Federal Reserve Bank of New York. The blue book suggests language that normally follows the pattern of the previous directive unless the staff saw a need to make some modification.[6]

The conversation focuses on the final, operational paragraph of the directive. Box C contains two examples. The first sentence indicates the degree of pressure on reserve positions desired in the immediate future. The usual phrasing is "maintain the existing degree of pressure on reserve positions" or "increase" or "decrease" such pressure. The degree of change in pressure desired can be indicated with the modifier "slightly" or "somewhat." A preference for Alternative B is conveyed by the first expression. The alternative phrasings are associated with the selection of Alternative C or A, respectively. The first example in Box C was prepared at a meeting when the economy was expanding rapidly and the Committee was concerned about inflation. As a result, Alternative C was chosen.

The directive then reviews the conditions that are expected to prevail during the period before the next FOMC meeting and indicates the Committee's inclination with regard to potential changes in the degree of reserve pressure. This passage has undergone several revisions in the past. In the 1970s and early 1980s, it listed conditions that could lead to an intermeeting change. It gave prominence to deviations in the behavior of the monetary aggregates. Later in the 1980s, as the demand for money became more variable, the Committee included a range of factors in addition to the monetary aggre-

gates and periodically re-ranked the factors as its primary concerns shifted. In 1991, the Committee adopted a standard list, choosing to use the items presented to reinforce its longer term priorities. The current phrasing is, "in the context of the Committee's long-run objectives for price stability and sustainable economic growth, and giving careful consideration to economic, financial, and monetary developments. . . ."

To express the Committee's leanings with respect to changes in reserve pressures between meetings, the directive uses certain key words. If the Committee were more inclined to tighten than ease, the directive probably would express that preference by saying greater reserve restraint "would" be acceptable, while lesser reserve restraint "might" be acceptable. The potential size of an adjustment is indicated by the use of "somewhat" or "slightly." (See the second example in Box C.) In contrast, if the FOMC is more inclined to ease, it reverses the use of "would" and "might."

The FOMC typically chooses symmetrical phrasing when it is not inclined to make a change in reserve pressures between meetings because it considers the risks to be essen-

Box C

Operating Paragraphs from FOMC Domestic Policy Directives

From the meeting held on August 16, 1994

In the implementation of policy for the immediate future, the Committee seeks to increase somewhat the existing degree of pressure on reserve positions, taking account of a possible increase in the discount rate. In the context of the Committee's long-run objectives for price stability and sustainable economic growth, and giving careful consideration to economic, financial, and monetary developments, slightly greater reserve restraint or slightly lesser reserve restraint would be acceptable in the intermeeting period. The contemplated reserve conditions are expected to be consistent with modest growth in M2 and M3 over coming months.

From the meeting held on March 28, 1995

In the implementation of policy for the immediate future, the Committee seeks to maintain the existing degree of pressure on reserve positions. In the context of the Committee's long-run objectives for price stability and sustainable economic growth, and giving careful consideration to economic, financial, and monetary developments, somewhat greater reserve restraint would or slightly lesser reserve restraint might be acceptable in the intermeeting period. The contemplated reserve conditions are expected to be consistent with moderate growth in M2 and M3 over coming months.

tially balanced or, as in the case of the first example in Box C, because it believes the move made at the meeting should be sufficient for the upcoming period. The FOMC may adopt such phrasing even though it thinks the next move is likely to lean in one particular direction if it doubts any action will be needed before the next meeting. It may use either "would" or "might" in conjunction with both phrases about the degree of restraint.

Once the directive's wording has been completed, the Chairman calls for a vote. All voting members indicate their approval or disapproval. By that point, majority support is assured, as the directive has been constructed to encompass the majority view. The Deputy Secretary of the FOMC records the votes and reports the results.

If the FOMC makes a change in reserve pressures at the meeting, a press release is prepared. Suggested wording is read by the Chairman. The statement is released early in the afternoon. (See the examples in Box B.) If no change is made in reserve pressures, standard practice is to forgo a press release; the Board's press officer indicates that the meeting has ended and that no statement will be released. At the end of the meeting, the Chairman confirms the next regular meeting date, and the meeting is adjourned.

Following the meeting, copies of the directive are sent to participants. Later, the office of the FOMC secretariat prepares extensive minutes that report the substance of the meeting's discussion. These minutes are sent to Committee members for review and correction. They are published along with the directive a few days after the following meeting. Any member who voted against the directive includes with the minutes an account of his or her reasons for dissenting. A lightly edited transcript is also prepared, which will be released about five years after the meeting.

Chapter 6

The Trading Desk—Policy Guidelines and Reserve Measures

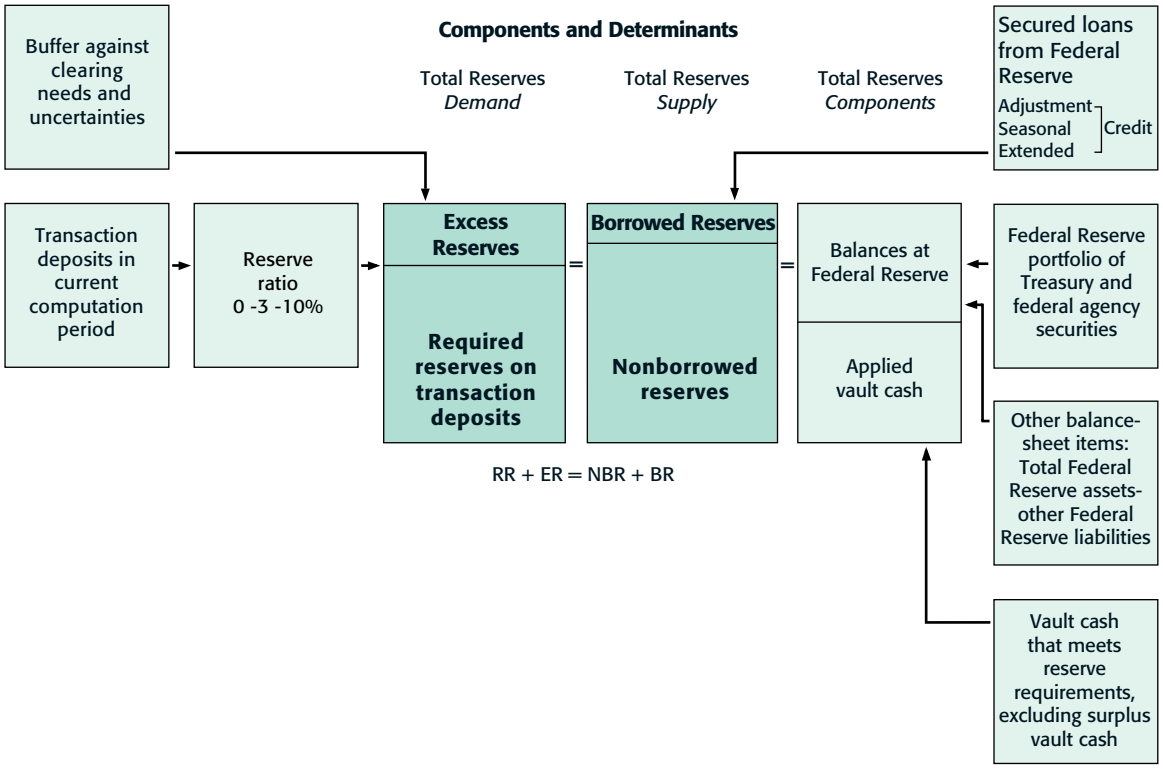
The FOMC's monetary policy decisions embodied in the directive are implemented on a day-to-day basis primarily through the use of open market operations—defined as outright and temporary purchases or sales of government securities by the Federal Reserve. Open market operations are planned and carried out at the Federal Reserve Bank of New York by units within the Markets Group, referred to collectively as the Open Market Desk, the Trading Desk or, more simply, the Desk.

Implementing FOMC Policy Decisions

To implement the FOMC's policy instructions, the open market area seeks to manage reserve levels of depository institutions in a way that will encourage the Federal funds rate to trade around the level agreed to by the Committee.[1] Effectively, Open Market Desk personnel adjust quantities (of reserves) to achieve a price (the Federal funds rate). To guide decisions about reserve quantities, the Open Market Desk develops estimates of the banking system's likely demand for total reserves. Estimated demands arise from the banks' needs to meet reserve requirements and in some cases to hold additional reserve balances to avoid unintended shortages. Banks' demand for total reserves (TR) can be expressed as the sum of required reserves (RR) plus banks' desired excess reserves (ER). (Box A, pp. 150-5, describes the various reserve measures.)

The Desk then estimates the volume of nonborrowed reserves (NBR) that will be available to the banking system in the absence of any additional open market operations. Initial estimated supplies result from past open market operations and estimates of the impact of other factors affecting reserves. (These latter items, often referred to as market factors because they are not under direct Federal Reserve control, are described in Box B, pp. 156-61.) If estimated supplies differ significantly from estimated demands, the Desk will generally add or drain reserves through open market operations to balance reserve supplies with demands, a process described in the following chapter. If the Desk does not fully meet the demand for reserves, the banks must meet the balance at the discount window with borrowed reserves (BR). Supply and demand must balance such that TR = RR + ER = NBR + BR. (The diagram illustrates reserve supplies and demands.)

Total Reserves



1. Evolving Procedures

The FOMC's directive still refers to the degree of pressure on reserve positions. Traditionally, that meant instructing the Desk to change interest rates by altering the share of the demand for reserves met with nonborrowed reserves. To increase reserve pressures, the Desk would increase the expected amount of discount window borrowing to force banks to borrow more. As a group, the banks would be left short of nonborrowed reserves. They could bid reserves away from other banks, which would increase the funds rate, but it would not eliminate the systemwide reserve shortage. That would happen only when the higher funds rate induced some banks to borrow reserves at the discount window. The banks' actions would bring reserve supplies up to the level demanded.[2]

To reduce reserve pressures, the Desk used to increase the proportion of reserve demands met with nonborrowed reserves. As banks needed to borrow less, they put less pressure on the Federal funds rate. Banks as a group could reduce the aggregate amount of total reserves directly only to the extent that they could reduce their discount window borrowing. The mechanism thus depended on there being a significant amount of routine borrowing. If not, banks would have unwanted excess reserves. Equilibrium in that case would be achieved only when the funds rate had fallen close enough to zero for the banks to be willing to hold the excesses.

2. Recent Modifications

As discussed in Chapter 2, this mechanism has not worked well for a number of years. The amounts of reserve pressure and borrowing have ceased to be closely linked. A series of financial difficulties in the banking system starting in 1984 led banks to go to considerable lengths to avoid using adjustment credit. The funds rate often had to rise to extraordinary levels—rates of 20 to 30 percent were not uncommon and much higher rates occurred occasionally—to induce banks to borrow significant amounts. Because the Fed did not try to force banks to borrow when they were so reluctant, borrowing was routinely at minimal levels.

Because of these difficulties in achieving a subtle response of the Federal funds rate to changes in the amount of borrowing, achieving the degree of reserve pressures specified in the directive has been interpreted since the late 1980s to mean creating conditions consistent with the FOMC's desired Federal funds rate. That rate has generally been apparent to the banks; since 1994 it has been

announced formally and in prior years it was clearly indicated through an open market operation. The rate has tended to move to the new, preferred level as soon as the banks knew the intended rate, with little or no change in the amount of borrowing allowed for when constructing the path for nonborrowed reserves (described below).

Preparing Reserve Paths

1. Forecasting Required Reserves

To construct the nonborrowed reserve path at the start of a two-week reserve maintenance period, projection staff members at the New York Federal Reserve and the Board of Governors in Washington, D.C., first estimate required reserves. They do so by forecasting transaction deposit behavior and average reserve requirement ratios. The staffs estimate the underlying deposit trends and the impact of technical and seasonal factors. They forecast the underlying behavior by looking at recent trends in transaction deposits and considering how interest rate movements and economic developments are likely to affect them. For instance, deposits may be growing rapidly because interest rates on market instruments are falling faster than the rates on deposits. As indicated in Chapter 1, a key technical development has been the spread of sweep accounts, which reduced required reserves slightly in 1994 and more rapidly in 1995 and 1996. In making the forecasts, the staffs responded to reports of planned and actual sweep account introductions.

A prominent seasonal factor affecting deposits is the buildup in balances to accommodate the extra transactions during the holiday period, stretching from late November to early January (and the sharp reversal during January). A shorter term seasonal pattern arises from the payment of social security benefits on the third of each month; most recipients allow their cash balances to rise initially, then gradually work down the deposits as they pay their bills. (The Treasury's total cash position might show offsetting movements, but most Treasury cash is not subject to reserve requirements.[3]) Staff estimates rely on experience with these events to forecast transaction deposits.[4]

Once the projection staffs have developed forecasts of total transaction deposits, they must estimate the appropriate average required reserve ratios to use in deriving required reserves. Transaction deposits are divided into three tranches, with indexed cutoffs that change slightly each year. In l996, the first $4.3 million of

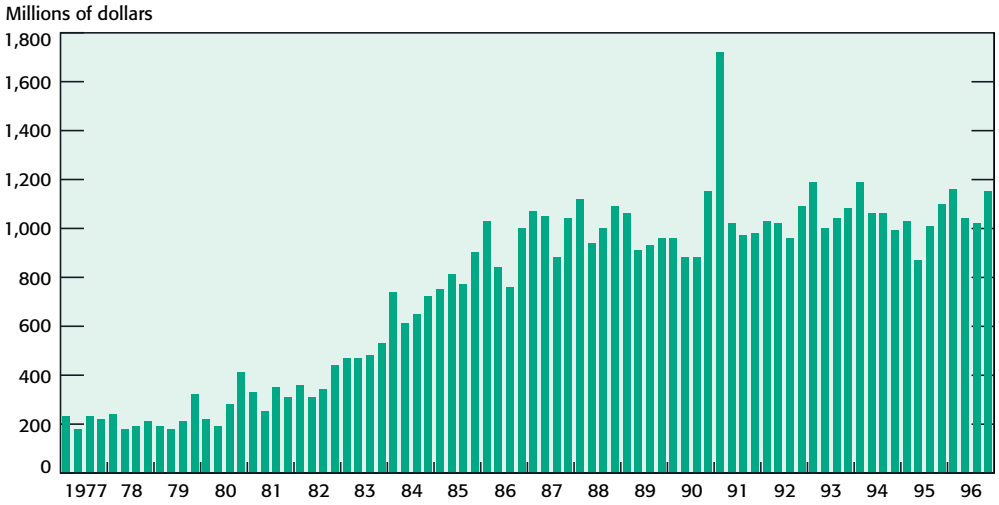
transaction deposits was exempt from reserve requirements. Then, deposits up to $52 million were subject to a 3 percent reserve ratio. All transaction deposits above $52 million were subject to a 10 percent reserve ratio. Because of the tranches, average reserve ratios on transaction deposits change as deposits move among different-sized institutions. In 1996, the maintenance period averages ranged from 7.417 to 7.911 percent.

During each maintenance period, the staffs frequently update their forecasts of required reserves as information on actual deposit levels becomes available. Usually, they do so during the middle part of the period in response to preliminary data on deposit levels for the first week of the period.[5] The staffs make further adjustments late in the period when they receive preliminary deposit data for the second week and actual data for the first week's figures. They continue to revise required reserves after the period has ended, taking into account the more complete information received. However, these changes will not affect the Desk's reserve provision for that period.

2. The Allowance for Excess Reserves and the Behavior of Required Reserve Balances

Usually, the nonborrowed reserve path includes a standard allowance for excess reserves because average excess reserve levels have been relatively steady since the late 1980s (Chart 1). Between

Chart 1. **Quarterly Average Excess Reserve Levels**



Source: Board of Governors of the Federal Reserve System.

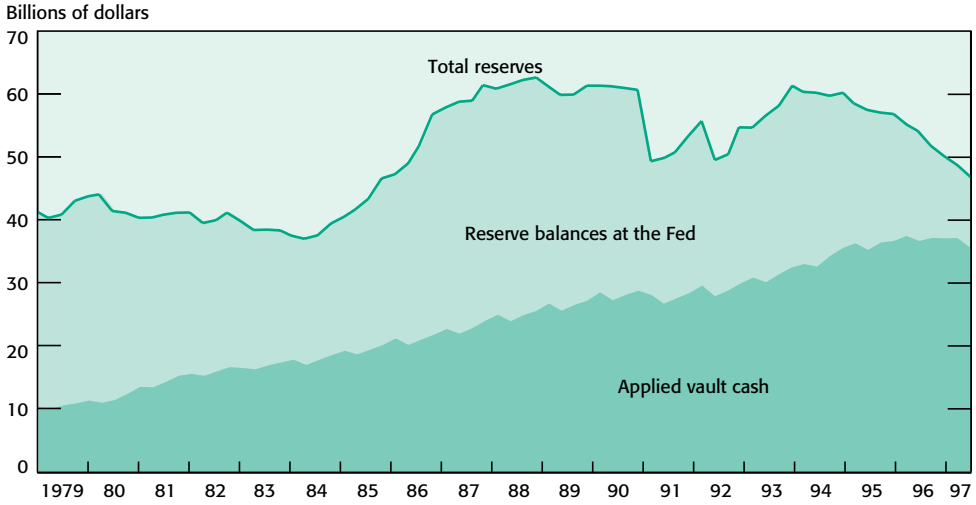
1991 and 1996, the standard allowance was $1 billion. Generally, allowances for deviations from the standard amount are made informally, although occasionally the recorded reserve path has been changed. Variations from the norm are forecast through the use of econometric models, staff judgment, and from observing banks' appetite for reserves during the period. Excess reserves are most likely to differ substantially from the norm in certain reserve periods: when the period includes a year-end, when unusually large excesses or deficits are carried into the period, or when required reserve balances drop sharply, either because of a reduction in reserve ratios or, early in the year, when reservable deposits are seasonably low.

Both the average level and the period-to-period variability of excess reserves are influenced by the level of required reserve balances. Higher required reserve balances increase the underlying stability of the banks' demand for reserves. With higher balances, banks have more day-to-day flexibility within a maintenance period to manage their reserve positions against the background of unpredictable flows of funds through their reserve accounts. When a bank unexpectedly ends a day with excess reserves, it will try to offset them by running balances below required reserve levels on other days. If its required reserve balance is high, it will simply aim for a low balance each day until it has worked off the accumulated excess reserves.

If a bank's required reserve balance is low, however, efforts to run reserve balances below requirements will expose the bank to the risk of an overdraft from an unexpected late-day reserve outflow. Because it does not earn interest on excess reserves, the bank will try to keep reserve balances on subsequent days as low as possible, but they may not be low enough to work off the excess reserves accumulated earlier. The bank's efforts to achieve low balances may require it to either buy or sell Federal funds very late in the day as it adjusts to surprises in its reserve picture. It may face a thin funds market at that time, which may adversely influence the rate it can earn or has to pay. Occasionally, the adjustment may not be possible, and the bank will either be stuck with excess reserves or be potentially overdrawn and have to go to the discount window to cover the overdraft.

Required reserve balances first reached exceptionally low levels in 1984. Member bank requirements had been fully phased down under the Monetary Control Act, but nonmember bank requirements had only been phased up halfway. In addition, vault cash holdings were expanding rapidly as the use of automated teller machines was spreading (Chart 2). Balances were

Chart 2. **Composition of Total Reserves**
Quarterly averages



Source: Board of Governors of the Federal Reserve System.

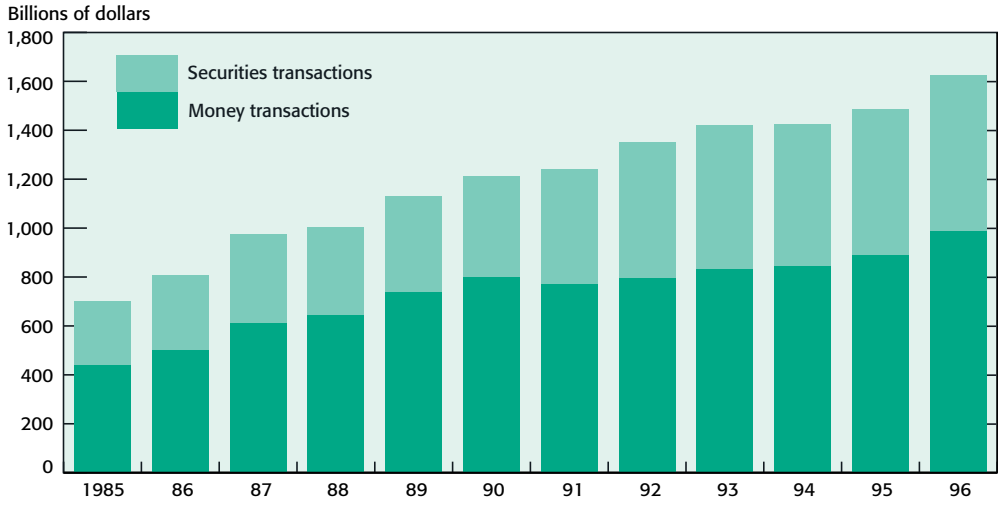
Note: Data are not seasonally adjusted or adjusted for reserve requirement changes.

rebuilt later in the 1980s, helped by the completion of the phase-in of nonmember bank requirements. Required reserve balances next dipped sharply early in 1991 after the Board of Governors eliminated reserve requirements on nontransaction deposits in two steps, one at the end of 1990 and one at the start of 1991. Balances experienced a more modest decline following the Board's 1992 reduction in maximum transaction deposit requirements from 12 percent to 10 percent. Rapid growth in M1 helped lift required reserve balances once again in the early 1990s. In addition, in the 1990s, large banks began to open required clearing balances (described in Box A), which lifted the level of operating balances that banks needed to hold.

Especially during the early 1991 interval, excess reserves temporarily rose on average and became more variable as daily clearing needs came to dominate banks' demands for reserve balances. Both the intraday and interday volatility of the Federal funds rate rose appreciably during that episode. In 1995-96, sweep accounts took required reserve balances to low levels again. So far, the impact on excess reserves and on funds rate volatility has been modest, possibly because the reductions in requirements came at the banks' initiative and because the declines have been gradual.

Low reserve balances can lead to reserve management difficulties because the volume of reserve transfers is very high (as noted in Chapter 3). Fedwire money transactions in 1996 averaged around $990 billion a day and securities transactions averaged about $640 billion (Chart 3). Offline check settlements averaged about $48 billion and Automated Clearing House (ACH) transfers, which are preauthorized electronic payments, averaged almost $38 billion. These daily transactions totaled $1.7 trillion—about 75 times the average $22.5 billion end-of-day reserve balance. Thus, the balances in the reserve accounts are intensively used. As discussed in Chapter 3, this heavy volume of transactions often contributes to some banks' reserve accounts being overdrawn during part of the day. Such daylight overdrafts are subject to size restrictions and fees. By day's end, banks must cover all overdrafts or face significant penalties, even if they have already met their reserve requirement for the period.[6]

Chart 3. **Systemwide Fedwire Activity**
Daily Averages



Source: Federal Reserve Bank of New York.

3. Combining Estimates to Form the Nonborrowed Reserve Path

The projection staffs add their estimated demands for required reserves to the assumed allowance for excess reserves to obtain estimated demands for total reserves. From that, they subtract the Desk officials' estimate of likely borrowed reserves (recently consisting mostly of seasonal borrowing) to form tentative nonborrowed reserve paths. The exercise is undertaken for the current and two subsequent maintenance periods. Staff members update the nonborrowed reserve path during a maintenance period as required reserve estimates are revised to keep the objective closely aligned with bank demands for reserves. As indicated above, Desk officials make informal revisions when excess reserve estimates deviate from the initial assumption. Typically, informal adjustments are also made when borrowing is expected to deviate from the path allowance.

Estimating Reserve Availability

Once the Desk has an objective for nonborrowed reserves for the two-week reserve maintenance period, it must develop a strategy for bringing actual nonborrowed reserves into line with that objective. The first step is to estimate the level of nonborrowed reserves for the current and future periods. The nonborrowed reserves arising from past open market operations will be known. Some of those arising from other balance-sheet items, however, are subject to considerable period-to-period or even day-to-day variation and change in ways that are hard to forecast (Box B).[7] The Desk undertakes a substantial share of open market operations to offset the unwanted reserve impact of swings in these factors.

Each morning, members of the New York Fed's monetary projection staff present to the Desk their estimates of the likely behavior of the factors affecting reserves. Their counterparts at the Board perform a similar exercise to provide the Desk with a second set of estimates. As information flows in, projection staff members learn the actual values of the factors on the previous day and what developments may affect these factors on the current day and in the future. They interpret any deviations from the factors' expected behavior and decide how to modify their forecasts. These forecasts form the basis of the estimate of reserve supplies. They will be compared with the reserve paths in developing a plan for carrying out policy operations. (A more detailed description of the daily procedures for implementing monetary policy appears in Chapter 7.)

The Banking System's Responses to Federal Reserve Actions

The response of the banks and the public to policy actions will depend upon many circumstances, including the underlying institutional and regulatory structure described in Chapter 3. The adjustment process is inevitably complex in view of the large number and variety of financial institutions in the United States that create reservable deposit liabilities. How a particular action will affect money, credit, and interest rates can be described in general terms, but the magnitude and timing of the responses to a monetary policy action can only be estimated roughly at best.

1. Changes in the Federal Funds Rate Target

When the funds rate target is raised or lowered, banks have an incentive to adjust the pricing of loans and deposits. These adjustments will gradually work to alter money and credit growth. Banks may reevaluate the structure of their lending rates, as well as their deposit rates' competitive position relative to rates on market instruments. In the current environment, with unrestricted interest rates on all but demand deposits, banks have considerable flexibility to adjust rates, but their actions have tended to lag the markets. Thus, M2 and M3 generally weaken in the months after a restrictive policy action as market rates rise more rapidly than deposit rates. Once the rate adjustments are complete, the aggregates should partially recover. M1 growth, affected by continued rate restrictions on some types of deposits and very slow adjustment of consumer transaction deposit account rates by banks, will likely be held down for a more extended period. The details of how banks adjust to a change in reserve provision will vary according to initial conditions and expectations.

The public's response to a change in policy will arise from whatever steps the banks take to adapt their pricing of deposits and loans and from the public's perception of future interest rate developments. For instance, if banks raise their rates on loans, customers may cut back on their use of bank credit: they may substitute other, less costly types of credit, reduce their overall dependence on credit, or reduce their spending. However, if customers expect this rise to be the first of many increases in interest rates, borrowers may rush to get fixed-rate loans before they become even more expensive, thus initially accelerating, rather than reducing, loan demand and related deposit expansion. (This topic is explored in Chapter 8.)

2. Banks' Adjustments to Changes in Reserve Provision

The impact of a change in reserves through open market operations works its way quickly from the handful of banks that participated in the operation to the entire banking system. If the Desk buys Treasury securities, for instance, the sellers' banks will initially gain reserves. Those reserves will quickly be distributed to other banks as the customers spend the receipts or as the recipient banks attempt to work off a surplus (relative to their initial positions). The resulting reserves will thus quickly shift from the banks of firms participating in the open market operation to other banks.

Within a single two-week reserve maintenance period, the banking system's options for addressing a reserve excess or shortage are more limited than those of individual banks, which may take steps that merely redistribute the reserve shortages and excesses. As indicated in Chapter 3, a bank can adjust to a reserve shortage by selling assets such as short-term securities or loans, it can bid for wholesale deposits such as large CDs or Eurodollars, or it can purchase reserves from other banks in the overnight funding markets. None of these actions increases the total reserves of the banking system, but all of them redistribute the shortage.

In principle, banks could reduce their aggregate demand for reserves. They could lower their required reserves by reducing transaction deposits. To this end, banks could increase lending rates and lower transaction deposit rates, thereby encouraging customers to reduce loans and deposits.[8] Such prompt adjustments by many banks and by their customers, however, are unlikely. Changes in deposits and lending rates are not generally made in response to what is perceived to be a temporary reserve imbalance. Even if the changes were made, customers would need time to respond to them. Cutting back on excess reserve holdings is also a theoretical option but, as indicated in Box A, banks are already devoting considerable resources to holding down excess reserves.

In practice, banks and their customers will initially follow the strategies that redistribute reserves—strategies that may change the Federal funds rate. As the funds rate rises or falls, the Desk may respond by providing more or less nonborrowed reserves. Otherwise, in the end, the adjustment will occur at the discount window.

Box A

Description of Reserve Measures

Total Reserves

Total reserves are defined as reserve balances held at day's end at the Federal Reserve and applied vault cash (described below).[9] Banks must hold total reserves to meet reserve requirements, specified as averages of closing balances held over two-week reserve maintenance periods that end every other Wednesday.[10] Applied vault cash is defined as that portion of banks' total currency that is used to meet reserve requirements. The vault cash applied during a two-week reserve maintenance period was held during a two-week computation period that ended on a Monday, three days before the reserve maintenance period began. Almost all small depository institutions and some of the larger banks and other institutions routinely hold more than enough vault cash to meet their reserve requirement. They are referred to as "nonbound." Applied vault cash for those institutions is equal to their required reserves. Their total vault cash is reported to the Federal Reserve early in the reserve maintenance period, but the portion applied to meeting reserve requirements cannot be computed until after the reserve maintenance period ends and their reserve requirement is known.

Surplus vault cash—the excess of total over applied vault cash—is excluded from the various reserve measures. It arises because banks base their holdings of vault cash on expectations of customer demand rather than reserve requirements. Many banks have found that they need more cash for conducting business than for meeting requirements. In particular, widespread use of automated teller machines led banks to expand their vault cash holdings.[11] On average over l996, applied vault cash amounted to about $37 billion while surplus vault cash was $5.4 billion. The decision to exclude surplus vault cash from the definitions of total (and excess) reserves was made because banks cannot directly use it to make reserve adjustments during a maintenance period.

Banks that do not hold sufficient vault cash to satisfy their entire reserve requirement are referred to as "bound," and they must hold reserve balances at their Federal Reserve Bank to meet the remaining portion of their requirement. Reserve balances also provide the means for transferring funds among banks. As checks clear through the Federal Reserve Banks, reserve balances flow from the paying bank's account to the receiving bank's account. Private clearing services also clear checks and arrange for the net settlement among reserve accounts. Many of these transactions occur when a bank directs the Federal Reserve to make a wire transfer for itself or a customer to another bank or its customer over the Fedwire system. ACH instructions also direct the transfer of reserve balances. Securities of the Treasury and some federal agencies are held in book-entry form at the Federal Reserve and are transferred through Fedwire. Settlement occurs using reserve balances.

Required Reserves

Reserve requirements can be satisfied by holding either or both of the two forms of total reserves—vault cash from the preceding computation period and end-of-day reserve balances at the Federal Reserve. The latter are often referred to as required reserve balances. Banks must come close to meeting their requirements on average over a two-week maintenance period; they are allowed to carry forward for one maintenance period an excess or deficiency of up to 4 percent of their requirements, or $50,000, whichever is greater.[12] Once these carryovers are taken

Box A *(Continued)*

into account, a bank that fails to meet its requirement will be assessed a penalty on the deficiency at a rate that is 2 percentage points above the basic discount rate (although the penalty may be waived if there are extenuating circumstances). If a bank frequently fails to meet its requirements, the Federal Reserve will contact senior management to discuss the problem and remind them that repeated failure to comply with this important obligation would put the institution under scrutiny.

Reserve requirements, as specified in Federal Reserve Regulation D, are computed as various fractions of transaction deposits. The Board of Governors establishes requirements in conformity with rules and guidelines specified in the Depository Institutions Deregulation and Monetary Control Act of 1980 (MCA) and the Garn-St Germain Depository Institutions Act of 1982.[13] For required reserves against transaction deposits, the computation period is the two weeks ending on the Monday two days before the maintenance period ends.[14] Thus, neither the banks nor the Fed know the level of required reserves until very late in the maintenance period.[15]

Excess Reserves

Excess reserves are defined as total reserves not used to meet reserve requirements. Because surplus vault cash is excluded from the definition of total reserves, all excess reserves take the form of reserve balances at the Fed. Excess reserves arise because banks that use reserve balances for clearing purposes do not have perfect control over the level of those balances. They hold excess reserves when they estimate the cost of eliminating them to be greater than the interest lost by holding nonearning reserve balances. Banks that meet most or all of their reserve requirements with vault cash may hire a correspondent to process their transactions. Most of those banks would not hold reserve balances on their own and would thus not hold excess reserves.

Banks that do maintain reserve balances at the Federal Reserve are under an obligation to avoid end-of-day overdrafts.[16] All large banks maintain reserve accounts. They devote considerable resources to monitoring reserve and deposit flows so as to avoid reserve deficiency penalties while trying to avoid unusable excess reserves. Most of these banks have required reserves plus required clearing balances (defined below) high enough to keep excess reserve levels within the band established by their carryover allowance much of the time. Because excess reserves are measured before taking account of carryover amounts, these banks often hold excesses and deficiencies in alternate maintenance periods. From their perspective, they are not holding either excesses or deficiencies because they include the carryover in their own calculations.[17] Occasionally, around quarter ends or at other times when reserve flows are particularly hard to predict, large banks may have excess reserves that exceed their carryover limits, or they may waste excess reserves carried into the period.

Most small- and medium-sized commercial banks and thrift institutions and a few large banks are nonbound or close to it. If they clear for themselves, the flows through their reserve accounts each day are large compared with the small-to-nonexistent amount of reserve balances needed to meet requirements. These institutions can open required clearing balance accounts (described below), but those balances may not be large enough to cover their clearing needs. For them, it often costs less to hold reserve balances in excess of requirements than to engage in the close management of reserve positions necessary to eliminate excess reserves.

Box A *(Continued)*

Excess reserves grew during the 1980s (Chart 1, in the main text) after the MCA and the International Banking Act of 1978 mandated that reserve requirements be extended gradually to more institutions.[18] As reserve requirements were phased in, some of these institutions became subject to reserve requirements in excess of vault cash. They opened reserve accounts to meet requirements and to provide funds for clearing through the Federal Reserve. For the first time, they were in a position to hold excess reserves as measured by the Federal Reserve. Excess reserves were then reasonably trendless, except for a spike in early 1991 after the large reduction in reserve ratios (discussed in the main text, section 2B).

Required Clearing Balances

The MCA anticipated that some small commercial banks and thrifts would have difficulties handling settlement of interbank transactions without either holding excess reserves or being overdrawn. It provided that institutions routinely needing reserve balances for clearing purposes—either because their required reserve balances at the Federal Reserve were low or because vault cash fully met requirements—could establish so-called required clearing balances. A bank may negotiate with its Reserve Bank the amount of reserve balances it expects to need for clearing and commit to holding that amount on average. The Federal Reserve then compensates the institutions for those balances in the form of credits to cover fees for priced services. The value of the credits is computed from the average Federal funds rate during the maintenance period in which the balances are held. The maximum required clearing balance that offers a return is determined by the amount of priced Federal Reserve services the bank uses and by the level of the Federal funds rate. (The credits are good for a year after they are earned.) Often, the maximum useful level of credits is below the reserve balance needed to avoid holding excess reserves. Many small banks and thrifts have chosen not to establish required clearing balances because doing so would entail paying increased attention to reserve management.

Large banks became active users of required clearing balances beginning in 1991 after the reserve requirement reductions caused many of them to need more reserve balances to protect against overnight overdrafts than they needed to meet requirements. As a result, the amount of required clearing balances climbed dramatically. Balances then dipped in 1994, when rising Federal funds rates reduced the volume of clearing balances needed to cover the cost of services purchased. Balances climbed again in 1995 and 1996, as sweep accounts spread and required reserve balances fell (Chart 4). Required clearing balances are not treated as part of total reserves (or excess reserves). In its analysis of banks' reserve management strategies and its assessment of the risk of overdrafts, the Federal Reserve focuses informally on required operating balances, which consist of required reserve balances plus required clearing balances.

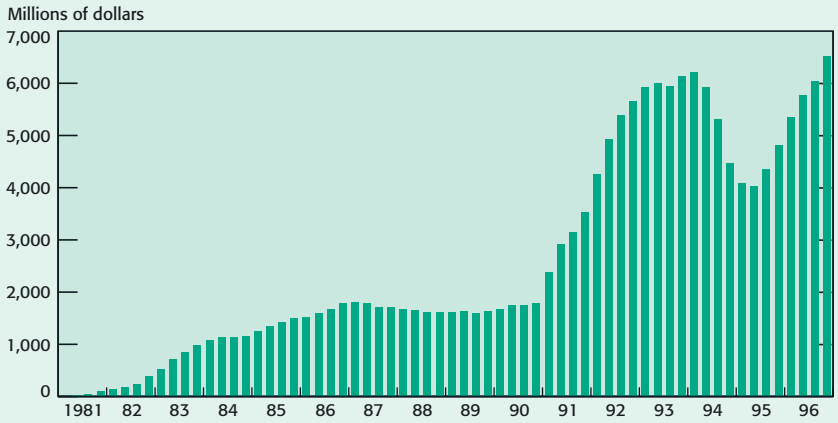
Borrowed Reserves

Three basic types of collateralized credit—adjustment credit, seasonal credit, and extended credit—may be made available to banks and other depository institutions at the discount window.

Adjustment Credit. A bank can use adjustment credit when it comes up short in its efforts to meet its reserve requirement or when it would otherwise run an overnight overdraft. Banks are instructed to make a good-faith effort to

Box A *(Continued)*

Chart 4. **Required Clearing Balances**
Quarterly Averages



Source: Board of Governors of the Federal Reserve System.

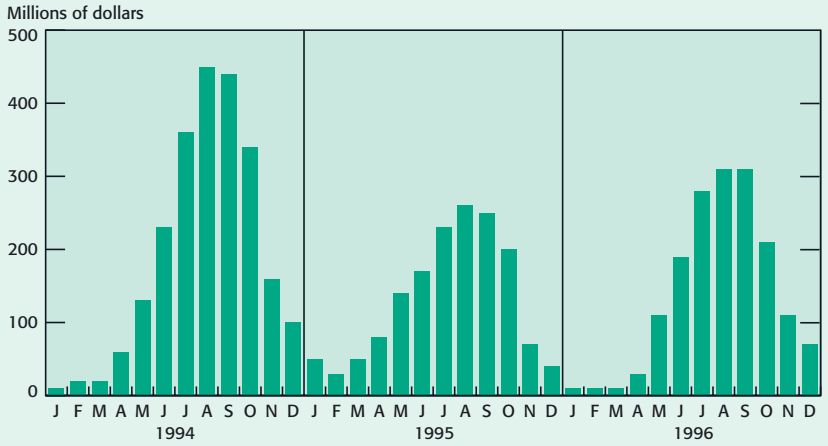
obtain the reserves from other sources before borrowing from the discount window; they could, for example, attempt to purchase Federal funds from another bank as long as they discover the need before Fedwire closes at 6:30 p.m. eastern time. (Banks can borrow at the discount window for a few hours after Fedwire has closed.) The Federal Reserve extends adjustment credit for one or at most a few business days at the basic discount rate and discourages prolonged or frequent use. Thus, when a reserve shortage forces borrowing to rise sharply, the Federal funds rate is likely to rise as well because of the banks' efforts to obtain reserves from other sources. Banks also must demonstrate that they are not relending the borrowed funds to other banks. Banks and thrift institutions eligible to borrow from a Federal Home Loan Bank may also use adjustment credit, but normally they would meet anticipated needs through Federal Home Loan Bank advances. Adjustment borrowing is generally subject to the basic discount rate established by the Reserve Banks' Boards of Directors and approved by the Board of Governors.[19]

Seasonal Credit. Under the seasonal borrowing program, small banks with a significant seasonal pattern to their lending can borrow modest amounts for a more lengthy period during that portion of the year when their lending is regularly high. Indeed, this borrowing has a strong seasonal pattern because many users are agricultural area banks that face their greatest credit demands over the spring and summer (Chart 5). Because these banks are small, the Federal Reserve assumes that they have limited access to funds in the national money markets. If the bank is eligible to use the program at that time of year, the discount window officers will not require the same justifications that apply to requests for adjustment borrowing.

Since 1992, the discount rate charged for seasonal borrowing has been linked to monthly average Federal funds and certificate of deposit rates, with

Box A *(Continued)*

Chart 5. **Seasonal Borrowing**



Source: Board of Governors of the Federal Reserve System.

the basic discount rate serving as a floor. Consequently, incentives to use seasonal borrowing no longer vary with spreads between the funds rate and the basic discount rate. Nonetheless, seasonal borrowing shows some cyclical variation, rising in years when credit demands are particularly strong.

Extended Credit. Extended credit borrowing represents loans to depository institutions experiencing unusual financial difficulties. An institution in this program generally is unable to borrow additional funds from normal market sources. Hence, its dependence on Federal Reserve credit is likely to last until its basic problems are resolved—for example, through an acquisition, an infusion of additional capital, its closure, or some other action by its insurer. While in the program, banks are permitted to borrow without the normal pressures to repay promptly. Soon after the borrowing begins, the interest rate is set 50 basis points above the market-based discount rate charged for seasonal borrowing, making the cost to the troubled institution slightly higher than prevailing market rates.

Since the last heavy use of the program, in 1990, legislation has imposed some limitations. Legislators were concerned that a failing institution might be kept open by Federal Reserve credit for a prolonged period. While it remained open, losses could grow while uninsured depositors could flee, thus increasing potential burdens to the insurance system or the taxpayers. Therefore, under the Federal Deposit Insurance Corporation Improvement Act of 1994 (FDICIA), the Federal Reserve is encouraged to limit the length of such loans.[20]

For reserve path purposes, adjustment and seasonal credit together constitute borrowed reserves. Extended credit borrowing was not included in the path level of borrowing because of its special characteristics. The choices were made when borrowing was playing a bigger role in the policy process. Adjustment credit borrowing was included in the borrowed reserve measure because it was related to the spread between the Federal funds rate and the

Box A *(Continued)*

discount rate. Limitations on banks' use of this type of credit forced the Federal funds rate to rise until the discount window alleviated the reserve shortage. Seasonal borrowing was included because it had seemed to respond to changes in reserve pressures in a fashion similar to adjustment credit. (At the time, it was subject to the basic discount rate, so spreads to market rates varied along with those on adjustment borrowing.) For a number of years, no clear seasonal pattern to the sum of adjustment and seasonal borrowing was evident, despite the strong pattern to seasonal borrowing, apparently because adjustment borrowing was dominant. Beginning in the late 1980s, however, seasonal borrowing has often constituted a large share of the total, and its seasonal pattern has shown through to the combined measure.

Nonborrowed Reserves

Nonborrowed reserves can most easily be described as the portion of total reserves provided to depository institutions through any means other than the discount window. Past open market operations, which will have established the size of the System's portfolio of Treasury and federal agency securities, are the primary source of nonborrowed reserves. However, nonborrowed reserves can also be provided or absorbed by a number of factors besides changes in the portfolio. Most of these consist of Federal Reserve balance-sheet items not under direct Federal Reserve control (Box B). The formal definition of nonborrowed reserves does not include extended credit borrowing, although the definition used for reserve path construction does.

Box B

Forecasting Factors Affecting Reserves

Currency

Over time, currency demands represent the largest net drain on reserves of any of the factors and have been responsible for much of the growth in the System's portfolio of government securities. Banks replenish currency holdings to handle cash withdrawals by obtaining currency from the Federal Reserve. The Fed debits the banks' reserve accounts. When banks acquire more currency than they wish to hold, they return the excess to the Federal Reserve and receive a credit to their reserve account. To keep reserve balances from falling or rising as a result of the currency withdrawals and returns, the Federal Reserve would normally adjust reserves through open market purchases or sales of government securities unless some other factor was providing an offsetting add to or drain of reserves.

Part of the upward trend to currency reflects the nominal expansion of domestic economic activity. Credit cards and other electronic means of payment have reduced the amount of currency needed for a given volume of payments, but the spread of automated teller machines has increased currency use for transactions. A large portion of the currency growth in the last decade or more, however, has reflected demand for use abroad. Some countries' residents seek U.S. dollars because of bad experiences with inflation in their home currency or lack of confidence in the local government. Sometimes U.S. dollars have been acquired mostly as a store of value, while in other cases they have also been used for local transactions. Some demand seems to come from countries whose own currency is considered stable. Apparently, that demand arises because of the international nature of the U.S. dollar more generally, a topic described in Chapter 9.

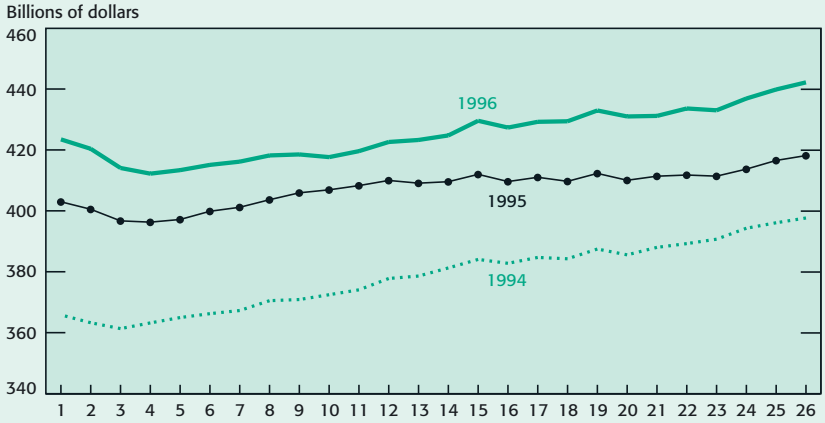
The heavy use of currency abroad provides valuable seigniorage revenues to the Treasury, but it has complicated the process of forecasting currency changes.[21] Those demands have not followed any clear-cut patterns either in terms of average growth rates or short-term variation. They have sometimes obscured the short-term repetitive patterns in the domestic figures and have made forecasting more difficult. Nonetheless, some patterns can still be observed that arise from regularities in payments and receipts and from seasonal variation in currency use (Chart 6). For instance, the demand for currency rises during the summer vacation travel period and around major holidays.

Treasury Cash Balances

Although the Treasury's balance at the Federal Reserve changes little over the year as a whole, it is the reserve factor that shows the most variation from one reserve maintenance period to another. Increases in the Treasury's cash balance at the Federal Reserve absorb reserves since they involve a transfer of funds from the banking system to the Federal Reserve, while declines in the Treasury's balance provide reserves to the banks. The Treasury attempts to keep a steady working balance at the Federal Reserve for making its payments,[22] and it places additional cash in so-called Treasury tax and loan note option, or TT&L, accounts at depository institutions that have agreed to accept them.[23] Each morning, the Treasury, the New York Reserve Bank, and the Board staffs evaluate the estimated flows through the Treasury's Fed account. The Treasury may decide to transfer funds to the Fed by making a "call" on the TT&L accounts if estimates suggest its balance would otherwise be below the target balance or to transfer funds to the TT&L accounts by making a "direct investment" to the accounts if the estimated balance would otherwise be higher than desired.[24]

Box B *(Continued)*

Chart 6. **Currency in Circulation**
Maintenance Period Averages



Source: Board of Governors of the Federal Reserve System.
Note: Data are not seasonally adjusted.

The banks must pay interest on the TT&L accounts at a rate one quarter of a percentage point below the weekly average Federal funds rate and must hold collateral against them. Because of these requirements, the participating banks place caps on the amount of Treasury balances they will accept. At times when the Treasury is particularly flush with cash, such as after some of the major tax dates—those in the middle of January, April, June, and September—its cash balances may exceed the capacity of the TT&L accounts to a considerable degree. The excess cash will lift the balance at the Federal Reserve (Chart 7).[25] As the funds flow from the commercial banks to the Fed, they drain reserves. Once the Treasury spends the money, the Treasury's balance at the Fed falls back to normal levels, adding to reserves.

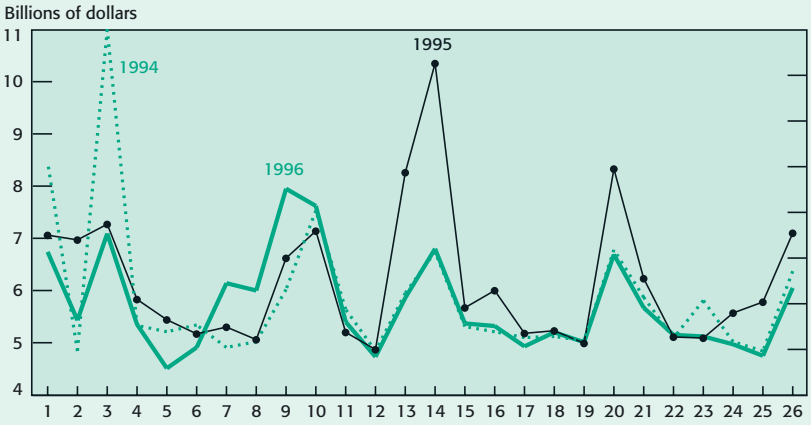
Errors occur in the day-to-day forecasts of the Treasury balance because it is not possible to estimate precisely the level or timing of the myriad receipts and expenditures of the federal government. Most of the time, a single day's error has only a modest effect on the average level of nonborrowed reserves over the two-week reserve maintenance period because the Treasury will adjust the size of the next day's call or direct investment in order to bring the balance back to the normal target level. When total Treasury cash exceeds the capacity of the TT&L accounts, however, unexpected changes in flows, such as higher or lower receipts than forecast, will affect the level of the Treasury's balance at the Federal Reserve not just for a day or two but until the total cash balance drops below the TT&L capacity again, a development that may take a couple of weeks. The resulting reserve effect will be magnified.

Federal Reserve Float

Federal Reserve float is generated when checks are processed more slowly than specified in a preset schedule for crediting the banks presenting the checks. When the presenting bank's reserve account is credited before a corresponding debit is made to the account of the bank on which the checks are drawn, two banks will

Box B *(Continued)*

Chart 7. **Treasury Balances at Federal Reserve Banks**
Maintenance Period Averages



Source: Board of Governors of the Federal Reserve System.

simultaneously have the same reserves credited to their respective accounts. Thus, float is a source of reserves. Float declined dramatically in the early 1980s because the Fed worked to discourage it under the terms of the MCA (Chart 8). In 1983, the Federal Reserve started charging the banks explicitly for the float they generate.

Float has become more predictable as forecasters have gathered more information about delivery and processing of checks. Nevertheless, float occasionally jumps unexpectedly—most commonly when bad weather interrupts normal check delivery (Chart 9). Interruptions to the Fed's wire transfer system can also create or reduce float. Errors introduced by incomplete or misdirected wire transfers are corrected afterward with so-called as-of adjustments. If the problem is not completely resolved before the end of the maintenance period, the adjustment may be made in a later period, thus affecting each period's reserve availability. Efforts have been made to minimize the unpredictable component of as-of adjustments.

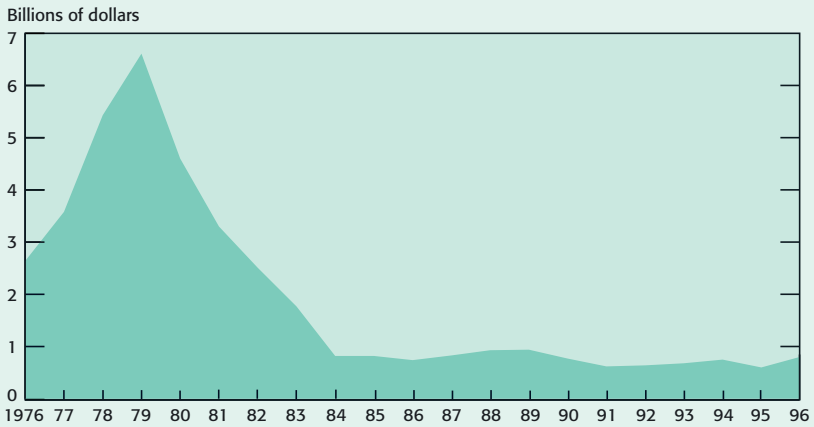
Foreign Exchange Intervention

In the United States, foreign exchange transactions are not undertaken for the purpose of affecting reserves. Nonetheless, foreign exchange developments can change reserve levels. Those effects must be considered along with other market factors. When the Federal Reserve intervenes in the foreign exchange markets, it either buys dollars—draining reserves—or sells dollars—adding reserves. The reserve absorption or provision from the purchase or sale of dollars usually occurs two business days after the intervention. Generally, intervention is arranged on behalf of both the Federal Reserve and the Treasury. The Federal Reserve's portion of the intervention will add or drain reserves when the payments are made.[26]

The reserve impact of the Treasury portion will depend upon how the Treasury pays for its intervention. If the Treasury follows its standard procedure and pays out either dollars or foreign currencies from the Exchange Stabilization

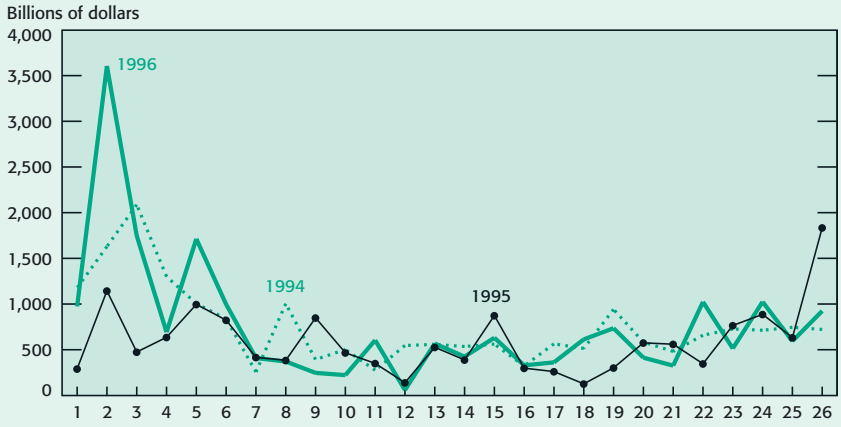
Box B *(Continued)*

Chart 8. **Annual Average Federal Reserve Float**



Source: Board of Governors of the Federal Reserve System.

Chart 9. **Federal Reserve Float**
Maintenance Period Averages



Source: Board of Governors of the Federal Reserve System.

Fund (ESF), the intervention will generally have no reserve impact. The potential injection or withdrawal of dollars will be offset by adjustments to the size of the call or direct investment made by the Treasury. (When the TT&L accounts are at capacity, however, the intervention will change the Treasury's Federal Reserve balance and therefore will affect reserves until the TT&L balances fall back below capacity.) Occasionally, the ESF does not have sufficient dollars available to cover a sale. In that circumstance, it may issue Special Drawing Right (SDR) certificates to the Federal Reserve against SDRs obtained from the International Monetary Fund. This "monetization" of SDRs adds reserves. If the Treasury acquires dollars from

Box B *(Continued)*

the Federal Reserve by placing foreign currencies with the Fed (with an agreement to buy them back at the same exchange rate) in what is known as a warehousing transaction, the warehousing will add reserves as the Treasury pays out the funds.[27] The Treasury will reduce its TT&L calls when it receives funds from an SDR certificate monetization or warehousing that exceeds its immediate intervention needs.

Reserve levels are also affected by the monthly revaluation of Federal Reserve holdings of foreign currencies to reflect changes in exchange rates. The Federal Reserve recognizes income from this source when the foreign exchange value of its foreign currency balances appreciates. The Fed remits this income to the Treasury each week, allowing the Treasury to call in less cash from the banks. Losses are recognized when the Fed's foreign currency balances depreciate in value, thus reducing the Fed's weekly payments to the Treasury and increasing the need for TT&L calls. (If losses on foreign currency holdings exceed the week's profits from earnings on the securities portfolio, the Federal Reserve will make no payment to the Treasury until the losses have been covered.)

Transactions by Foreign Official Institutions

Many foreign central banks hold demand deposits at the Federal Reserve for execution of various dollar-denominated transactions. Transfers of funds into these accounts from commercial banks drain reserves. Because the central banks are not paid interest on these demand deposits, however, they try to keep them down to an essentially steady working balance. The ultimate reserve effect of an inflow of dollars to a central bank account depends on how the central bank invests the receipts. If the funds stay within the Federal Reserve, the inflow drains reserves. The most common way for the funds to stay within the Fed is for the foreign account to arrange a repurchase agreement (RP) on which it earns interest, with the Fed acting as counterparty. From the Federal Reserve's perspective, this transaction is a matched sale-purchase agreement (MSP). The Fed arranges MSPs with the foreign accounts when their cash buildup is expected to be temporary. The reserve forecasts routinely allow for the drain from the inflow of funds to the Federal Reserve and their arrangement as MSPs, since they occur every business day. Hence, on those occasions when the Desk passes through part of the foreign investment orders to the market as customer-related RPs, the RPs, in a sense, add reserves since the drain has already been factored into the assumptions about reserve levels. The Desk must estimate how large the foreign RP orders will be in the coming days. Although the central banks attempt to predict large flows into or out of their accounts, their estimates are often wide of the mark. Unexpected variations in the flow of central bank RP orders can cause errors in the reserve forecasts.

If a central bank expects a rise or fall in its cash holdings to persist, it may ask the Federal Reserve to make an outright purchase or sale of Treasury securities on its behalf. In contrast to the RP orders, these operations are routinely arranged in the market. If payment for these transactions comes into the Federal Reserve and flows out again on the same day, there is no reserve impact. At times, the Desk will be the counterparty to these transactions if they serve its reserve management needs. In these situations, the transactions will have the same reserve impact as an outright purchase or sale in the market, discussed in Chapter 7.

Box B *(Continued)*

Other Factors

Also affecting reserves are a number of other balance-sheet items such as interest accruals and remittances of profits to the Treasury. For the most part, however, forecasting these factors is reasonably straightforward. Gold holdings of the Federal Reserve affect reserves, but the volume of reserves would change only if the Treasury altered the amount of certificates issued to the Federal Reserve because its gold holdings changed or if the official price of gold was changed. Occasionally, the Treasury makes small adjustments to the certificates outstanding, reflecting transactions that affect its gold holdings. As of December 1996, the Federal Reserve held certificates representing almost 262 million troy ounces of gold, worth about $11.05 billion at the official price of $42 2/9 per troy ounce. (The price was last changed in 1973.)

Chapter 7

The Conduct of Open Market Operations

The Framework of Reserve Management

The Manager of the System Open Market Account, supported by other Trading Desk personnel, develops a strategy for bringing actual nonborrowed reserves in line with the nonborrowed reserve path over the two-week reserve maintenance period. Working out plans for adding or draining reserves to achieve the nonborrowed reserve path is partly an "art" requiring skill and experience in accounting for the many diverse factors affecting reserves. Desk personnel must assess the prospective as well as the current estimated reserve situation. To achieve bank reserve levels that balance reserve supplies with demands, Desk personnel focus both on the average nonborrowed reserve path over the two-week reserve maintenance period and on the day-to-day distribution of reserves.

In developing daily plans, the Manager must deal with both variability and uncertainty about bank reserves. Short-term variation in reserve supplies and demands from factors other than open market operations, described in Chapter 6, Box B, is substantial (Chart 1). In 1996, for example, the System's securities portfolio rose an average of about $700 million per two-week reserve maintenance period. (The increases supported currency, which expanded by an average of $870 million per period. Nonborrowed reserves actually fell about $300 million per period on average.) However, during the same year, the average absolute change in reserve availability attributable to operating factors (including currency) from one reserve maintenance period

to the next was, at $2.5 billion, almost four times as large; the biggest change was $9.1 billion. ("Absolute" means changes without regard to whether they are positive or negative.) A large portion of temporary open market operations served to offset this variability. The operations reduced average period-to-period changes in nonborrowed reserves to about $1 billion. Much of the residual change in nonborrowed reserves accommodated seasonal variation in required reserves (Chart 1).

Further complicating open market strategy are the difficulties in estimating reserve factors and the inevitable forecast errors that result. Average absolute errors of operating factor estimates made at the start of each maintenance period were about $930 million for 1996, with a peak one-period error of $2.5 billion. Comparable errors for required reserve estimates averaged around $350 million.[1]

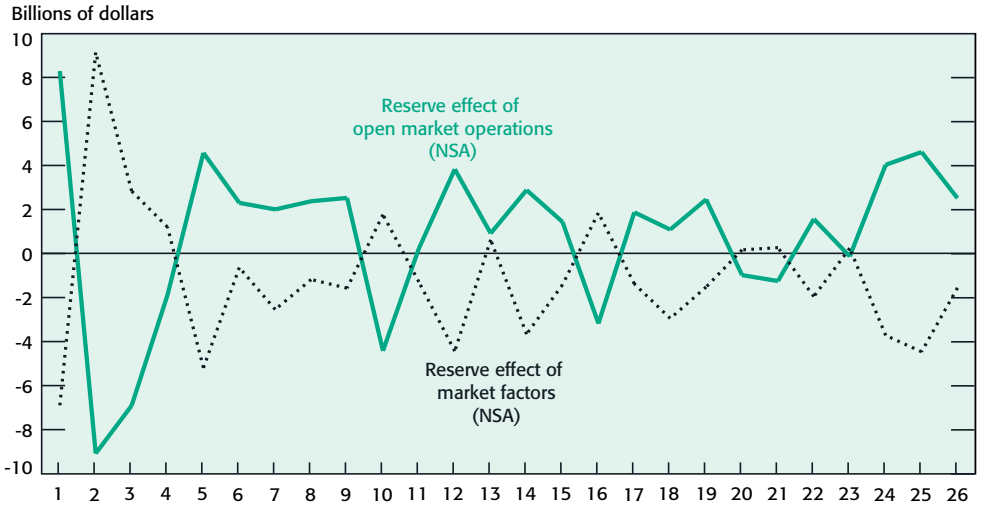
Each day the projections staff presents participating officers and staff with a summary of the reserve estimates and some indication of areas where the risk of revisions is high. The Manager or a designated officer must decide whether to add or drain reserves "permanently" by buying or selling securities outright or temporarily by providing or draining reserves through an operation that reverses itself in one or a few days. The reserve management strategies of depository institutions (banks) are also taken into consideration. For instance, banks may show a preference for excess reserves that are higher or lower than their regular patterns. These preferences will affect the relationship between the demand for reserves and the behavior of the Federal funds rate. In choosing each day's operation, the Desk weighs both the action indicated by the reserve projections and the margins for error. The first concern is to achieve reserve levels consistent with the average nonborrowed reserve path for the maintenance period. The second concern is to make sure reserve levels do not get very far out of line with the objective on individual days during the period. The emergence of low average required reserve balances, discussed in Chapter 6, has increased the importance of the individual days' balances.

Tools of Open Market Operations

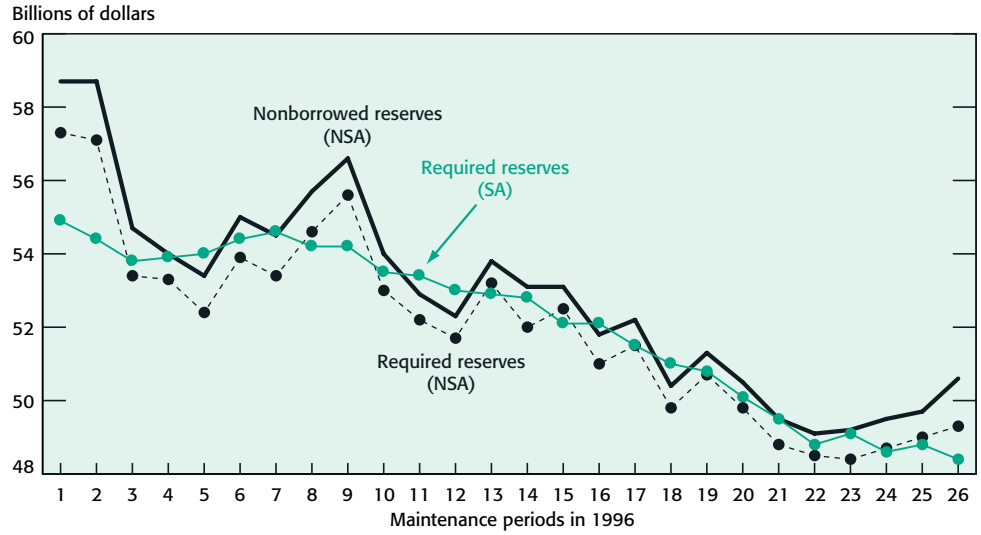
The Desk uses the System's portfolio to achieve its reserve objectives. The Federal Open Market Committee (FOMC) spells out the Manager's authority in a special directive, which is usually reviewed at the first FOMC meeting of the year and may be amended as necessary. (The authorization is published in the *Federal Reserve Bulletin* with the minutes for the FOMC meeting at which it is reviewed.) It authorizes outright transactions at

Chart 1. Reserve Measures and Open Market Operations
By Reserve Maintenance Period

Panel A: Reserve Effects of Market Factors and Open Market Operations



Panel B: Selected Reserve Measures



Source: Board of Governors of the Federal Reserve System.

Notes: Reserve data are not adjusted for changes in reserve requirements. Nonborrowed reserves include extended credit borrowing.

market prices in Treasury and federal agency securities with securities dealers and with official foreign and international accounts maintained at the Federal Reserve Bank of New York. As Chapters 2 and 5 explained, the authorization includes a limit on the net change permitted in the System's outright portfolio in the interval between meetings—routinely $8 billion during l996. The Manager may request a temporarily expanded leeway if staff estimates of likely reserve movements over the upcoming inter-meeting period, prepared before each meeting, suggest the need. Because this leeway for portfolio changes between meetings has long since ceased to be the key indicator of Committee policy preferences, the Manager's requests for an increase are generally approved routinely by the FOMC. The FOMC also authorizes the Desk to make repurchase agreements (RPs) involving the same types of securities for periods of up to fifteen days for the New York Reserve Bank's account. When conducting RPs in the market on behalf of official foreign and international accounts, the Desk interposes the New York Reserve Bank's account between the foreign accounts and the market.[2]

1. Outright Purchases and Sales

In buying and selling securities, the Manager of the System Open Market Account functions within a framework of Federal Reserve–Treasury relations that has evolved to keep monetary policy and debt management separate. Currently, the degree of separation between Treasury operations and the Federal Reserve far exceeds that of the early years of the System. As indicated in Chapter 2, the Treasury–Federal Reserve Accord of 1951 freed the Federal Reserve from the obligation to support prices in the secondary market and gave it the ability to use open market operations for its monetary policy objectives.

The Federal Reserve makes all additions to its portfolio through purchases of securities that are already outstanding. The Federal Reserve Act does not give the System the authority to purchase new Treasury issues for cash.[3] In a refunding, the System cannot subscribe for a larger amount of the issues offered than the amount of the maturing securities it holds. Because the portfolio has had an upward trend, the Manager has normally rolled over the System's maturing securities so as to avoid the drain that would occur if they matured without replacement. Securities are rolled over by submitting noncompetitive tenders at the auction. The System receives the average auction rate.[4]

The Manager can, however, reduce the System's portfolio by redeeming a part of the maturing holdings. To do so, the System bids competitively for the amount it wants to redeem at a higher

rate than the Treasury is likely to accept. The Trading Desk occasionally redeems a modest portion of its maturing three- and six-month Treasury bills as a means of absorbing reserves. The Desk has rarely run off coupon issues deliberately, although it did run off modest amounts in 1989, the only time since 1957 that the portfolio declined over the year. (The portfolio was reduced to offset reserve provision from heavy purchases of foreign exchange. At the time, the Desk had already cut back bill holdings considerably.) In some instances, the Treasury has changed its debt management procedures so that no replacement security has been issued at the time the old one matured. In these instances, the Desk has had to redeem securities.[5] Runoffs have also occurred when the Treasury has paid down maturing securities because legislative authority to issue new debt was temporarily exhausted. When such drains are inconsistent with the reserve picture, they are offset through purchases in the secondary market.

When arranging outright open market operations in the secondary market, the Manager faces key choices involving the timing, amounts, and types of securities to be bought or sold and the counterparties for the transactions. The timing of outright activity depends principally on the extended outlook for nonborrowed reserves. The Manager generally executes outright purchases (or sales) of Treasury debt in the market at times when the estimated need (or surplus) is expected to be large—at least several billion dollars in each upcoming maintenance period—and to extend a few periods into the future. A reluctance developed over the years to address small reserve shortages or excesses of brief duration with outright operations, which entail greater costs in terms of resource utilization to execute and can be affected by market price changes. Once a sustained need for a reserve adjustment is forecast, the precise timing of the operation must be chosen. The Desk has preferred to avoid operations when markets are thinner than usual. The recent decision to split Treasury coupon purchases into smaller operations (described below) reduced their potential to disrupt the markets and raised timing flexibility.

In arranging outright market transactions, the Manager chooses whether to operate in Treasury bills or Treasury coupon securities (notes and bonds). Both markets are sufficiently broad to accommodate Desk purchases.[6] In particular instances, one market may seem a better choice because of a special factor. For example, if the Treasury were retiring bills because of seasonally heavy receipts, market scarcities could develop, making coupon purchases appear preferable. The Desk has not sold coupons in the market but

has sold bills. With the portfolio generally rising, sales from the portfolio have been rare in the 1990s.[7]

In choosing which type of securities to buy, the Manager also considers the impact of the purchases on the structure of the System's portfolio. Chapter 2 reviewed some of the factors that have driven portfolio decisions. One concern is making sure that contingent needs for liquidity can be met. While the portfolio has rarely been reduced for extended periods or by large amounts since the 1951 Accord, a range of events, each with a low probability, could require substantial sales from the portfolio over a relatively short period. Such events include a banking crisis that involved heavy reserve provision by the discount window, a reflow of currency because of changed usage in the United States or abroad, or sizable intervention purchases of foreign exchange. Treasury bills, with their short maturities, can be easily sold or redeemed and provide such liquidity. Coupon issues can be redeemed, but market sales could prove difficult under some circumstances.

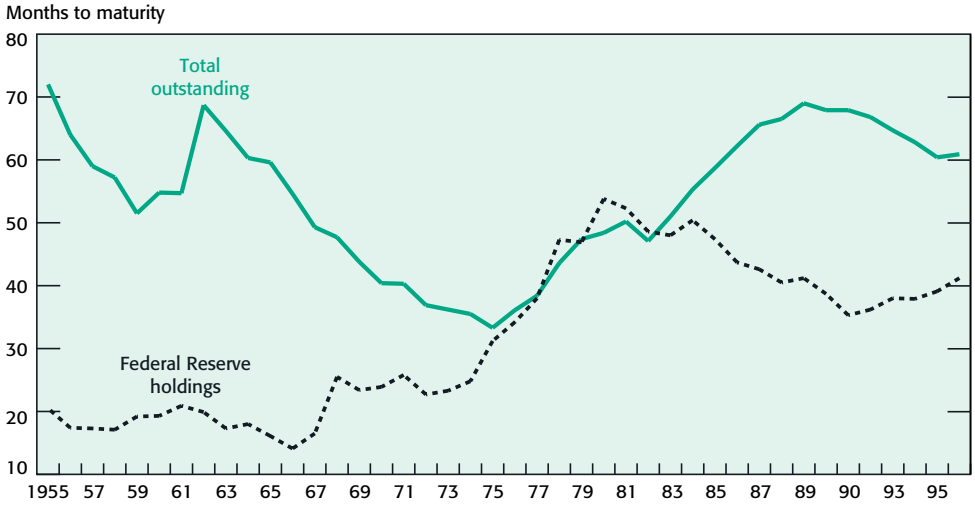
In addition to liquidity needs, another preference has been for the System portfolio to contain securities from the full range offered by the Treasury. Such an approach reduces the chances that the Federal Reserve's purchases of securities will work at cross purposes to the Treasury's debt management efforts. It also means that the Federal Reserve has a range of securities available that it could lend to dealers in a crisis (against collateral) to ease settlement problems that could otherwise disrupt the functioning of the securities markets.

The Continental Illinois National Bank crisis in 1984, described in Chapter 2, encouraged the FOMC to seek a gradual buildup in the liquidity of the portfolio through a modest leaning toward bills in its outright purchases and toward shorter term coupon issues in purchases and rollovers. In 1992, the FOMC decided that the degree of liquidity had risen to comfortable levels. Going forward, it preferred to see the average maturity of the System portfolio remain more or less steady, as long as that was consistent with retaining plentiful liquidity. Thereafter, the average maturity crept up slightly, to forty-one months by the end of 1996, at the same time that the Treasury was shrinking the average maturity of its debt outstanding. At year-end 1996, Treasury marketable debt outstanding had an average maturity of sixty-three months (Chart 2). The portfolio is large enough that the average maturity changes slowly. Outstanding issues shorten in maturity with the passage of time, although rapid rollovers of bills keep their average maturity fairly steady. With coupons, some effort is required to offset the shortening of existing holdings. Average maturities have been held

in a narrow range since 1992 in part by making close to half of outright purchases in coupon issues with a maturity mix that was fairly similar to those of the Treasury's outstanding securities.

When the Trading Desk executes outright purchases or sales in the market, it selects from among the dealers' offers or bids to achieve the highest or lowest yields to maturity in relation to the prevailing yield curve. The System tends to buy issues that are plentiful in the market since those are likely to be offered at the highest relative yields. When the Desk buys Treasury bills, it generally solicits offers for the full range of bills outstanding (fifty-two at the end of 1996). It used to follow that approach for Treasury coupon issues as well, but the huge number of coupon issues outstanding (208 at the end of 1996) made coupon purchases slow and cumbersome.[8] Because dealers are at risk from price changes that occur between the time they submit their offers and the time the Desk responds, the long processing time made dealers more cautious in their participation. In 1995, the Desk began making coupon purchases from small sections of the coupon curve at a time and was able to reduce processing time dramatically. The Desk still buys across the entire curve, but transactions could occur over an interval of days if, for example, the Desk were addressing a large need, or over a longer period if, for example, the reserve need built more gradually.

Chart 2. **Weighted-Average Maturity of Marketable Treasury Issues**



Sources: Federal Reserve holdings data are from the Board of Governors of the Federal Reserve System; total outstanding data are from the U.S. Treasury Department.

Because most of the operations occur at times of predictable seasonal swings in reserve needs, the dealers will often have anticipated and prepared for these operations in their positioning of securities. Occasionally, an operation may surprise the market if the reserve factor movements calling for it were atypical. Rate movements may be a bit larger than otherwise when there is an outright operation, but they are generally modest. A Desk bill purchase on a particular day may run around 10 to 15 percent of that day's market volume of bill trades with customers, although a large transaction may be above 20 percent.[9] Coupon operations generally represented similar shares when they were arranged as single operations.[10]

In addition to its transactions in the market, the Trading Desk has the option to buy Treasury securities from foreign official accounts on any day the accounts are selling or to sell issues from its own portfolio to meet the buy orders of such accounts. These trades give the Desk a means of adding or draining relatively modest amounts of reserves more gradually than with a market operation. The foreign orders are generally modest in size—from a few million dollars to several hundred million dollars—so purchasing (or selling) the whole order is usually consistent with reserve goals. When the market trading patterns show an issue to be in short supply or if System holdings of the issue are especially large, however, the Desk will generally skip that issue in its purchases. Transactions with foreign accounts are put through at the middle of the latest bid and asked rates in the market. Sometimes, foreign buy and sell orders may be arranged between two foreign accounts that have purchase and sale orders of matching maturities. The Desk will execute the balance of the orders in the market.

2. Temporary Transactions

In managing bank reserves, the Manager finds it very helpful to put reserves in or take them out in large volume for one day to a few days at a time. The Desk relies heavily on temporary reserve operations in dealing with the uncertainties that affect bank reserves. Even when the reserve forecasts on the first day of the maintenance period indicate no need for System action, reserves may actually turn out substantially higher or lower than projected. RPs and matched sale-purchase agreements (MSPs) enable the Desk to respond quickly when reserves fall short of desired levels or prove excessive. Furthermore, a need or an excess may be concentrated on certain days within the period, and temporary transactions can help to smooth the daily pattern of reserve positions.

An example can illustrate an advantage of RPs. Suppose that the forecast suggested that nonborrowed reserves would be in short supply for the next three days but would be close to their desired level for several days thereafter. The Desk could provide the needed reserves by buying Treasury bills outright for settlement on the day the need for reserves arose and selling bills from the portfolio when the additional reserves were no longer needed. However, such an approach on a regular basis would involve considerable transaction costs. The Desk could more easily accomplish a temporary reserve adjustment with a single RP operation rather than two outright transactions. The dealers would provide the Fed with their selection of eligible securities on the day the operation is undertaken and return the money to receive their securities again on the maturity date of the contract. Eligible collateral includes not just bills but Treasury coupon and federal agency securities held by both dealers and their customers.[11]

The large range of collateral and the low market risk mean that the RP market is huge, allowing the Desk to conveniently undertake bigger operations through RPs than through outright purchases.[12] To some extent, collateral offered to the Desk reflects the availability of securities being financed from day to day. This factor in turn depends partly on floating supplies from recent Treasury sales and on positioning strategies of dealers and others active in the RP markets. If market participants anticipate that interest rates will soon decline, they tend to add to their positions. Collateral becomes plentiful and the RP rate rises relative to the Federal funds rate. When higher rates are anticipated, dealer positions are cut back sharply and the RP rate may fall.

RPs may have maturities ranging from overnight to fifteen days.[13] Multiday RPs may be fixed for the full term of the agreement or may permit the parties to withdraw from the contract before the maturity date. Technically, both the Desk and the dealer may terminate a withdrawable RP early, but in practice, the Desk has not exercised its option. Withdrawable RPs used to be the dominant form of multiday RPs employed by the Desk, but since 1993, fixed contracts have been used more frequently. The early withdrawal option was long a standard feature of RPs, at first because RPs were undertaken at the dealers' initiative, as described in Chapter 2. The feature was retained when RPs became an active open market policy tool, partly because dealers liked the flexibility and were encouraged to participate in RP operations.

Withdrawals are permitted up to a specified time prior to the routine execution of temporary open market operations. Before 1997, open market operations were normally arranged at 11:30 a.m.

eastern time, and withdrawals could be made up to 11 a.m. But in 1997, the Desk's normal market entry time was advanced closer to 10:30 a.m., and the cutoff for withdrawals was moved to 10 a.m. Before 1990, withdrawals had been permitted until l p.m., which meant that the Desk did not know the total withdrawals before it had to decide on that day's open market operation.

In some cases, the dealers' early withdrawals have worked to the Desk's advantage. If during its term an RP turned out to have been too large, such that aggregate nonborrowed reserve levels exceeded bank demands, early withdrawals by the dealers could reduce or eliminate the surfeit. Plentiful reserve levels have generally encouraged the Federal funds rate to fall, a decline that in turn has encouraged a lower RP rate. Dealers would respond by arranging a new RP with another counterparty at the lower rate and withdrawing from the RP with the Federal Reserve.

Nevertheless, the withdrawal feature has sometimes made the job of maintaining desired reserve levels more difficult. Withdrawals have often been made even when reserves were scarce. The funds and RP rates may have dropped because a Treasury coupon delivery date has passed, or because some other factor has reduced financing pressures. Dealers sometimes withdraw to meet delivery commitments even though the RP rate may still be firm. Furthermore, as was indicated in Chapter 4, the spread between the RP rate and the Federal funds rate varies considerably. Hence, the RP rate could soften even when the funds rate was still firm. Thus, the Desk may prefer to use fixed-term RPs when the risk of over-adding reserves is small. The Desk has found that dealers have been willing participants in fixed-term operations.

As Chapter 6 indicated, many foreign official and international accounts place a portion of their dollar holdings in a daily RP investment facility provided by the Federal Reserve Bank of New York. The Desk's handling of these orders determines their reserve effect. The Desk has had the choice of arranging the RP orders internally, executing an overnight MSP using its portfolio, or passing the orders through to the market as a customer-related RP. The first option results in a reserve drain because the funds received by the foreign account from a commercial bank remain with the Fed. The reserve projections allow for this drain on the assumption that the investment orders will be arranged internally. Consequently, should some of the orders instead be passed through to the market as customer-related RPs, they would add reserves relative to the projected level.[14]

Through 1996, the choice between a System RP and a customer-related RP depended largely on the magnitude and

duration of the reserve injection that the Desk wanted to accomplish. Customer RPs were routinely arranged to mature on the next business day, since participation in the foreign RP pool changes each day. Customer RPs had to be limited in volume because they could not exceed the total funds available to foreign accounts for investment. The choice of customer-related RPs often indicated that the estimated reserve need was modest, a message that was conveyed to the market by including the intended size of these operations in the announcement to the dealers.[15] When the reserve need was large or likely to persist for a number of days, the Manager was more likely to choose System RPs. In December 1996, the Desk indicated that, beginning in 1997, customer RPs would no longer be used routinely to add reserves. In connection with this change, the Desk also indicated that it would begin to make public the par value of accepted propositions on all of its market operations immediately after the operations were completed.

When the Manager wants to absorb reserves for one or a few days, MSPs with dealers provide a convenient mechanism.[16] In an MSP, the Desk sells Treasury bills from the System Account for immediate delivery and simultaneously buys them back for delivery on the date specified. This procedure provides securities to be financed for one or a few days, making it unnecessary for dealers to increase their positions at risk of loss from a price drop. While MSPs are just the reverse of an RP in their effect on reserves, their form is different. Technically, they encompass two separate outright Treasury bill transactions. With the portfolio generally expanding in recent years, MSPs have been used less frequently than RPs. Typically, however, they have been helpful early in the year when reserves and currency have shown a temporary seasonal decline and for other short-lived events that cause an abundance of reserves. MSPs are not subject to withdrawal because they are literally matched outright transactions with specified delivery dates.

A Day at the Trading Desk

The working day in the open market area has a regular rhythm. The morning is filled with information-gathering activities to prepare for the day's policy decisions. The forecasting staff analyze new information affecting the behavior of reserves. Trading room staff cover RP and Federal funds markets to get a sense of likely trading patterns and potential dealer partici-

pation in any Federal Reserve RP operation. Others follow the broader securities markets and develop a general understanding of forces at work, paying particular attention to any factors that might affect open market operations. By the time of the morning conference "call," where the plan of action is presented to an FOMC member and senior Board staff members, the market information will have been synthesized and pulled together to explain price movements and sentiments. The reserve forecasts are presented to explain the Desk's course of action. Then, if the Manager decides to arrange an open market operation, Trading Desk personnel carry it out. The afternoon is spent on more information gathering, telephone meetings with a couple of primary dealers, market analysis, and the preparation of written and oral reports.

1. Early Morning Activity

At the Trading Desk, a staff member talks with contacts in Europe beginning around 7 a.m. eastern time. These conversations provide insights into how U.S. Treasury debt and other dollar-denominated debt have been trading in European markets. When speaking with the European contacts, the person also typically discusses trading activity in Asia that day. (Trading in Asia has ended by that time. When the European trading day begins, activity in Asia is in progress, allowing European traders to speak directly with their Asian counterparts.) Information from contacts about overseas developments in U.S. dollar instruments is supplemented by reviewing reports on the electronic news services. Trading in New York can begin at any time, but it generally starts around 7:30 a.m. Usually, most activity remains focused on European and Middle Eastern customers for a while, but the balance gradually shifts toward U.S.-based customers. The U.S. markets are fairly active around the time when economic data reports are released, often at 8:30 a.m. eastern time. A flurry of trading will follow any report that is significantly different from expectations, particularly if it changes perceptions about the future course of monetary policy.

Meanwhile, computer reports of factors affecting reserves arrive at the New York Bank from the other Federal Reserve Banks. The projections staff begins compiling and evaluating the material. The information is used to update forecasts of nonborrowed and required reserves.

2. Other Preparatory Activities

As trading activity picks up over the morning in New York, trading room staff members speak about market developments

with the primary dealers and other active market participants. One or two traders will talk to dealers about financing conditions in the market. The Desk is interested in ascertaining the likely size of the dealers' participation in any RP operation that might be undertaken. The amount that dealers have left to finance, particularly in the context of a sense of typical behavior, may be helpful information.

Another trader talks with reserve position managers at most of the largest banks. The reserve managers report the banks' cumulative excesses or deficiencies for the maintenance period in progress and the amount they expect to borrow or lend in the overnight Federal funds market that day. These conversations give a sense of whether the Federal funds market may tighten or ease over the day. The reserve managers' reports provide a different perspective from that furnished by the estimates of aggregate supplies and demands for reserves.

The reserve projectors in New York will continue to gather data on factors that have affected bank reserve positions on earlier days and information about factors that may influence future reserve demands and supplies. They will consider whether to adjust their projections because of the new information. (Such information gathering and analysis are also going on at the Board of Governors in Washington, D.C., giving the Manager another perspective on the data.) As the aggregate data become available, the New York staff provides them electronically to the area's officers.

3. The Treasury's Balance and Foreign Official Investments

A daily conversation with the Treasury takes place around mid-morning. Prior to this call, a projections staff member explains the data revisions to the open market staff member who will recommend the daily program of action to the Manager. The projector describes developments behind the staff's preliminary estimate of nonborrowed reserves for the maintenance period in progress. The estimate gives a sense of the operations that are likely to be needed to achieve the nonborrowed reserve path.

This estimate is refined by examining the assumptions about the Treasury balance at the Fed on that day and the next two days. As noted in Box B of Chapter 6, the Treasury balance is often the biggest source of uncertainty for daily reserve levels. After a review of the figures, a projections staff member telephones Treasury Department personnel who make their own estimates of Treasury cash flows. If the forecasts differ significantly, they will review their

respective assumptions. The Treasury makes adjustments to its balance at the Fed in an effort to keep it relatively steady so as to minimize its impact on bank reserves. When the two staffs' forecasts are significantly different, the Treasury official would normally give weight to each, being careful not to aim for a balance that was uncomfortably low on either forecast.[17]

When both the Treasury and New York staffs suggest that the balance is likely to move away from desired levels, the Treasury will, if possible, take action to bring the balance back in line by transferring funds to or from depository institutions' Treasury tax and loan (TT&L) note options accounts. The transfers are made through direct investments or calls. The Treasury tries to take its actions for the following business day so as to give the banks some advance notice that they will be gaining or losing funds. Large forecast errors sometimes lead to same-day adjustments. Typically, calls and direct investments are calculated as a fraction of an earlier day's TT&L balance. For instance, on a Wednesday, the Treasury might call 20 percent of the book balance of that Tuesday for payment on that Thursday. On rare occasions when the Treasury is very short of funds, same-day receipts may be called into the Federal Reserve. After the Treasury call, the projectors will revise their nonborrowed reserve estimates if the actual Treasury actions differed from their assumptions.

Another important item for completing reserve forecasts is the size of the foreign RP pool. That forecast is prepared from information provided by the New York Reserve Bank's central bank services area. That area receives payment and receipt instructions through numerous telegrams from the foreign central bank participants. A preliminary estimate is prepared around 9:30 a.m., but that estimate may be revised later in the morning if new information changes the picture. Revisions of several hundred million dollars to the estimate of that day's level compared with the previous day's estimate are not uncommon. Preliminary forecasts for later in the period may also undergo revisions.

4. Formulating the Day's Program

As the forecasts are being completed, staff in the open market area develop a plan of action for the day. At the beginning of the maintenance period, a general plan is considered, with the recognition that forecast revisions may call for modifications. The starting point is the estimates of the need to add or drain reserves, both for the current period and the next few periods. A telephone call to the Board will provide a preliminary reading on the Board

staff's reserve estimates as well as an opportunity to give senior Board staff an indication of what sort of action is being contemplated. New York and Board staff forecasts are given similar weight in the deliberations. When the forecasts suggest that nonborrowed reserves are not close to the path, the participants will discuss ways to bring them in line. They will consider whether to use outright operations, temporary operations, or some combination. (Tables 1 and 2 illustrate two situations the Desk might face.) As indicated above, outright operations are generally reserved for situations where forecasts show sizable needs that are persistently in one direction. (The need for an outright operation might have been addressed before the period started.) Transactions with foreign accounts may be considered either as a supplement to a market operation or when the adjustment need is modest. Allowing some bills to mature without replacing them may be discussed when an extended need to drain reserves is expected.

If temporary operations are considered—because the need to add or drain reserves is forecast to reverse soon or is not viewed as large enough to address with outright operations—the staff recommends the operation's timing and maturity. Multiday operations are well suited to address a need to add or drain reserves that is fairly evenly distributed over the maintenance period. Occasionally, the staff will recommend a fourteen-day operation covering the whole maintenance period. More commonly, it will favor a series of shorter operations because of the prospect of revisions to the reserve forecasts.

When the day-to-day needs to add or drain reserves are unevenly distributed, it may be preferable to choose a pattern of temporary operations that will smooth the reserve profile somewhat. A mix of multiday and overnight operations may be used. The operations will be designed to avoid leaving very large reserve shortages on any one day. Because reserve balances are used for settling interbank transactions, as described in Chapters 3 and 6, very low systemwide balances could leave a number of banks overdrawn as the end of the day approached, creating a sharp runup in the funds rate as the banks scrambled to cover their overdrafts. The staff would also want to avoid leaving banks with larger amounts of excess reserves than demanded early in the period because some banks might be unable to work off undesired excess positions without risking an overdraft.

After the first day, the discussions will include a review of the planned approach to see if it needs to be revised. Because reserve factors rarely behave exactly as expected, modifications are

Table 1. **Hypothetical Reserve Estimates as of Wednesday, March 29**
Millions of Dollars

Reserve Period Ending	RR Estimate	ER Assumption	BR Assumption	NBR Objective	Projected Supply–NBR	Open Market Operations Need	Average ER to Date	Average BR to Date
3/29	58,000	1,000	100	58,900	NY 58,800	+100	900	100
					BD 59,000	-100		
4/12	58,100	1,000	100	59,000	NY 54,000	+5,000		
					BD 53,900	+5,100		
4/26	58,500	1,000	100	59,400	NY 54,400	+6,000		
					BD 54,200	+6,200		
5/10	57,500	1,000	100	58,400	NY 51,800	+6,600		
					BD 51,600	+6,800		

When Table 1 is presented to the Desk on Wednesday, March 29, it shows that estimates of nonborrowed reserves by both the New York and Board staffs closely surround the path in the maintenance period ending that day. Consequently, the Desk would most likely decide not to take any action to affect that period's reserve levels.

The Desk would then turn its attention to the three upcoming maintenance periods, spanning March 30 to May 10. Because the estimates continue to show large reserve deficiencies for those periods, it would probably decide to carry through with its tentative plans to address future needs with an outright purchase of Treasury bills—thus adding reserves on a permanent basis. (It might have chosen either bills or coupon securities.)

Guided by the reserve estimates from both staffs, the purchase amount could be up to $4 billion or so. The possibility that the reserve needs could be lower than forecast would have been a factor in the decision to meet less than the entire estimated need with outright purchases prior to or at the onset of the period. With a delivery date of Thursday, March 30, the first day of the April 12 maintenance period, a $4 billion purchase would increase the supply of nonborrowed reserves over that maintenance period by that full amount of the operation. The purchase will leave the desk the flexibility to make further moderate additions to reserves, as estimates are updated and revised. If the numbers underwent no revision, the Desk, in order to meet path estimates, would have to supply an additional $1 billion to $1.1 billion in the period ending April 12, $2 billion to $2.2 billion in the period ending April 26, and $2.6 billion to $2.8 billion in the period ending May 10. These additions would be easily achieved through RPs.

Two reserve factors account for most of the substantial estimated reserve needs in this interval. The first is currency: public demand climbs in the seasonally more robust spring and summer months. The second is Treasury balances at the Federal Reserve: tax receipts are large in mid-April and continue to be processed into early May. The daily swings in Treasury balances tend to be large and can produce notable day-to-day volatility in reserves. The Desk might not offset that part of the increase in reserve need resulting from an increase in the Treasury's balance with outright purchases since that increase is temporary.

Table 2. **Hypothetical Reserve Estimates as of Thursday, October 5**
Millions of Dollars

Reserve Period Ending	RR Estimate	ER Assumption	BR Assumption	NBR Objective	Projected Supply–NBR	Open Market Operations Need	Average ER to Date	Average BR to Date
10/11	55,900	1,000	300	56,600	NY 55,800	+ 800	700	300
					BD 55,600	+1,000		
10/25	56,300	1,000	300	57,000	NY 57,400	- 400		
					BD 57,200	- 200		
11/8	56,500	1,000	300	57,200	NY 55,400	+1,800		
					BD 55,100	+2,100		

A review of Table 2 shows that on Thursday, October 5, midway through the maintenance period ending on October 11, moderate open market operations of $800 million to $1 billion for the period as a whole are needed to raise the supply of reserves to the path level. Because the period is halfway over, it would take reserve additions of $1.6 billion to $2 billion a day—double the estimated average shortage—to raise average NBRs to the path level.

This period included a quarter end, when excess reserves and borrowing could have behaved unusually. However, on October 5, the quarter end has passed, and no unusual behavior was observed in either measure. The excess reserve position to date, at $700 million, is modestly below the $1 billion assumption and is more or less typical for this stage in the period. The remaining days of the maintenance period contain no other sources of particular uncertainty, although at any time, errors can occur. Under these conditions, the NBR path can probably be attained without causing an unduly high or low Federal funds rate.

To address the remaining need for the maintenance period, the Desk might execute a four-day System RP of about $2 billion. That amount, in place from Thursday through the weekend, would raise the NBR projection average for the period by just under $600 million, meeting a large part of the reserve need, based on New York figures. The amount would likely leave room for further reserve additions in the last three days of the maintenance period, in part because of the possibility that reserve needs might be revised downward after the weekend. The choice of a temporary operation recognizes that the reserve needs are short term. In the next period, the projected supply of reserves slightly exceeds the objective.

common. Major shifts in the outlook for reserves within a maintenance period generally occur a few times a year.

Trading Desk personnel will watch the Federal funds rate each day. The funds rate may move outside the anticipated range for a number of reasons. The clearest situation occurs when reserves are forecast to be scarce (or in excess) and the funds rate is high (or low) relative to the announced rate. If both the reserve projections and the funds rate suggest a need to add (or drain) reserves, the decision is usually straightforward. The picture is not always so clear, however. A number of situations may cause the funds rate to move in a way that is inconsistent with the reserve estimates. The funds rate may reflect expectations of an imminent policy change. If, for instance, banks expected the FOMC to lower the funds rate later in the maintenance period, they would try to keep their daily reserve balances as low as they could without risking an overdraft. Their actions would depress the rate. A poor distribution of reserves or heavy settlement days can leave banks unaware of their true reserve position. Desk staff would try to read the rate's meanings.

When the two measures give conflicting signals, the staff must decide how much weight to give to the reserve estimates as compared with the funds rate. With announcements of policy changes, the funds rate should not mislead the banks about the Fed's policy intentions. More reliance may be placed on the forecasts at times when confidence in them is relatively high. For example, during the late-year seasonal buildup of reserves and currency, there may be considerable confidence that additional reserves will be needed although the magnitude may remain uncertain. Reserves may be added even when the funds market does not confirm the shortage. If confidence is low because of particular uncertainty about reserve factors, the funds rate may play a relatively greater role in the decision.

Near the end of the maintenance period, the Desk will look closely at the behavior of borrowed and excess reserves to date to see if the path assumptions are likely to hold. Some unusual event, such as a major internal accounting difficulty, might have caused a large bank to borrow heavily at the discount window during the period. It might be mathematically impossible to achieve the borrowing level used in constructing the path because borrowing can never be less than zero. In practice, small banks always engage in some seasonal borrowing. If a large amount of borrowing has occurred, the Manager would normally decide to provide fewer reserves than called for to achieve the nonborrowed reserve path. Otherwise, total reserves would be high and consequently

excess reserves would be large relative to probable bank demands.

In evaluating excess reserve demands, the Desk staff will examine the reserve positions carried in by large banks to see if they will be trying to end with excesses or deficiencies. Reports of actual levels to date can also be helpful toward the latter part of the period. If small institutions have built up an above-average reserve excess, they will only work off a limited portion. Many of these institutions never run reserve deficiencies and others only run small ones because the reserve balances that they are required to hold at the Federal Reserve are modest to nonexistent. Large banks sometimes find they have excess reserve positions that they cannot eliminate without ending one of the remaining days with their accounts overdrawn, an outcome they would avoid. Because excess reserves are not a target in themselves, the Manager generally allows informally for expected deviations from the assumption used in the path. Not all of these issues must be readdressed at each day's morning strategy session. The actual conversation among the staff members and the presentation of the recommendation to the Manager or another officer usually take only ten to fifteen minutes.

As the discussion progresses toward a conclusion, a member of the money market staff will write a program indicating the action planned for the day. The program will describe the reserve situation and report the Federal funds rate, along with other considerations that have influenced the approach taken. On the first day of the maintenance period, the program will review the degree of reserve pressure being sought. If policy is changed during the period, that development will be reported and explained. Once the program is drafted, the Manager or another officer will review it. Meanwhile, in the trading room, people who follow the various markets will prepare notes so that they can cover market developments that morning during the conference call.

5. The Conference Call

The next step in the process is the morning conference call. For many years, the call took place around 11:15 a.m., but beginning in 1997 it was advanced to 10:20 a.m. The traders who will report on market developments will join the Manager and representatives from the areas that planned the action for the day. The call links the Trading Desk with the office of the Director of the Division of Monetary Affairs at the Board, where several Board staff members are assembled, and with one of the four Reserve Bank presidents (outside of New York) serving on the FOMC. The call enables the Desk to consult daily with one of the Committee

members concerning the Desk's execution of FOMC instructions. The Reserve Bank president on the call not only has an opportunity to comment daily on the Desk's approach, but also gets a sense of the circumstances, including uncertainties and difficulties, faced by the Desk between meetings.

The call usually runs about fifteen minutes. A trader will summarize the morning developments in the Treasury securities market. (Activity from the previous afternoon will already have been described in a daily recap distributed through electronic mail, so any review at the call is brief.) Generally, the commentary begins with market developments in Asia and Europe. The trader then reports on market reactions to releases of U.S. economic data and other factors affecting market activity. Commentary may also include analysis of market developments and sentiment as a result of traders' more in-depth coverage of particular market segments over a longer period of time.

A trader who follows the money markets may report on short-term financing in the Federal funds and RP markets. The trader may describe the state of the Federal funds market, indicating trading patterns and any information provided by the Federal funds brokers or the major banks that may help to explain its behavior. Someone who covers foreign exchange markets may review activity abroad and locally and report on any intervention by the Federal Reserve or foreign central banks. Noteworthy developments in equity markets will be reported. A member of the projections staff then discusses the reserve outlook and explains revisions to the figures. If the reserve forecasts of the Board and New York staffs differ significantly, the call provides an opportunity for discussing the discrepancies.

Finally, the author of the planned program of action reads it and asks the Reserve Bank president for comments. (Occasionally, a governor will sit in at the Board and will also be asked to comment.) Usually, the president will concur in the planned approach; occasionally, the president may ask whether an alternative approach has been considered. Such a question will elicit further elaboration of the reasoning behind the proposed program. After the call, a Board staff member condenses the information into a brief report that is given to each governor by early afternoon and wired to each Reserve Bank president.

The Chairman of the Board of Governors does not attend the call but is kept fully informed of all significant matters relating to open market operations. The Manager and Director make sure the Chairman knows in advance about large outright or other significant open market operations. If necessary, the Manager, the

Director, and the Chairman will discuss unfolding developments that may bear on how the Committee's directive is to be carried out—particularly whether a change in the desired degree of reserve pressure may be appropriate. The Chairman may decide that a consultation of the full Committee, or perhaps a formal telephone meeting, is in order.

6. Executing the Daily Program

Any temporary transactions authorized in the program are carried out directly after the conference call, generally shortly after 10:30 a.m.[18] In the operation, a message is sent electronically to all of the primary dealers using the Federal Reserve's Fedline terminals. At the same time, the public information area of the Federal Reserve Bank of New York is informed of the action to enable its staff to respond to inquiries from the news media.

When arranging RPs, the Desk sends out a standard message indicating the type of operation, its maturity date, and, if it is a multiday operation, whether it is fixed or withdrawable. The message includes a deadline, generally ten to fifteen minutes after the announcement. The computer sorts the offerings, displaying the amounts at each rate from the highest to the lowest rate. Once the deadline has passed, designated staff members will run some edit checks. When any discrepancies are reconciled, they will inform the officer or staff person in charge of the operation that the process is complete. That person will generally arrange an amount close to that specified in the program, but there is some flexibility, especially early in the period when there will be time for further reserve adjustments. A somewhat higher volume may be arranged if large offerings or a stringent Federal funds market suggests the possibility of a greater than forecast need for reserves. If offerings are skimpy or unattractively priced, a smaller volume than was contemplated initially may be executed. Once the officer decides the amount to accept, the designated trader will mark the stopout point on the computer screen and release the results. (A partial percentage may be arranged at the stopout rate if the volume at that rate is larger than the desired amount.) The dealers will read on their screens which propositions were accepted and which were rejected. Each accepted proposition will be arranged at the rate the dealer offered. The whole operation is over within a few minutes of the deadline for offers.

After an RP operation is completed, those dealers whose propositions were accepted use their Fedline terminals to notify the Desk of the specific securities that they or their customers are providing to the Federal Reserve under an RP. Because the issues

identified may trade significantly above or below par depending on whether their coupon interest rates are higher or lower than current rates, the collateral value of each security must be assessed. A price is set somewhat below the bid price currently being quoted in the market plus any accrued interest on the issue, a practice referred to as taking a haircut. The dealer receives that price in return for the securities. This procedure affords the Federal Reserve protection against declines in market prices during the term of the contract and against potential losses should the dealer not return the money when the contract matures.[19] Securities are valued using either prices that have been manually entered or an electronic price "feed" maintained by the Desk. Pricing information is transmitted to the dealer. It is also transmitted to the accounting area responsible for Desk activities and to the Bank's securities clearance area, which will initiate the delivery process.

If the day's action is an MSP, the entry time and announcement procedures are the same as for an RP, but some aspects of the operation are slightly different. The Desk indicates the specific Treasury bill it is selling from the System's portfolio. (It will use additional bills if the operation is larger than the System's holdings of the one bill.) In executing MSPs in the market, the message to the dealers indicates the market rate at which the System will sell the bill. Dealers are instructed to enter the amount they are willing to buy and the rate at which they will reoffer the security. The rate of discount set by the Desk determines the price realized by the System on its sale, while the competitively set reoffering rate determines the prices at which the System reacquires the same bill on the specified future day. Once the operation is complete, the procedures followed are similar to those after RPs. With an MSP, the Federal Reserve controls the delivery time for the bills, receiving its money when the securities deliveries are made.

When the Desk executes an outright transaction, delivery is generally the next day or two days forward. Outright operations are currently arranged at a variety of times. A message is sent to each primary dealer over the Fedline terminal indicating the maturity range and a deadline when the dealer's response must have been entered into the computer. Choosing among the propositions is more complicated than with a temporary operation because a yield curve involves more choices than the single interest rate comparison for RPs and MSPs. To assist in the process, the computer sorts the bids or offers by yield and by issue and arranges them relative to a recent market yield curve. Once edit checks have been completed, the officers and senior staff members choose the best propositions (based on maximizing yield to maturity) from the

array before them, according to guidelines about the dollar volume to be chosen from each maturity range. Once the selections have been reviewed by another person, they are released to the dealers. Next, the successful dealers must provide the necessary information through their Fedline terminals to process the transactions. Fed purchases of a dealer's own securities generate payments to the dealer's clearing bank.

7. Daily Dealer Meetings

Each day, one or more members of the open market area who are involved in the daily process of implementing monetary policy hold two fifteen-minute telephone meetings with representatives of government securities dealer firms who have a trading relationship with the Federal Reserve. Through 1996, these meetings were held in the morning, generally at 9 and 9:15, but in 1997 the Desk began holding these meetings starting at 3:15 in the afternoon. Over a four-week period, representatives from each of the primary dealers have the opportunity to speak with open market personnel. These discussions help the people from the Desk keep abreast of the forces at work in the financial markets.

The conversations are free flowing, covering a wide range of subjects. The money market economist often begins by giving the firm's view of prospective monetary policy, indicating whether current policy seems appropriate in the face of the firm's outlook for the economy and prices. He or she outlines the key assumptions underlying the economic and interest rate forecasts that the firm is presenting to clients. A trader or salesperson generally comments on what the firm's customers have been doing in the market—perhaps taking no action or else favoring a particular maturity range when making purchases or sales. This information may help to explain recent market behavior.

Treasury financings provide a recurring theme for the meetings. Some firms' economists develop expertise in forecasting Treasury cash needs and debt management plans. They may discuss whether the federal deficit seems to be growing or shrinking and the impact of the estimate on the size of the Treasury's near-term cash needs. A trader or salesperson may report his or her perceptions of the degree of market interest in coming offerings. After an auction, a trader reports on progress in distributing recently sold issues. To dealers, bidding in Treasury auctions of bills and coupon securities is an extension of the task of making markets in outstanding issues.

Some dealers offer information on developments in other debt markets where their firms have a presence. Depending upon

whether there have been any recent noteworthy developments, they may comment on corporate, Eurodollar, mortgage-backed, or tax-exempt bond markets. While the Desk does not operate in any of those markets, developments may show through to the Treasury market, either from effects on general credit demands and supplies or as a result of some hedging strategy. For instance, dealers holding long positions while underwriting a new corporate bond may offset them with a short position in a Treasury issue of similar maturity. Equity market developments may also be mentioned on occasion.

Communications within the System

One of the Trading Desk's functions is to keep others in the System informed about the implementation of the FOMC's monetary policy and related financial market developments. Regular Desk reports to the Committee and visits by System personnel to the Desk are important means of maintaining a clear understanding of these key aspects of the monetary policy process. As mentioned above, the Desk communicates with the rest of the System through an electronic mail summary of market developments sent at the end of each day, while the Board staff's wire describes the morning conference call.

In addition, a written report is prepared each Friday describing developments in both the domestic securities and foreign exchange markets and providing some explanation of the factors driving the market movements. Every other Friday, the report contains a section on open market operations for the maintenance period ended on the preceding Wednesday. This report describes the reasons for operations and provides tables and charts that track the behavior of the reserve measures in relation to the objectives. It also conveys the latest data and projections on the monetary aggregates.

Before each FOMC meeting, the various staffs prepare a summary report of operations and financial market developments since the last Committee meeting. The officers and staff most closely involved with the reports also prepare an annual report analyzing policy implementation for the year just ended. A modified version of this report is published.[20]

The Trading Desk also has occasional visitors from the Board and other Reserve Banks. They observe operations so that they can brief their principals and do research on monetary policy topics. Usually, visitors participate in the Desk's daily routines for a week, meet with staff members who describe the procedures, and visit firms in the markets.

Adjunct Desk Responsibilities

Trading Desk officers and staff members perform a number of other duties. As mentioned above, they carry out securities transactions for customers, mostly for foreign official institutions but occasionally for Treasury trust funds. They gather information concerning government securities market practices that is made available to the market regulators: the Securities and Exchange Commission, the Commodities Futures Trading Commission, and the U.S. Treasury. In addition, officers and staff undertake a wide range of studies relating to monetary policy and other financial developments.

1. Activities for Foreign Official Institutions

Purchase or sale orders are executed for foreign official customers at the customers' initiative. The Bank's central bank services area keeps in contact with the more than l50 official foreign institutions maintaining accounts with the Fed and compiles their requests for transactions. The orders that the Desk does not choose to meet using the System Account as counterparty must be either crossed between foreign accounts, if buy and sell orders coincide, or arranged in the market. Generally, the Desk will seek competitive bids or offers from authorized trading counterparties. The bulk of customer operations are in Treasury bills and short-dated coupon issues. The Desk will also purchase or sell non-Treasury instruments such as bankers' acceptances and large certificates of deposit when asked to do so. Most of the excess foreign cash is placed in the foreign RP pool, but at day's end, a limited amount of uninvested funds that arrived too late to be arranged as RPs may be sold to banks as overnight Federal funds.

Officers and staff also meet with visitors from foreign official institutions who have traveled to New York to expand their understanding of monetary policy implementation, securities auctions, and secondary market activity. They run a seminar each fall for a group of central bankers.

2. Relationships with the U.S. Treasury Department

The Trading Desk's relationship with the Treasury has many facets. Treasury officials occasionally call open market officers or staff members when they are planning securities issues to get a sense of what offerings investors might find attractive. Treasury staff members observe the market directly through electronic news services and no longer look to the Federal Reserve for routine market information. Nonetheless, they may occasionally call the Desk to

ask for an explanation of unusual rate movements. Desk officers supervise the electronic processing of competitive auction tenders submitted in New York, which usually account for 80 percent or more of the national awards of new issues.

The Manager is sometimes consulted by Treasury officials responsible for debt management. They may discuss the Treasury's financing options. Once each quarter, Treasury officials come to New York to obtain suggestions from primary dealers on structuring the midquarter financing and on meeting remaining cash needs in the months ahead. In the following week, one or two Desk officials typically attend the briefing sessions held by the Treasury in Washington, D.C. There, the Treasury obtains financing recommendations from a special advisory committee of the Public Securities Association that includes representatives of government securities dealers and other market participants.

3. Relationships with Primary Dealers

Dealers that seek a trading relationship with the Open Market Desk must demonstrate that they meet a series of criteria. These include adequate capital, the experience of management and trading personnel, and the capability to remain market makers.[21] The names of dealers that trade with the Federal Reserve are published in a list of reporting primary dealers. The number has varied depending on the perceived profitability and prestige associated with being a primary dealer. At the end of December 1996, the list included thirty-seven dealers. The firms' primary regulators are responsible for certifying that each dealer continues to meet the standards.

4. Specialized Reports and Research

Open market personnel engage in a wide variety of reporting and analytical assignments. Beyond the regular reports to the FOMC, described above, special studies are undertaken. They may involve proposed modifications in the Committee's approach to reserve management, such as how to deal with reduced levels of required reserves. Open market staff may also examine issues of Treasury financing and the Treasury's tax and loan accounts to find ways to reduce the disruptive effects of Treasury cash flows on reserves. Staff also study market developments, such as relationships between derivative financial instruments and the underlying securities.

Chapter 8

Responses to Federal Reserve Policy

Monetary policy has a wide range of direct and indirect effects on economic activity, prices, and interest rates. Although there is considerable agreement among economists about the channels through which monetary policy impulses are transmitted to the economy, the relative importance of each of these channels remains controversial. Most economists believe that monetary policy influences economic activity and prices by affecting the availability and cost of money and credit to producers and consumers. People make spending and investment decisions based upon current and expected wealth, income, prices, and credit availability, all of which are influenced by past, current, and expected future monetary policy actions. Interest rates respond to the current and prospective economic climate and to monetary policy. Decisions about consumption, savings, and investment respond to monetary policy actions. The effects of policy will both influence and depend upon the underlying economic environment, including perceptions about federal government expenditures and receipts, the strength of credit demands and supplies in the United States and abroad, and the outlook for the exchange value of the dollar.

This chapter explores some of the ways in which domestic monetary policy can affect the U.S. economy. The first section examines how economists over the last sixty years have interpreted the transmission of monetary policy.[1] Considerable understanding has been gained from the experience and analysis of recent decades; most economists currently believe that monetary policy influences prices and income through a number of chan-

nels. Among those cited are interest rates, wealth, the exchange rate, asset prices, the cost of credit, the condition of corporate and household balance sheets, and the health of financial institutions. Nonetheless, the significance of particular channels of transmission is still debated, and questions persist about the way people respond to new information. No single, comprehensive, widely accepted view has emerged about the role of monetary policy in determining economic activity and price behavior.

The second section considers the impact of policy on the cyclical behavior of the interest rate maturity structure, commonly called the yield curve. The potential effect of policy on the individual sectors of the economy is the subject of the third section; the discussion demonstrates that the sectors' different compositions and constraints shape their responses to interest rates and income. The final section discusses the communication of policy developments through the activities of "Fed watchers"—economists who forecast and interpret economic behavior, interest rates, and Federal Reserve actions.

Evolving Views of Policy Transmission

Economists' understanding of the transmission of monetary policy to the financial markets and to the economy has been modified extensively during past decades. One school of thought begins with J. M. Keynes' *General Theory*, published in 1935. Influenced by the Great Depression, Keynes argued that monetary policy had limited power to promote economic expansion; once interest rates fell close to zero, as they did during the depression, no further declines to stimulate investment would be possible. Wages were believed to be sticky and particularly resistant to declines, even in the face of high unemployment. A. C. Pigou, a member of the earlier classical school, objected to Keynes' arguments, saying that they depended upon an implausible failure of workers to respond to changes in their purchasing power. Pigou argued that as long as lower wages gave workers the same buying power, eventually the workers would accept lower wages. In turn, economic activity would return to its earlier path, and only the price level would have changed. In other words, monetary policy actions would be neutral with respect to economic activity in the long term.

Despite Pigou's arguments, the predominant belief in academic and policymaking circles during the l940s was that the long term in which that mechanism would work was too long to be important in practice and that monetary policy had little power to promote economic expansion. In the postwar period, economic expansion and inflation were the dominant conditions. Interest rates were no longer close to zero and "Keynesian"

economists modified Keynes' models. These economists came to expect that monetary policy would work primarily by affecting interest rates, which in turn would affect investment.[2]

Monetary policy was frequently analyzed in the context of business cycles, both by Keynesians and by economists who were extending and modifying the classical analysis.[3] Some economists suggested that business cycles resulted, at least in part, from the policy process itself.[4] Their arguments ran as follows: Monetary authorities would respond to weakness in the economy with an easier monetary policy that would lower interest rates by making loanable funds more plentiful. (Deliberate fiscal stimulus might make a difference in long contractions, but lags in recognizing the recession and in changing policy would preclude its use in countering short recessions.) Lower rates and increased credit availability would encourage more expenditures on investment and consumption, which in turn would support economic expansion as long as there was excess capacity to absorb the increased demand. When capacity constraints were felt, increased demand would merely lift prices, producing "demand pull" inflation. Interest rates would begin to rise, and investment would be choked off as credit became more expensive. If ceilings were then placed on the interest rates that banks could pay or charge, or if banks became reluctant to make loans that they perceived to be risky, credit availability would be reduced. The "credit crunch" would constrain economic activity, bringing the business expansion to its close.

During the l950s and l960s, economists struggled to explain inflation that arose when the economy seemingly was not at full employment. It was generally described as a "cost push" phenomenon and was attributed to structural distortions in the labor markets rather than to aggregate monetary or fiscal policies. A related hypothesis was developed by A. W. Phillips.[5] He observed that increasing levels of employment seemed to be associated with rising nominal wage rates. Graphical relationships between the unemployment rate and changes in wages or prices came to be referred to as Phillips curves.

These economic models relied on nominal wage rigidities, which meant that the prevailing descriptions of the policy transmission process could at best hold only in the short run. At some stage, people would change their behavior as prices and wages were observed to rise (or fall) persistently. In economic parlance, people would not suffer permanent money illusion but would, in time, recognize the change in their wages defined in "real" terms—adjusted to take account of price changes. In particular, as prices rose, workers would demand higher wages for a given amount of work to offset the loss of purchasing power, or alternatively would work less for the same wages.

The Phillips curve would not represent a long-run equilibrium. Once inflation expectations rose, the curve would shift outward.[6]

During these years, Milton Friedman and several other economists argued that the standard view of the monetary transmission process gave too little emphasis to the role of money balances. Consumers who found themselves with larger amounts of money when an increase in the aggregate quantity worked its way through the economy would feel wealthier and increase their spending. Sellers would respond to the increased purchases by ordering more goods and by raising prices; the increased total quantity of money available for purchases would sustain the higher prices.

The theory did not define how the increase in aggregate demand stimulated by the higher money balances would be divided between output and prices. Drawing on the classical model, the economists who emphasized the role of the quantity of money argued that increasing money balances would not affect output indefinitely but in the end would only lift prices. The short-run dynamics of a response to a series of increases in money balances, however, would affect both economic activity and prices. The pattern followed would depend upon how the increases affected expectations and how quickly people adjusted their behavior when their expectations changed.

When inflation was expected to pick up, nominal interest rates—those observed directly—would increase. If the change were merely offsetting the expected decline in purchasing power over the term of the loan, the increase in nominal rates would not raise the inflation-adjusted or real cost of borrowing or the return to lending. Consequently, using nominal rates as a gauge of the tightening or easing of policy could prove misleading and could induce perverse results. For instance, the monetary authorities might think they were providing for a steady cost of credit by holding interest rates constant, but if the expected rate of inflation rose, they would really be fostering easier money and credit conditions.[7]

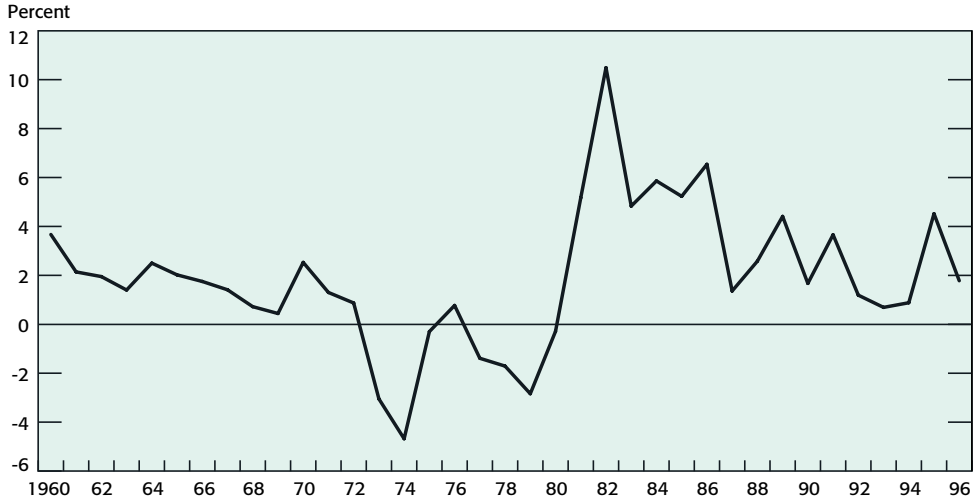
It became increasingly important to deal with distortions in nominal interest rates as inflation gained force in the late l960s and l970s. Economists made use of the concept, introduced years earlier by Irving Fisher,[8] of real interest rates—approximated as the nominal rate less the expected rate of inflation. This concept held that borrowers and lenders made their decisions based on expected real rates. These rates, however, could not be observed but had to be derived from expectations of inflation. Fisher suggested that the real rate was related to underlying economic conditions as they affected investment and savings opportunities and therefore might be reasonably constant. If that were the case, changes in nominal interest rates could be used as an indication of changes in inflationary expectations. Using that hypothesis, Fisher and subsequent observers found that interest rates appeared to

adjust to changes in inflation with long lags, possibly because it took time for borrowers and lenders to realize that a change in the rate of inflation would be sustained.

Fisher's hypothesis is difficult to test because ex ante real rates cannot be measured directly. Ex post rates may or may not be a good proxy. If real rates are computed ex post by subtracting actual inflation from nominal interest rates—even averaged over fairly long periods—we find that real rates have been far from constant (Chart 1). Ex post real returns have often been low and sometimes negative during periods of accelerating inflation such as the 1970s; they were well above levels of the previous decades in the early part of the 1980s when inflation was slowing.[9] The apparent variability in real rates may mean either that expectations of inflation are subject to substantial errors or that ex ante real rates are not constant.[10] Real rates may well change as part of the price adjustment process.

With the distinction between real and nominal measures attracting increased attention, analysts considered how to measure inflationary expectations. Most work done in the l960s estimated expectations of future inflation by extrapolating from past inflation. During the l970s, economists argued that this "adaptive" expectations approach was incomplete. They suggested that borrowers and lenders would make use of all of the relevant

Chart 1. **One-Year Treasury Bill Rate less Rate of Change of Consumer Price Index**



Sources: Treasury bill rate: Board of Governors of the Federal Reserve System; consumer price index: U.S. Department of Labor, Bureau of Labor Statistics.

Note: The plotted series is defined as the average one-year Treasury bill rate (bond-equivalent basis) for January (time t) less the percent change of the consumer price index over the ensuing year [(t+11)/(t-1)].

information available, not just that on past inflation. In particular, they would consider current monetary and fiscal policies and likely future actions by the policymakers. The approach has been termed rational expectations.[11]

The basic rational expectations concept has attracted a wide audience. Its proponents have argued that people will incorporate all of the predictable consequences of available information about monetary policy into their decision making, including the future effects of changes in policy priorities. Hence, if the Federal Reserve enacted a change in policy procedures, people would alter the way they responded to observed monetary variables in keeping with their understanding of the revised operating guidelines.[12]

Some writers, particularly in the academic community, followed this line of analysis to the conclusion that people would adjust their behavior to prevent any *anticipated* monetary policy actions from having an effect on the real economy. Thus, it was argued, only when a policy action was a surprise would it affect real interest rates and economic activity. Otherwise, it would only move prices to their new equilibrium level; monetary policy would be neutral in the short run, not just in the long run, an extreme interpretation of the classical view. This version of rational expectations theory figured importantly in real business cycle theory, which held that business cycles could be caused by exogenous shocks to the economy or by unexpected monetary policy developments but not by predictable monetary policy actions.[13]

Most economists, however, have rejected the notion that anticipated monetary policy does not affect real economic activity in the short run. Within the rational expectations framework, predictable monetary policy could affect real activity because of the sometimes substantial costs of acquiring and interpreting all of the information available about past, current, and future monetary policy. Although a large amount of monetary and economic data can be obtained easily with short lags, their significance will not always be immediately clear. The series are all subject to random as well as systemic variation, and relationships can shift in ways that may be hard to interpret until some time has passed. Furthermore, there may be institutional rigidities, such as long-term contracts that are not indexed for inflation. Rigidities will slow down the responses to a policy impulse, permitting a more conventional adjustment process to occur.

In evaluating the routes by which monetary policy affects the economy, a number of economists have focused on variations in credit availability, either as a key means of transmitting policy impulses or as a factor that may supplement other channels. Some writers have considered bank lending practices directly, although the numerous nonbank sources of credit described in Chapter 4 should have reduced the importance of banks' actions

on all but the most marginal of borrowers. Others have concentrated on balance-sheet constraints and the difficulties for lenders of evaluating credit risks.[14] Both sets of writers argue that a rise in interest rates stemming from a policy tightening will affect those entities that already have variable rate loans, first by raising the cost of their existing credit. The increase in cost will also cause their balance sheets to appear weaker, making potential lenders less willing to supply additional credit. As a result, credit available to marginal borrowers is particularly sensitive to the degree of ease or restraint in monetary policy. This sensitivity may intensify the effects stemming from other channels of policy transmission.

The numerous hypotheses about the transmission mechanism proposed over the last sixty years have left their mark on current thinking and have provided useful insights. Nonetheless, experience has taken a toll on many of them. For example, in the 1960s, Phillips curve analysis, by suggesting that there was a permanent trade-off between economic expansion and inflation, encouraged many economists in the 1960s to believe that some inflation was a small price to pay for economic prosperity. The concurrent development of large econometric models that incorporated these modified Keynesian views, including persistent wage rigidities, encouraged a move to active use of government policies as a way to "fine tune" the economy to encourage growth.

During the 1970s, the use of monetary policies to stimulate the economy seemed to be associated with inflation rates that got higher with each round of stimulus. At the same time, the economy did not expand as rapidly on average as it had in the preceding two decades, when inflation rates were lower. Although the oil crises of 1973-74 and 1979 were clearly factors, the problem of inflation pointed to weakness in the Phillips curve analysis. The Phillips curve kept shifting outward as people adjusted their wage demands to the rising rates of inflation.

The experience of the 1970s also demonstrated that inflation had more costs than many economists had expected. Resource allocation was distorted because some activities proved easier to protect than others from the effects of rising prices. The tax system was based on nominal magnitudes. Increases in earnings and capital values were taxed even when they did not represent real gains. Nominal, rather than real, interest income was taxed, hurting savers, while nominal interest expenses were deductible, benefiting borrowers. Tax law revisions in 1981 introduced indexation, which offset inflation's impact on earnings, but the changes did not address distortions to interest or to capital investment. The inability to pay interest on currency or most transaction deposits led people to economize artificially on holdings of money balances, in the process diverting resources from more productive

uses. By the late 1970s, the growing realization that it was not feasible to protect against the full costs of inflation led to increased support among economists and the public for monetary policies aimed at reducing the inflation rate.

Targeting money growth, rather than interest rates, seemed to be a solution to the problems of inflationary bias and the associated misinterpretation of nominal interest rates. But using the quantity of money relationships depended on a reasonably stable demand for money on the part of the public. For a number of years, the relationships appeared to be sufficiently predictable to be of use to policymaking. By the early 1980s, however, close substitutes for traditional money measures were proliferating, partly in response to the combination of rising nominal interest rates and restricted interest payments on currency and bank deposits. Consequently, it became increasingly difficult to find an empirical measure of money that had stable demand properties, and money's usefulness in policymaking decreased.

Although the well-publicized policy of holding down average money growth during the 1979-82 period succeeded in reducing inflation, the process was far from cost-free. The economy went through a severe recession, in contrast to the optimistic predictions by some forms of the rational expectations theories.

As a group, Federal Reserve policymakers continue to regard monetary policy as a powerful tool, although individuals place different emphases on the various transmission routes and on the appropriate role of monetary policy in the short-run stabilization of economic activity. Some policymakers believe response lags are sufficiently short to allow policy actions to be used for short-run stabilization. Others are concerned that long, unpredictable lags will keep monetary policy from being a good tool for short-run stabilization. As a result of experiences of the past thirty years, in which inflation became a major problem requiring long and costly efforts to overcome it, many Federal Reserve policymakers have become strong advocates of price stability. The more pertinent question today is, What is the best strategy to achieve such stability?

Monetary Policy and Yield Curves

Monetary policy works most directly by changing reserve availability. Such changes affect the overnight Federal funds rate and other short-term rates in a reasonably straightforward way.[15] When the overnight Federal funds rate is serving as a target, the funds rate will respond promptly to a change in the Federal Reserve's policy objective. Other short-term rates also tend to adjust

promptly as well, sometimes moving before the policy step if an action was widely expected.

The determinants of the relationship between short-term rates and longer term rates—often referred to as the shape of the yield curve—have long been a source of discussion and debate among both academic and market analysts.[16] Perhaps the most commonly accepted view is that the shape reflects both expectations of future short-term rates and preferences for liquidity that lead investors to favor shorter term maturities to varying degrees.[17] This view of yield curve determination is described in the literature as the liquidity-augmented expectations hypothesis.[18] (Liquidity in this context means the ability to turn an asset quickly into cash without facing the risk of significant loss of nominal value. Hence, short-term instruments with their smaller price fluctuations are generally considered more liquid than intermediate- and long-term Treasury debt instruments.)

The expectations hypothesis assumes that at least some investors and borrowers can adjust their maturity mix to achieve the expected yield pattern.[19] Their success in predicting rates will determine the extent to which expected rates are realized. The primary determinants of expected future interest rates are presumed to be the outlook for inflation and for real interest rates, which in turn are influenced by expectations about economic activity, monetary policy, and fiscal policy.[20]

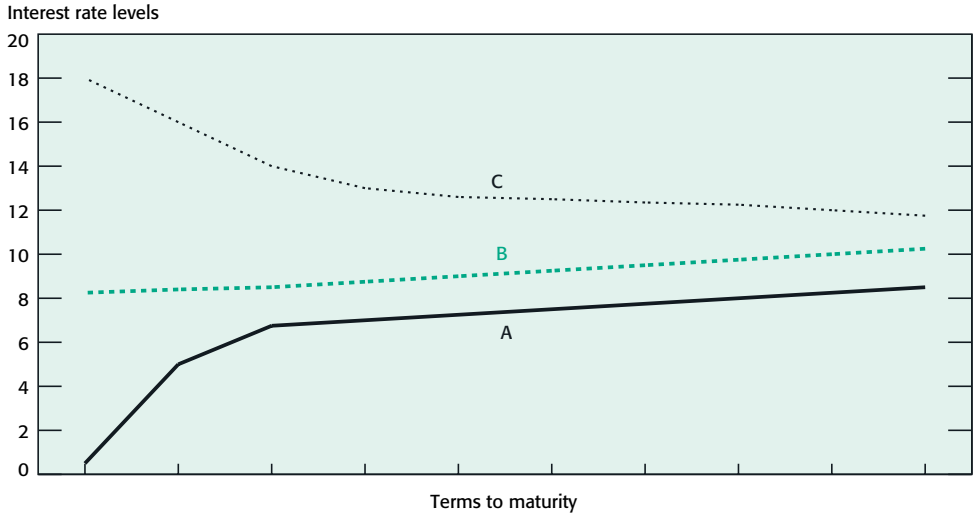
If preferences for liquidity are imposed on the expectations model, interest rates will rise as the term to maturity lengthens when expectations of steady rates would otherwise call for a flat yield curve; at other times, the yield curve will slope upward by more or downward by less than would be the case based on expectations alone. Investors would expect a higher return on longer term obligations as compensation for giving up the greater liquidity of shorter term instruments. The longer the time before maturity, the greater will be the change in price that will accompany a given change in interest rates and the greater the likelihood that rates will change substantially during the security's remaining life.

Presumably, the degree of liquidity preference rises when the perceived risks of relatively high and variable inflation rates increase because the expected range of future nominal rates is larger. For instance, when confidence in the Federal Reserve's commitment to price stability was low in the late 1970s and early 1980s, nominal long-term rates moved over a wide range as investors factored in a wide band of potential inflation rates. (To be sure, short-term rates also moved over an unusually wide range during those years, complicating the interpretation of movements in long-term rates.) An extended period of low inflation rates has reduced the range of variation in long-term rates and should lead to lower liquidity premia.[21]

Because credit demands and inflationary expectations change over the business cycle, the shape of the yield curve may do so as well. The yield curve tends to have a steep upward slope when market participants believe that short-term rates are below sustainable levels, such as might be the case when the economy was weak and the Federal Reserve was pursuing a stimulative policy (Chart 2, line A). At some stage during an economic recovery, the yield curve tends to flatten as short-term rates rise to a range considered to represent an essentially neutral policy (Chart 2, line B). An aggressive effort to restrain inflationary tendencies may lift short-term rates above sustainable levels, and the yield curve would become downward sloping, at least over part of its length (Chart 2, line C).

These relationships cause the impact of monetary policy actions on longer term rates to depend on how the policy action affects expectations of future short-term rates.[22] In particular, a tightening in what is believed to be a recovery may encourage expectations of more tightening moves in coming months, since market participants will expect one move to be followed by more, based on previous experience. Thus, longer term rates are likely to rise by as much or more than short-term rates. Alternatively, if the tightening is considered to be around the end of a series, it may have little or no effect on longer term rates since it will not feed expectations of further increases. Indeed, if the action is seen as a particularly aggressive anti-inflation move, it may lead to declines in longer term rates by reinforcing expectations that nominal rates will be lower in the future.

Chart 2. **Potential Yield Curves**



Policy's Effect on the Economic Sectors

Monetary policy influences spending and investing decisions in all sectors of the economy through the effects of interest rates and the availability of money and credit on spending and investment decisions. The various economic sectors will respond in different ways, depending on the extent to which they are borrowers or lenders and the importance and relative availability of credit to the sector.[23]

1. The Household Sector

Monetary policy's cumulative impact on the household sector can be substantial. Policy can influence household spending through numerous channels: income and employment, wealth, the division of income between saving and consumption, expectations of inflation, and the cost and availability of credit. To the extent that monetary policy changes the level of overall business activity, it affects households' incomes and employment. These factors, in turn, have strong effects on consumer spending. Changes in interest rates influence household spending by affecting wealth and income, by shifting the relative returns to future savings, and by affecting the cost of borrowing.

Households will respond to changes in interest rates according to the forms of wealth they hold, the types of debt they have incurred, and their propensities to save the changes in income brought about by changes in rates. Households as a group are net savers, so their incomes should be increased by a rise in rates. The net stimulus to spending from higher rates will be partially offset, however, by declines in existing wealth held in the form of fixed-rate investments, since their prices fall when rates rise. Furthermore, if rates rise, those households with variable-rate loans will have to make higher payments on existing loans; these obligations will take away resources that might otherwise be directed to consumption.

Responses to interest rate changes will also depend upon how households interpret them. For instance, if consumers regard a sharp rise in nominal interest rates as a sign that greater economic uncertainty and rising unemployment lie ahead, they will tend to save more and borrow less. If, however, inflationary expectations shift upward such that real after tax interest rates fall, consumers may reduce saving and increase their borrowing in order to step up current spending before prices increase further. In recessions, a sharp fall in interest rates could lower borrowing costs, a development that might temper the decline in consumer spending that results from the reductions in income.

Household investment in housing is sensitive to the cost and availability of credit. The effects are less dramatic than they were in the 1970s and early 1980s, when a variety of consumer lending and deposit rates had been subject to ceilings. Those ceilings were frequently binding in the inflationary environment, thus limiting mortgage credit sharply. When credit was available, however, the demand was usually great as people sought the tax advantage of interest deductibility. As consumers came to expect increased inflation and anticipated that future home prices would provide a good hedge against it, they also stepped up home buying.

Such expectations have become less common, however, as relatively low rates of inflation have gradually become accepted as the norm. Nonetheless, in the current environment, where ceilings do not exist and lower interest rates and inflation prevail, households remain sensitive to rate changes. Prospective home buyers' responses to rising interest rates depend on their perception of future rate changes. Sometimes a rise can actually encourage a spurt of home buying to get ahead of expected future rate increases. But in time, higher rates tend to discourage home buying by reducing affordability. In addition, rising mortgage interest rates reduce the attractiveness of refinancing existing homes to provide more resources for spending. Higher rates also affect those who have variable-rate mortgages or home equity loans on a floating-rate basis, because their monthly payments may increase. Households may feel less wealthy when homes become harder to sell or the prices of existing houses decline. When interest rates fall as the economy shows weakness, the activation of deferred housing demand can contribute to economic recovery.

Monetary policy also affects the use of consumer credit such as installment and credit card loans. Consumers are heavy users of such credit, especially for purchases of automobiles and other durable consumer goods. Changes made to the tax law in 1986 phased out over five years the deductibility of interest on all personal loans, other than those secured by owner-occupied housing, encouraging the use of home equity credit. Nonetheless, credit card and installment credit have remained popular forms of finance. Interest rates on credit cards are not particularly sensitive to the banks' cost of credit, so the cost to card users does not adjust promptly to a change in monetary policy.[24]

2. The Business Sector

Monetary policy affects business decisions concerning production levels, inventories, and new investments. Businesses produce most of the goods and services consumed by the other sectors. To

be successful, they must anticipate and respond to the demands of consumers, other businesses, governmental units, and foreign buyers. These demands will be influenced by monetary policy as it affects and responds to general business conditions.

Businesses depend heavily on the credit markets to finance both productive capacity and inventories needed to meet customer demands. The Federal Reserve's flow of funds statistics show that during the first half of the 1990s, corporate cash flow from retained earnings and depreciation allowances provided about three-fourths of the funds used for capital spending, the extension of trade credit, and the acquisition of other financial assets. The remainder came chiefly from borrowing in the credit markets. Moreover, business credit demand typically grows more rapidly than the economy once the expansion phase of the business cycle is well under way, as internal sources of finance are exhausted and expectations of strong demand stimulate plans for increasing capacity.[25] For instance, retained earnings provided more than 80 percent of financing in 1990 and 1991, when the economy was soft, but only about 65 percent in 1995, when the economy had been expanding for several years.

Businesses manage inventories much more efficiently than they once did, thus making proportionately less use of credit to finance inventories. Nonetheless, expectations of strong sales will encourage some inventory buildup. When interest rates rise, business managers have to weigh the increasing cost of financing inventories against the risk of losing sales if supplies are inadequate. Price expectations also enter their calculations. If inflation is expected to be low, there is every incentive to keep inventories lean. If, however, inflation is expected to accelerate, or even if the cost of selected raw materials is expected to rise, managers may increase purchases of affected inputs ahead of anticipated price increases. When the economy slows unexpectedly, inventories may become unintentionally heavy, requiring a reduction in current production to bring them back in line.[26]

Rising costs, associated with higher perceived real interest rates, and slowing demand, associated with monetary stringency, can put pressure on profit margins, leading businesses to step up their efforts to cut costs. If their businesses are heavy credit users, they may choose to trim capital spending or lenders may force them to do so by not providing additional financing. The rise in long-term rates may itself reduce the attractiveness of prospective projects by increasing the rate at which projected income streams are discounted. Often the spreads widen between yields on bonds of well-capitalized firms that are given investment-grade ratings and yields on lower rated bonds. The increased spreads may force

potential borrowers contemplating risky uses of the funds to turn to less conventional financing; higher financing costs may also crowd some borrowers out of the credit markets altogether.[27] Aggregate capital spending tends to be sustained well into a recession, diminishing only as the rising margin of available capacity reduces the desirability of further additions.

As noted in Chapters 3 and 4, during the 1980s, a number of techniques were developed to allow hedging of some interest rate risk involved in business operations. Corporations employing these techniques can reduce their sensitivity to changes in market rates, for instance, by using financial futures and other derivative products to lock in a specified interest rate cost or to cap future increases. They can use swaps to change a variable-rate commitment into a fixed-rate one or to do the reverse, depending upon their expected pattern of revenue streams. Although these devices themselves have costs and cannot insulate a firm from all effects of interest rate changes, they can reduce costs of rate changes.

3. The U.S. Government

Monetary policy's direct impact on federal spending and revenue decisions generally is limited, but the indirect effects can be substantial. Changes in interest rates affect the interest cost of refinancing outstanding debt and issuing new debt. The budgetary impact can be sizable because a significant portion of the outstanding debt must be refinanced annually.[28] In 1995, for instance, 33 percent of the marketable debt outstanding at the start of the year was refinanced at least once during the year. Changes in Treasury interest costs over the business cycle affect annual budget deficits and the degree of concern about deficits. Nonetheless, the Treasury chooses the maturity structure of its debt on the basis of longer term objectives and rarely alters its debt management strategy in response to changes in the shape of the yield curve.

The Treasury is a major force in financial markets, competing with other borrowers for funds and for command over real resources. Because federal deficits have a cyclical aspect, real federal credit demands have tended to rise more in recessions than in expansions. Thus, over the cycle, they have generally run counter to demands of other borrowers. Real per capita spending on unemployment compensation and other income-sustaining programs generally falls during expansions and rises during contractions. Revenues generally rise slightly faster than GDP during a noninflationary expansion because the graduated income tax structure causes tax receipts to rise more than proportionately as incomes increase.

Inflation affects real government revenues and expenditures in a variety of ways, on balance raising net revenues. Parts of the tax code are not indexed, so that nominal increases in magnitudes raise tax payments even in the absence of a real increase in value.[29] In particular, net government revenues are raised because capital gains are taxed based on nominal increases in value, and the portion of nominal interest earnings that merely compensates the lender for the decrease in purchasing power is taxed. Net government revenues are reduced by the deduction that individual and business borrowers can take as a result of their enlarged nominal interest cost and the higher interest rates that the government must pay to borrow. Although the government pays more to borrow, inflation reduces the value of its outstanding debt. The net impact of inflation on the government's debt operations will depend upon the amount and maturity of its outstanding debt and its future borrowing needs.

Since the Treasury can always satisfy its credit needs, some observers have questioned whether its heavy borrowing might adversely affect the flow of funds to other potential borrowers. The high deficits of the 1980s were for an extended period associated with high real interest rates. Nonetheless, over time the relationship between federal deficits and real interest rates has been variable and the empirical evidence of a relationship has generally been inconclusive.[30] High real interest rates clearly crowd out some borrowers, although many firms that are willing to pay for credit seem to be able to get it.

4. State and Local Governments

Most units of government below the federal level operate essentially by balancing current spending with receipts from taxes and grants-in-aid from higher levels of government. Since persistent deficits are not permitted, state and local spending depends heavily on the current condition of the economy. As the economy expands, revenues increase, encouraging new spending initiatives. Conversely, disappointing revenues in times of recession often lead state and local governments to scale down their capital expenditures fairly quickly because of the need for balancing income and expenditures.[31] The credit market effects of monetary policy on governmental units work chiefly through capital spending, but total capital outlays are a relatively modest portion of state and local government expenditures. Major capital projects that depend heavily on bond financing include building and repairs of schools, roads, water systems, sewers, and transportation systems. At the margin, rate increases may lead to some reduction

in, or postponement of, capital spending programs. Some issuers may be unable to borrow because rates rise above ceilings established by state law on what they can pay.

The Role of the Fed Watchers

The participants in the money and capital markets watch the actions of the Federal Reserve. They try to understand the basic thrust of policy and to predict future policy changes by forecasting the variables they believe the Federal Reserve is following.[32] Financial firms employ economists—often called Fed watchers—to help them anticipate the effects of policy moves on interest rates and on the demand for credit because such information is important to the firms' trading and positioning strategies. In developing their outlooks, the economists track developments in the economy, forecast economic activity and inflation, and review statements of Federal Open Market Committee (FOMC) members to identify priorities and concerns. The analysts provide regular briefings to their own managers and analyze current developments during the day. Sales personnel at most firms circulate the views of their in-house experts. The economists also meet with clients and are available to customers for telephone consultation. Independent entrepreneurs in the field and some Fed watchers who work for dealer firms present their basic analyses to clients through weekly market letters and daily commentary on computer information systems. The computer systems serve clients in all parts of the world.

1. Forecasting Federal Reserve Policy Changes

For many years, one of the key aspects of Fed watching was interpreting daily market activity conducted by the Trading Desk at the Federal Reserve Bank of New York. Temporary operations were scrutinized to determine whether the Desk might be signaling a change in the stance of monetary policy. Beginning in the late 1980s, as the FOMC gave increasing weight to the behavior of the Federal funds rate in setting policy, reading the stance of policy became easier than it was over most of the preceding decade. Consequently, firms began to reduce the resources devoted to interpreting daily Trading Desk operations. In 1994, when the FOMC began to issue press releases announcing policy changes almost immediately after the decisions were made, Fed watchers no longer needed to provide analysis of daily Desk activity to interpret current FOMC policy.

Previously, considerable resources had been devoted to estimating whether the Trading Desk was likely to add or drain reserves to bring reserve supplies in line with reserve objectives. Daily temporary open market operations were easier to interpret if the Fed watchers had a sense of the nature of adjustments the Desk would be seeking to undertake. Once operations were no longer being used to signal a policy change, Fed watchers could assume that any operations were intended to bring reserve supplies into line with estimated demands.

Nonetheless, some Fed watchers have continued to make reserve forecasts. The financing desks at dealer firms, in planning the daily financing of the firms' inventories of securities, find it helpful to have an idea whether the Federal Reserve will be arranging a temporary operation. Traders of Treasury debt are interested in the potential for outright purchases or sales of securities by the Federal Reserve, because those operations affect market inventories of securities. Thus, forecasting of reserve supplies and demands has continued, although the resources devoted to it have diminished considerably. Indeed, some firms rely on the analyses available over their news screens rather than on internal forecasters.

The financial market economists—by forecasting the variables that Federal Reserve policymakers are believed to be using in their decision making—still play an important role in predicting future Federal Reserve policy moves. Currently, as discussed in Chapter 5, such variables include a range of measures of economic activity and the behavior of prices.[33] (The market refers to such economic indicators as "hard news.") Fed watchers also follow speeches and other public statements by FOMC members to get a sense of their concerns and priorities. (The market refers to this information as "soft news.")

As the behavior of the monetary aggregates became less closely linked, at least in the short run, with economic activity and Federal Reserve policy actions, the resources Fed watchers devoted to forecasting the monetary aggregates diminished as well. Some analysis of the monetary aggregates has continued, however. Those analysts who forecast reserve supplies and demands watch the behavior of the aggregates, particularly M1, because its main components—currency and transaction deposits—both affect the reserve picture, as described in Chapter 6. Others watch the monetary aggregates because they still derive some predictive power from them, at least after adjusting for factors known to change the demand for money.

2. Other Roles of Fed Watchers

FOMC actions are only one of many influences contributing to the behavior of market interest rates. The money market economists observe and forecast economic and price behavior for their direct influence on yields. They also analyze and forecast changes in the demands for and supplies of funding from various sources. Surveys of money managers' views, produced by several on-screen financial market services, are watched closely for what they convey about the views of other market participants. Analysts also observe foreign demand for U.S. debt instruments. Foreign participation, which can vary substantially, is large enough to influence yield movements significantly.

Federal budgetary developments are assessed to understand likely borrowing demands of the U.S. Treasury. Because of the huge amount of Treasury debt outstanding, the Treasury regularly must sell new debt to replace maturing debt. In addition, ongoing deficits require additional borrowing. As described in Chapter 4, the Treasury issues debt in a regular, predictable fashion. However, as the Treasury's needs and priorities change, it makes adjustments in the size of its debt and occasionally changes the mix of issuance. Fed watchers follow budgetary developments and forecast Treasury cash needs to anticipate the likely size of Treasury debt offerings.

Chapter 9

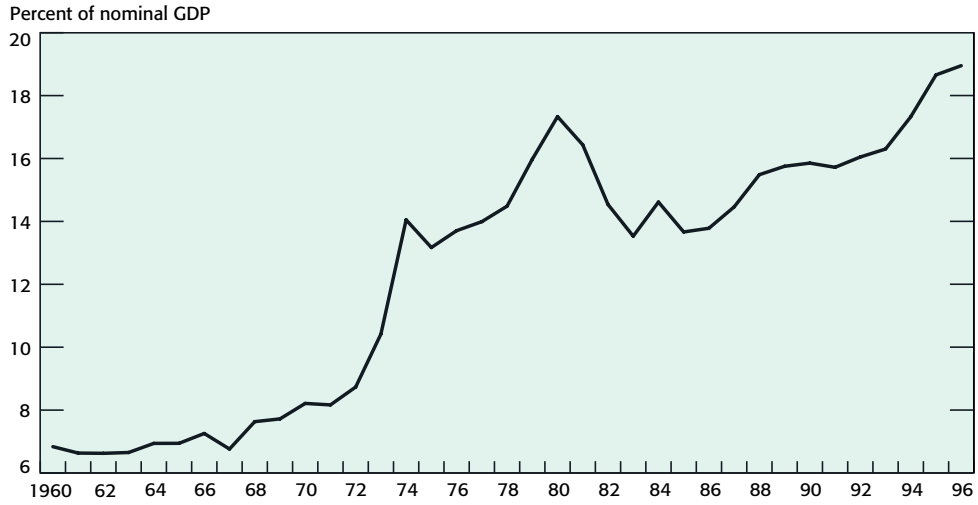
International Aspects of Monetary Policy

Monetary policy in the United States has long had an important influence on the rest of the world, primarily because of the U.S. economy's size and the dollar's role as a major reserve currency and medium of exchange for international transactions. Although monetary policy is mainly determined by domestic economic and financial events, the greater openness of trade and finance over the past two decades has meant that events in other parts of the world also influence U.S. monetary policy and the effects of policy actions on the domestic economy.

Barriers to both trade and capital flows have fallen substantially and world trade volumes have grown more than twice as fast as real gross domestic product (GDP) in the United States over the past thirty-five years. In 1960, total trade (exports plus imports) was equivalent to just 7 percent of U.S. GDP; that figure is now 19 percent (Chart 1). Cross-border capital flows have become a complex web of banking, securities, and direct investment transactions. The United States received net foreign capital inflows averaging almost $50 billion a year from 1990 to 1996, which helped to finance its large current account deficit.

The next section briefly describes the factors leading to increased interdependence in international capital markets. It is followed by a section highlighting the special role of the U.S. dollar. The subsequent section analyzes the international transmission mechanism of U.S. monetary policy. The chapter ends with a discussion of international influences on U.S. monetary policy.

Chart 1. **U.S. Merchandise Trade Flows**



Source: International Monetary Fund, *International Financial Statistics*.

The Shift to Floating Exchange Rates and International Capital Mobility

Two related sets of developments influenced the current international financial system: the widespread adoption of floating exchange rates in the 1970s and the progressive dismantling of restrictions on international capital flows in the 1980s. The first was the abandonment in the early 1970s of the Bretton Woods system of pegged exchange rates, which set the stage for the move to floating exchange rates. The change occurred in an environment in which there was both a growing belief in allowing markets to adjust and a series of strains on the old system arising from persistent U.S. balance of payments deficits, worsened by the emergence of inflation in the United States. The floating-rate system that replaced the Bretton Woods regime relies on a highly visible price adjustment mechanism—the U.S. dollar's[1] exchange rate against other major currencies—to remove U.S. international payments imbalances. At the same time, central banks have gained greater independence in conducting domestic policy, because they are not obliged to intervene to support fixed exchange rates.

The second set of changes was the gradual removal of restrictions on international capital flows. Foreign exchange and capital flow controls had restrained—with declining effectiveness—the potential flows of capital that

had been encouraged, in part, by economic imbalances under the old system. The United States eliminated most capital controls with the advent of floating exchange rates. Other countries gradually reduced capital controls because of such contributing factors as free-market philosophies and pressures from shifting payments imbalances that proved wider than those under the Bretton Woods system.

The two sets of changes have had varying implications for the effectiveness of monetary policy. Under flexible exchange rates, domestic policy actions are more independent than under relatively fixed exchange rates because policy is less constrained by official balance of payments settlements. In addition, exchange rate changes can be used to reinforce the effects of monetary policy on the domestic economy. For example, a tightening of monetary policy, ceteris paribus,[2] tends to restrain U.S. inflation and, over time, economic growth, driving up the dollar's exchange rate. A higher exchange rate, in turn, shifts trade from the United States to other countries and contributes to slowing U.S. economic growth.

At the same time that flexible exchange rates have made monetary policy potentially more effective, freer capital movements have made the policy transmission mechanisms more complex than they were in the 1960s. Freer capital movements promote rapid and widespread financial adjustments to U.S. monetary policy actions in advance of the slower and more complicated real-sector and price adjustments.

The Special Role of the Dollar in International Financial Markets

The U.S. dollar, the world's most actively traded currency, has a qualitatively distinct role from other currencies. The dollar serves many monetary functions outside the United States—it is an intervention and reserve currency, a medium of exchange, a unit of account, and a store of value.

Foreign central banks use the dollar as an intervention and reserve currency. For example, the Bank of Canada manages the float of the Canadian dollar by exchanging U.S. and Canadian dollars in the foreign exchange market to influence the exchange rate. Foreign central banks hold a large portion of official international reserves in the form of U.S. dollars and dollar-denominated assets, partly because of the dollar's role as an intervention currency. From 1990 to 1996, foreign central banks held an average of 55 percent of their official reserves in dollar-denominated assets.[3] In contrast, foreign central banks held on average only 15 percent of their reserves in German marks or mark-denominated assets and 8 percent of their reserves in Japanese yen or yen-denominated assets.

The dollar is also a medium of exchange in the foreign exchange market. Exchanges between third currencies often take place through dollars rather than directly. For example, if a Mexican bank needs Spanish pesetas, instead of buying the pesetas directly with Mexican pesos, the bank would likely buy dollars for pesos and then use the dollars to buy pesetas. Because of this special role, the U.S. dollar market is the largest part of the foreign exchange market in foreign centers, and New York is one of the largest foreign exchange centers in the world. Of the $1.2 trillion average daily trading volume in the world's foreign exchange markets, 83 percent of transactions involved the dollar, and 32 percent occurred in the United States. In contrast, 37 percent of transactions involved the German mark and 24 percent the Japanese yen.[4]

The dollar acts as a unit of account.[5] International commercial contracts are most commonly denominated in dollars, even when neither party to the contract is based in the United States. This practice is most common in raw material and commodity markets, which are unified globally and deal in standardized contracts. In many cases, payment is also made in dollars. For example, European countries use dollars to pay for oil from the Middle East. Furthermore, Japan's imports of raw materials from Southeast Asia are largely denominated in dollars. Thus, the dollar acts as an international money, providing a portion of the international economy with the advantages of having a single medium of exchange.

Finally, just as foreign central banks accumulate dollar reserves, both businesses and individuals abroad use the dollar as a store of value, either in the form of currency or bank deposits. It has been estimated that between 50 and 70 percent of the stock of U.S. currency is now held outside the United States.[6] In addition, the Bank for International Settlements (BIS) estimates that U.S. dollar deposits in banks outside the United States averaged $530 billion per year from 1991 to 1996.[7]

Foreigners choose to hold the U.S. dollar because of its wide international acceptance and because it is a relatively stable source of purchasing power. The use of the dollar as a store of value is particularly pronounced in countries with a great deal of economic or political uncertainty. Currency is often preferred to bank deposits because of its anonymity and, in some countries, because of low confidence in the banking system. In a few countries, such as Liberia and Panama, the dollar is actually used as the domestic currency. In other countries, such as Argentina and Russia, dollars are widely used in the wake of episodes of rapid inflation.

International Transmission Channels of U.S. Monetary Policy

How, and through what channels, does a change in U.S. monetary policy affect the economies of other countries? This section describes how an easing of domestic monetary policy influences financial and economic conditions in other countries, conditions that, in turn, affect the U.S. economy.

1. The Influence of Financial Markets

The international money market, the capital market, and the foreign exchange market represent the most immediate channel for transmitting U.S. monetary policy to other countries. The financial market response to a U.S. monetary policy action depends on an interplay of domestic and foreign influences.

A U.S. monetary easing, ceteris paribus, reduces nominal and real interest rates on short-term dollar investments relative to those abroad.[8] The lower rates encourage investors to shift from dollar to foreign currency assets, placing downward pressure on the exchange value of the dollar and on foreign interest rates. Investment decisions reflect both the exchange rate risk involved in international transactions and the ease of making such transactions.

This consideration comes into play as investors and borrowers compare expected rates of return across currencies expressed in the home currency. For example, a U.S. investor compares the expected nominal return on an investment denominated in dollars to the return on a foreign currency investment expressed back in dollars. The nominal dollar return on the foreign currency investment consists of its nominal interest rate plus the expected change in the exchange value of foreign currency, with an adjustment for the risk of uncertainty in the exchange rate.[9]

A U.S. borrower, however, compares the nominal interest rate, which is the cost of borrowing in U.S. dollars, to the cost of borrowing in a foreign currency expressed in dollars. A foreign investor compares the nominal return in the currency of the home country with the return on U.S. dollar investments expressed in the home currency. The foreign investor adds the expected change in the exchange value of the dollar to the nominal dollar interest rate and subtracts an adjustment for risk. A foreign borrower makes a similar comparison of borrowing costs in the home currency and in U.S. dollars expressed in the home currency.

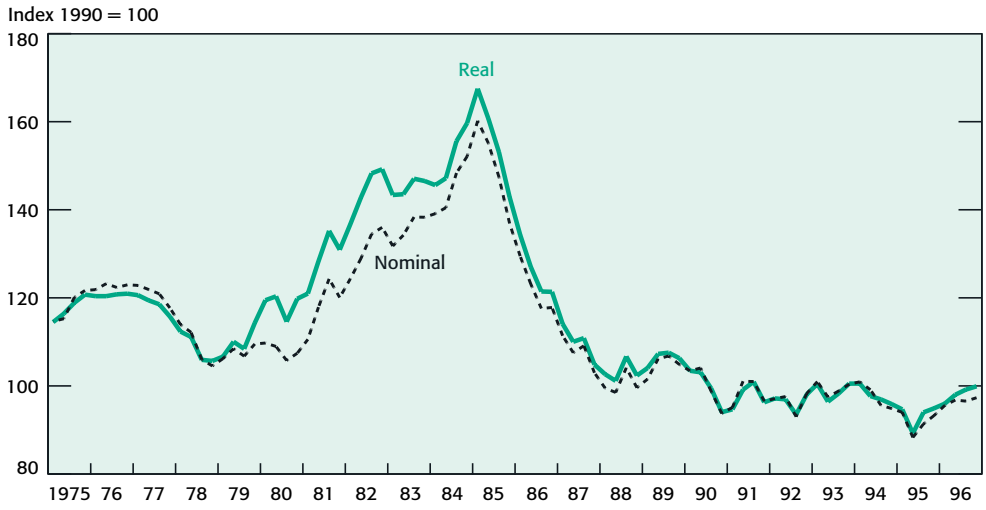
These comparisons by investors and borrowers contribute to a fundamental economic process. Because investors and borrowers

ultimately decide to save and borrow based on the *expected* real interest rate in their home country, their comparisons of international returns adjusted for exchange rates lead to a mechanism that compares *real* interest rates across countries adjusted for the expected change in the real exchange rate over the holding period.

A change in the U.S. real exchange rate is the change in the nominal dollar exchange rate adjusted for changes in the dollar's purchasing power relative to foreign currency (that is, the difference between U.S. and foreign inflation). The real exchange rate therefore expresses the relative value of U.S. goods in terms of foreign goods. Changes in the ex ante real exchange rate cannot be measured directly and are commonly measured by changes in the ex post real rate.[10] Chart 2, which illustrates the nominal and real U.S. effective exchange rates weighted against sixteen industrial countries, shows that exchange rates in recent years have been fairly stable.[11]

A decrease in U.S. ex ante real interest rates relative to those abroad reduces the foreign exchange value of the U.S. dollar and creates incentives for domestic and foreign investors to purchase foreign currency financial assets. Borrowers turn to the U.S. dollar markets from markets with higher real interest rates. The incipient flows eventually bid down the U.S. dollar exchange rate, altering supply and demand across national capital markets to bring real

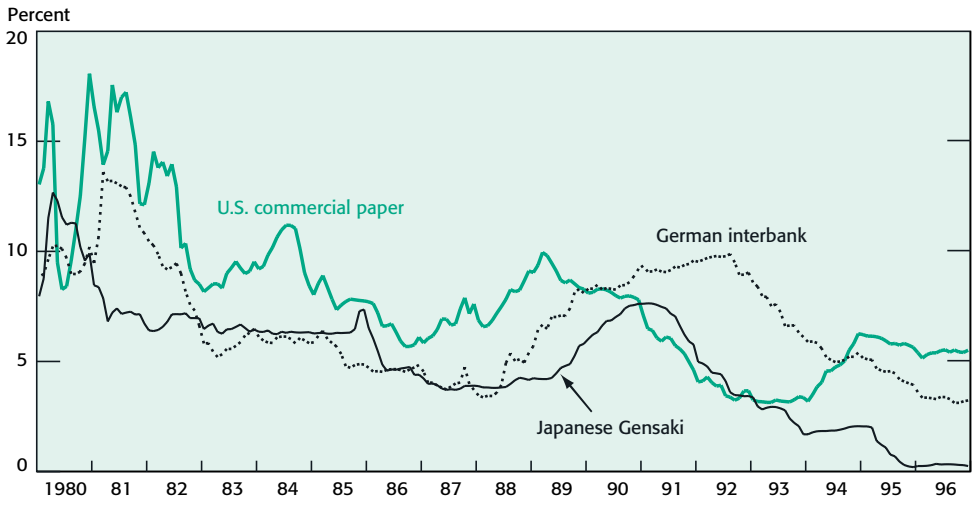
Chart 2. **U.S. Effective Exchange Rates**
Weighted against Sixteen Industrial Countries



Source: International Monetary Fund, *International Financial Statistics*.

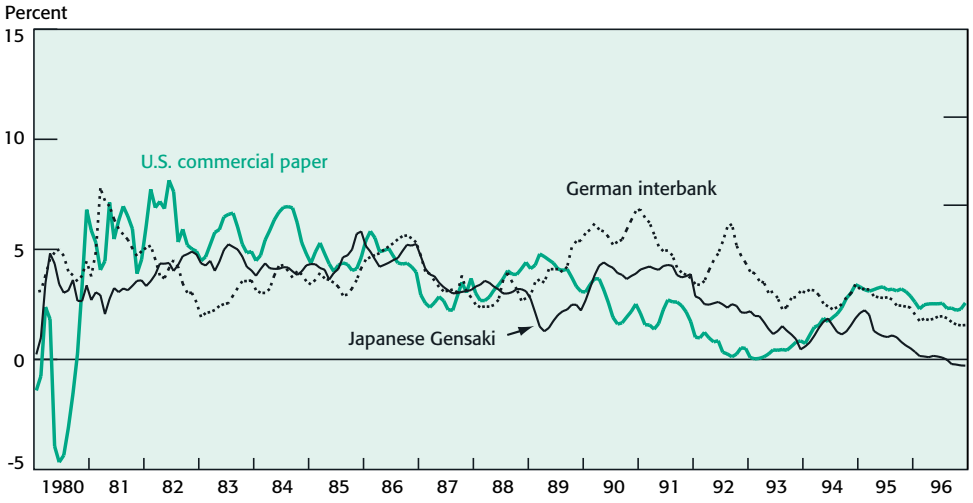
interest rates into closer alignment. Charts 3 and 4 illustrate, respectively, nominal and real short-term interest rates in the United States, Germany, and Japan.

Chart 3. Nominal Three-Month Interest Rates



Sources: Organization for Economic Cooperation and Development; *Financial Times*.

Chart 4. Ex Post Real Three-Month Interest Rates



Sources: Organization for Economic Cooperation and Development; *Financial Times*; International Monetary Fund.
Note: Real interest rates are nominal rates less the three-month moving average in consumer price index inflation.

The effect of a decline in nominal interest rates can be offset by an equivalent reduction in inflationary expectations. When lower expected inflation produces higher real rates, it leads to an increase in the expected future dollar exchange rate, reflecting the dollar's anticipated gain in relative purchasing power. The reduced nominal return on dollar assets largely compensates investors for higher expected dollar appreciation (or lower expected depreciation). In this case, falling nominal interest rates do not induce investors to switch their assets from U.S. dollars to other currencies.

While a U.S. easing tends to lower the exchange value of the dollar, the extent of this decline depends in part on foreign central banks' monetary policies. If economic and inflationary pressures abroad are weak, or if the foreign central bank is stabilizing the foreign exchange value of its currency, the central bank may also ease its short-term interest rates. In this case, the dollar's exchange rate may undergo little or no change. However, if a foreign central bank maintains its interest rate levels for domestic policy reasons while the United States lowers its rates, the dollar may fall.[12]

The effects depend further on market perceptions of U.S. and foreign monetary policy stances. Central banks can have considerable influence over short-term interest rates. Hence, market perceptions may be reflected primarily in changes in the spot exchange rate and in relative long-term interest rates, changes which themselves reflect reactions to the policy moves and expected longer term relative price performance. If the U.S. monetary easing is viewed as inflationary but the foreign central bank's stance is not, U.S. long-term interest rates may rise, while foreign rates remain unchanged. The relatively higher U.S. long-term rate compensates investors for lower expected future exchange losses.

In practice, because interest rates and exchange rates are simultaneously determined, it is difficult to predict accurately the net response to a monetary policy action. However, reduced U.S. nominal and real interest rates, ceteris paribus, tend to lower the exchange value of the dollar unless there are offsetting shifts in inflationary expectations or simultaneous reductions in interest rates by foreign central banks.

2. International Effects of Changes in U.S. Real Activity and Prices

When a monetary easing reduces U.S. interest rates, the real economy expands and prices of goods and services rise, affecting the exchange rate and the trade account. For example, a lowering of the Federal funds rate stimulates domestic demand and increases

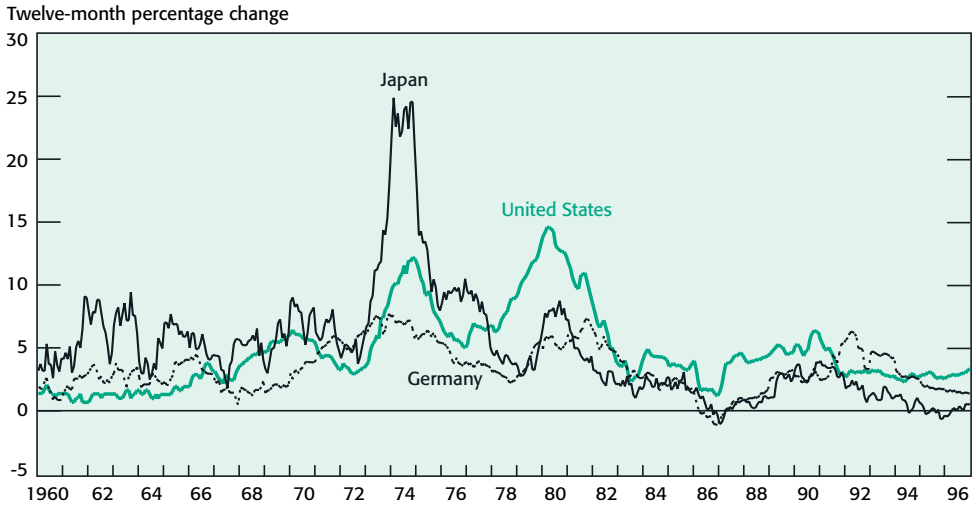
U.S. demand for imported goods and services over the next few quarters. If the easing also raises domestic prices of goods and services, both foreign and domestic customers have an incentive to shift from U.S.-produced goods to foreign goods. Together, these factors tend to increase U.S. import demand and reduce foreign demand for U.S. exports. Thus, the trade surplus will decline or the deficit will widen.

If the monetary easing also produces a decline in the real foreign exchange rate, the stimulative effects of the easing on the U.S. economy are reinforced. A lower dollar exchange rate makes foreign goods more expensive relative to domestic goods and U.S. goods more attractive in overseas markets. Both U.S. and foreign customers have an incentive to shift to relatively less expensive U.S.-produced goods and services from those produced abroad, offsetting part of the effect of higher U.S. growth on trade.

While higher U.S. demand and a lower dollar are both stimulative to the U.S. economy, they have offsetting, long-run effects on foreign economies. The expansionary effects initially predominate. From the foreign country's perspective, the increased U.S. demand for imported goods resulting from higher U.S. growth and prices provides a stimulus to production, while the lower dollar channels demand back to the United States by making U.S. goods and services relatively less expensive. Changes in U.S. real income quickly affect U.S. trade flows, but several quarters can pass before the major effects of changes in prices and exchange rates become apparent. Hence, a U.S. monetary policy easing is usually initially stimulative to foreign countries. This stimulus eventually feeds back—albeit weakly—to the United States through higher demand for U.S. exports and through changes in the price competitiveness of U.S. goods and services.

This type of cross-border interaction between policy moves and economic performance strengthens the role of medium-term interdependence between the United States and the rest of the world, while it still leaves a substantial role for purely domestic factors. During the 1970s and 1980s, the mix of interdependent and independent factors can be seen in the inflation process in three representative industrial countries—the United States, Germany, and Japan. Although floating exchange rates give some scope for independent monetary policy, when the economies themselves are interdependent (through trade and a dependence on common raw materials), complete independence is often infeasible. Germany and Japan tried to shelter their economies from inflationary U.S. monetary policy and a spike in oil prices in the late 1970s, but they were only partly successful, as can be seen in Chart 5. The

Chart 5. **Consumer Price Inflation**



Source: International Monetary Fund, *International Financial Statistics*.

simultaneous efforts of the industrial countries to combat inflation brought about an extended period of disinflation in the first half of the 1980s. Inflation has remained moderate since the mid-1980s.

International Influences on U.S. Monetary Policy

The Federal Reserve generally does not directly adjust its policy in response to international developments,[13] but it may do so indirectly when the developments affect domestic economic indicators. International developments often have an impact on U.S. economic growth and prices. For example, a political development that reduces the value of the dollar or a supply restriction that raises internationally traded commodity prices tends to raise import prices and can create domestic inflationary pressures. In formulating domestic policy, the Federal Open Market Committee (FOMC) monitors changes in the dollar and commodity prices; it may respond to them if the movements appear to signal significant changes in U.S. inflationary pressures or U.S. real economic activity.

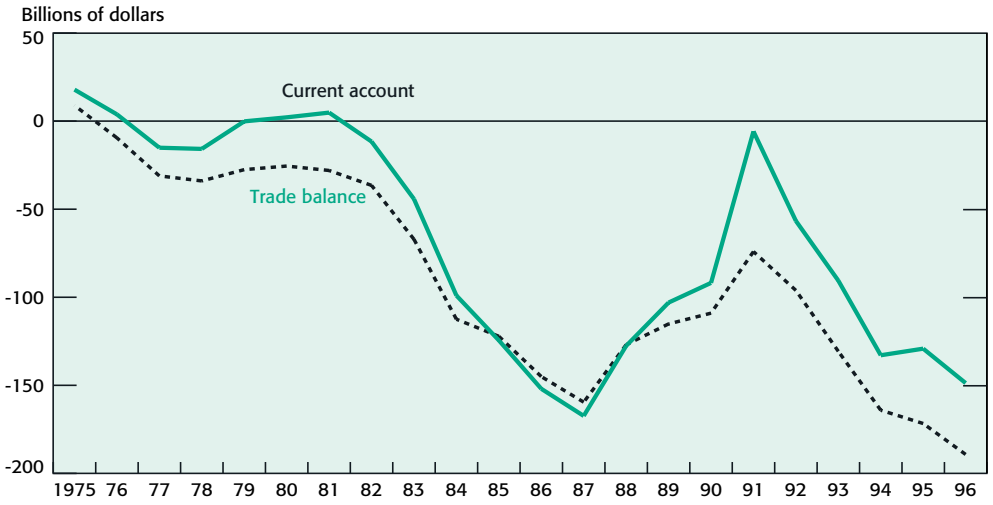
International developments can move countries away from both domestic goals and external goals. The oil shocks of the 1970s illustrate this point well: policy stimulus to offset the contractionary effects of the oil price increases worsened the already large current account deficits arising from the

higher cost of oil imports. Indeed, past experience has shown that countries with large current account deficits cannot long escape assigning considerable weight to the external goal—even though it conflicts with domestic objectives.

Because of the size of the U.S. economy and the important role of the dollar, the United States has perhaps more latitude than most countries in placing domestic policy goals above external considerations. In the United States, instances in which domestic objectives had to be sacrificed in the interest of external concerns have been rare. Such conflicts are possible, however. For example, economists have worried that such high dollar interest rates would be required to attract private financing for the large U.S. current account deficit that domestic growth would slow sharply.

As a reflection of growing interdependence among countries, international monetary and fiscal policy coordination has often had an important role in the formulation of U.S. monetary policy. The extent of policy coordination has been greater at some times than others, as disagreements sometimes arise about the distribution of the costs and the risks involved in any coordination effort. The emergence of large U.S. current account deficits since 1982, evident in Chart 6, has prompted intense debate among the major industrial countries. The issue still being resolved is the relative magnitude of adjustment to be undertaken by each as they shape a collaborative approach toward reducing the international monetary imbalances.

Chart 6. **U.S. Current Account and Merchandise Trade Balance**



Source: International Monetary Fund, *International Financial Statistics*.

Foreign Exchange Market Intervention

Intervention in the foreign exchange markets by the U.S. Treasury and the Federal Reserve is undertaken to restore orderly conditions in the exchange markets and at times to influence exchange rates. As explained in Chapter 5, the U.S. Treasury is primarily responsible for foreign exchange policy, but developments in the foreign exchange markets have important ramifications for U.S. financial and economic conditions and therefore for monetary policy and the Federal Reserve. Decisions to intervene in the foreign exchange market are made jointly by the U.S. Treasury and the Federal Reserve; the Trading Desk at the Federal Reserve Bank of New York conducts the operation.[14] At times since the mid-1980s, interventions have been coordinated actions by governments and central banks of the other Group of Seven countries.[15]

Foreign exchange intervention by a central bank primarily affects exchange rates by influencing sentiment of foreign exchange market participants. It may lead them to reassess their assumptions about the relative risks of short or long positions in foreign currency. In smaller markets, it may also have a direct effect on supplies and demands in the short run, although even in those markets, the volume of the intervention would generally have to be relatively large. The enormous expansion of transaction volume in the foreign exchange market (approximately $1.23 trillion a day in 1995, compared with $500 billion in 1989) has complicated the tasks of central banks in achieving a desired impact. Intervention may on occasion indicate a willingness to alter monetary policy to achieve an exchange market objective, and in some countries it can serve as a policy tool for altering short-term interest rates.

In the United States, the Federal Reserve and the Treasury use intervention for three general purposes. First, intervention can try to counter temporary but severe disruptions to liquidity and market stability. Second, and more broadly, intervention can signal official concern that exchange rates have deviated sharply from most measures of underlying value. Third, intervention can signal a change in official exchange rate policy or, more often, emphasize or clarify an existing policy.

Purchases and sales of foreign currencies by central banks generally involve an exchange of domestic currency reserves with the banking system and thus add or drain reserves. If a central bank (or finance ministry) offsets the full change in the monetary base produced by foreign exchange market intervention, then the intervention is sterilized. Sterilized intervention is a tactic used to influence market psychology and to signal central bank concerns. Its success depends on the readiness of market participants to interpret it as an indication of central bank policy resolve.

If a central bank (or finance ministry) offsets only part of the change in the monetary base, then the remainder is unsterilized intervention. Unsterilized intervention is a joint policy action involving both foreign exchange intervention and a monetary policy change. Since unsterilized intervention induces changes in the money supply and short-term interest rates of the intervening country, private residents and nonresidents have additional incentives to alter their investment and borrowing decisions.

The monetary effects of foreign exchange intervention by the United States are routinely offset under Federal Reserve operating procedures (see Box B in Chapter 6). The FOMC can and occasionally does change its monetary policy

Foreign Exchange Market Intervention *(Continued)*

stance in response to the same factors that inspired the exchange market intervention, but two separate decisions are involved. The intervention is never passively permitted to change reserves. Nor is intervention undertaken as a way of changing reserves, since domestic open market operations can be arranged when needed for that purpose.

In many other countries, however, the central bank does not automatically offset intervention in the exchange markets. On a technical level, open market operations in domestic securities are often limited by thin domestic financial markets. Hence, the operations cannot be as large or as frequent as they are in the United States. Some central banks may not have the domestic tools to achieve domestic goals and must operate in the exchange markets. Indeed, some foreign central banks use foreign exchange operations as an alternative to domestic operations for monetary policy purposes. They may choose to operate in the exchange markets rather than in domestic money markets under some circumstances because larger, more flexible operations may be feasible or because the sectoral and inflation consequences of intervention may be preferred to a domestic money market operation.[16]

Because foreign exchange intervention can be an important signal of central bank intentions, market participants try to detect and interpret intervention when it occurs. While the United States reports periodically on its foreign exchange intervention, few other countries release much information. As a result, market participants estimate dollar-related intervention from the growth of foreign exchange reserves abroad or the size of investments by foreign monetary authorities in the United States. These indicators can be misleading.

Increases in official reserves include nondollar reserves. For example, central banks participating in the exchange rate mechanism of the European Monetary System (EMS) have at times intervened substantially in EMS currencies to maintain agreed-upon exchange rate relationships. Most countries do not disclose the currency breakdown of their reserves, although the International Monetary Fund publishes periodic estimates in its annual reports.

The proportion of official financing of the U.S. current account deficit changes not only as foreign central banks accumulate dollar reserves, but also as foreign central banks shift the composition of investments of existing reserves among instruments. Official financing is the increase in the dollar reserves invested in the United States plus reductions in the reserves of the United States. Central bank investment of dollars tends to be confined to a relatively narrow but expanding spectrum of high-quality, highly liquid instruments. Traditionally, these instruments consisted of Treasury securities, deposits at commercial banks in the United States, private financial instruments such as bankers' acceptances, a minimum working balance at the Federal Reserve, and repurchase agreements arranged through the Fed. Now they also include Eurodollar deposits and other eligible Eurodollar instruments such as Eurocommercial paper or Eurobonds issued by governments or supranational agencies. Even in periods of little intervention, foreign central banks may shift their reserves between investments in the United States and those in the Eurodollar markets for portfolio considerations.

Chapter 10

Reflections on Recent Monetary Policy

Federal Reserve monetary policy procedures have undergone significant modifications since the late 1970s. While policy procedures have changed, the formal long-run goals have not. The Federal Reserve has continued to seek price stability and sustainable economic growth. Indeed, the experiences of the last few decades have emphasized the importance of eliminating inflation and adhering to a policy that promotes prolonged price stability.

Addressing the long-run goals has been complicated because traditional relationships among economic variables have become less dependable under the pressures of an evolving economy and financial system. Consequently, the Federal Reserve has found it more difficult to identify satisfactory indicators on which to base policy actions. In particular, a range of innovations has blurred the lines separating financial instruments that have some of the characteristics of money, making relationships among money, real economic activity, and prices harder to interpret. Consequently, new ways have been sought to gauge whether the stance of monetary policy is tight, neutral, or easy.

Two tools of policy—reserve requirements and Federal Reserve lending at the discount window—have also lost some of their effectiveness. Reserve requirements have fallen to levels that make them largely irrelevant to most depository institutions, and routine adjustment borrowing at the discount window has almost disappeared. Consequently, depositories have lost some

of the flexibility in reserve management that these tools used to provide. Execution of open market operations has had to take into account the banking system's reduced options for managing reserves, but so far the diminished effectiveness of the policy tools has not prevented the Fed from implementing monetary policy.

Fortunately, despite the breakdowns in traditional relationships among economic and policy variables, the Federal Reserve has achieved a considerable measure of success in moving toward price stability while sustaining economic expansion. The process is not complete, but good progress has been made.

Fighting Inflation

The last seventeen years have been marked by serious efforts to battle the inflation that began in the latter half of the 1960s and became embedded in the economy during the 1970s. Inflation rates since 1992, mostly in the 2 1/2 percent to 3 percent range (as measured by the consumer price index), are the lowest in a generation and are a vast improvement over the 13 1/2 percent peak rate in 1980. Nonetheless, even lower inflation rates are feasible, as demonstrated during the years from 1952 through 1965, when prices rose at an average 1.3 percent annual rate.

The experiences since the mid-1960s brought the costs of inflation and the difficulties of conquering it into sharp focus for those at the Federal Reserve who worked to overcome inflation and for governments, businesses, and consumers who struggled to plan around it. The inflationary period demonstrated that the benefits from pumping up the economy were short-lived. The so-called Phillips curve trade-off between the level of resource utilization and prices proved to be a temporary phenomenon that depended on "money illusion," or mistakes in distinguishing between nominal and real values. For example, workers may initially interpret changes in money wages as changes in real wages. With time, they would realize that what they cared about was the purchasing power, rather than the numerical value of their wages.

Indeed, because inflation distorts resource allocation, the relationship between economic activity and prices appears to be the reverse of the Phillips curve relationship over longer periods of time: *higher* average inflation rates tend to be associated with *lower* average real growth rates. For example, between 1952 and 1965, negligible inflation in the United States was accompanied by an average growth rate in real GDP of 3.3 percent.[1] The period from 1967 through 1980, when inflation was accelerating, was accompanied by an average real growth rate of 2.7 percent—a rate significantly

lower than that for the earlier period despite the stimulus to growth provided by the Vietnam War.

The costs of inflation were manifold: uncertainties about the likely return on investments discouraged long-term investment and savings. Interactions between the tax system and inflation raised some effective tax rates, discouraging related activities, and lowered other tax rates, encouraging those activities. Planners diverted resources from productive uses to the pursuit of strategies for minimizing the losses from inflation.

Because the U.S. dollar served as an international reserve currency, the inflationary pressures spread to other countries, even though some countries attempted to insulate their economies. For a time, the U.S. dollar's preeminent position as a world currency was threatened.

Ending inflation involved new costs. The Federal Reserve had to keep monetary policy tighter than it would have otherwise for extended periods, which held down average growth. Indeed, reining in inflation proved to be a long and difficult process. Several attempts during the 1970s to reduce inflation were cut short because of weakness in economic activity. Each round of renewed stimulus pushed the peak inflation rate to a new high. In consequence, the increased inflationary expectations became more and more embedded in the public's decision-making procedures. By the late 1970s, many observers questioned whether the Federal Reserve would ever reduce inflation permanently.

Consequently, in 1979, the Federal Reserve decided that substantial progress against inflation would have to be achieved quickly if the gains were to be sustained. It recognized that its efforts might involve greater short-run costs than a more gradual approach that gave people more time to adjust, but the evidence suggested that, in the circumstances prevailing, an aggressive approach was needed. By 1982, inflation had been brought down significantly. The lower 3 to 5 percent range of annual price increases was sustained through the balance of the decade, and signs of a pickup near the end of the 1980s were addressed promptly. These actions helped to build Federal Reserve credibility as an inflation fighter.

Efforts to guard against inflation cannot be relaxed, even when prices appear to have reached a point where inflation is no longer a concern in routine economic planning—the Federal Reserve's working definition of effective price stability. The risks that the political process will generate pressures for money expansion to pump up the economy, especially ahead of an election, or to pay for additional government-provided services will always be present.

Guidelines for Federal Reserve Monetary Policy

The Federal Reserve, and in particular the Federal Open Market Committee (FOMC), has long sought advance indicators of future changes in prices and economic activity because policy actions can take several years to have their full effects on the economy, especially on prices. But rapidly changing financial and institutional relationships have made traditional money and credit measures more difficult to interpret and less reliable as guides to appropriate policy.

One alternative approach is to "look at everything." A large array of information is almost certain to contain conflicting signals, however. The need to sort out contradictory information could delay the implementation of needed policy changes. Hence, the Federal Reserve has searched for a short list of potentially helpful indicator variables.[2] Nonetheless, none of the measures is infallible, and the Fed has continued to be guided by a relatively large number of variables.

Some of the indicators that the FOMC watches are based on the members' understanding of several aspects of the monetary policy process. Strains on the productive capacity of the economy are believed to encourage inflationary tendencies. Thus, the FOMC observes the estimated gap between actual and potential GDP, several measures of labor market tightness, and capacity utilization. Inflation arising from resource shortages can only be sustained if supported by accommodative monetary policy, but strains on capacity often signal that monetary policy has been on the easy side.

The Committee members also watch other indicators of future inflation. These include commodity prices, the monetary aggregates, estimated real interest rate levels, the shape of the yield curve, exchange rates, and trade patterns. Because conflicts among these indicators are common, considerable judgment is needed to discern the proper course of monetary policy.

Implementing Policy

Day-to-day implementation of monetary policy by the Trading Desk at the Federal Reserve Bank of New York has evolved both because of changes in the way the FOMC has formulated policy and because of the diminished roles of reserve requirements and the discount window. During the 1980s and early 1990s, routine discount window borrowing for other than seasonal needs almost disappeared in conjunction with the banking system's financial difficulties. Thus, varying the degree of reserve pressures could no longer be achieved by adjusting the amount of discount window borrowing forced on the banks.

The role of reserve requirements in establishing the banks' demand for reserve balances has also diminished as reserve requirement levels have fallen, both as a result of reductions in formal ratios instituted by the Board of Governors of the Federal Reserve System and as a result of actions by depository institutions to reduce their transaction deposits artificially.

Near-term policy has focused in recent years on achieving a relatively stable Federal funds rate. Doing so depends in part on depository institutions' having a reasonably predictable demand for reserve balances at the Federal Reserve. Depositories aim to hold enough reserves to avoid inadvertent overnight overdrafts and the associated penalties. They also seek to avoid unusable excess reserve balances on which they earn no interest. Recent reductions in reserve requirements have narrowed the range of reserve levels that a bank will find acceptable at day's end. The changes have introduced an element of instability to reserve demands. Even for many large depositories, meeting reserve requirements is no longer the prime motive for holding reserve balances. Most of the large banks compensated for the lower required reserve balances by holding required clearing balances that pay indirect interest. These balances restore some of the predictability and flexibility to reserve management strategies. But the cushion has still narrowed and the day-to-day margin for error has fallen. Furthermore, these banks seem to be uncomfortable about turning to the discount window in the event of a late-day reserve shortfall.

As of this writing, the difficulties in managing reserves stemming from the reduced roles of reserve requirements and the discount window have not been serious, although episodes of increased Federal funds rate volatility late in the day, along with heightened intra-maintenance-period variability in banks' desired excess reserves, have raised warning flags. Increased volatility in the overnight Federal funds rate could make day-to-day reserve management harder for depository institutions. It could also make gauging appropriate reserve provision more difficult for the Federal Reserve. Previously, as long as the Desk took actions to avoid very high or very low reserve balance levels on any day, it could direct most of its attention to achieving the two-week average objective for reserves keyed to average reserve requirements. As the banking system's ability to cope with moderate daily deviations of reserves has diminished, the Desk has found it necessary to pay more attention to daily levels of reserve balances.

Fortunately, the risk that funds rate volatility might mislead banks and other market observers about Federal Reserve policy intentions has been removed by the FOMC's decision to announce changes in intended interest rates right after the decisions are made. When no policy change has been

announced, observers can be confident that a move of the funds rate away from the previously indicated target does not signal a policy change.

Because volatility in the Federal funds rate is no longer likely to mislead observers about the thrust of Federal Reserve policy, it may not do much harm, but such volatility is not beneficial either. The policy implementation process would benefit from higher reserve balances to make the demand for operating balances more stable over the two-week maintenance period. Higher target balances would also allow more flexibility in day-to-day reserve management because depositories could absorb more of the unexpected end-of-day reserve surpluses and shortages.

Depository institutions will only wish to hold higher reserve balances if they are compensated in some way. Paying interest on required reserve balances would be the most direct way to accomplish this goal. In the past, objections have been raised on the grounds that the Treasury would lose revenue. But required reserve balances have fallen to such low levels recently that revenues from this source have dropped well below $1 billion a year and continue to decline. Thus, further losses from paying interest would be relatively small. Interest on required reserve balances would permit higher required reserve ratios without reducing the revenues of either the Treasury or depository institutions. (If reserve ratios were raised, the Federal Reserve would provide the reserves to meet them through additional securities purchases. The interest earned on those securities would cover the interest payments to the depositories.) Additional changes in the reserve structure may be part of the story in future editions of this book.

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 $100 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 1984.

    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.

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Charts, Tables, and Diagrams

Charts

Tables

Diagrams

U.S. Monetary Policy and Financial Markets describes how the Federal Reserve formulates and carries out monetary policy to achieve the twin goals of price stability and sustainable economic growth. The book offers a comprehensive account of the role of the Federal Open Market Committee in setting policy priorities and details the steps taken by the Federal Reserve Bank of New York's Trading Desk to implement those priorities through open market operations. The book also explains how policy is transmitted to the nation's economy through the banking system and financial markets and explores the effects of U.S. monetary policy on economic developments abroad.

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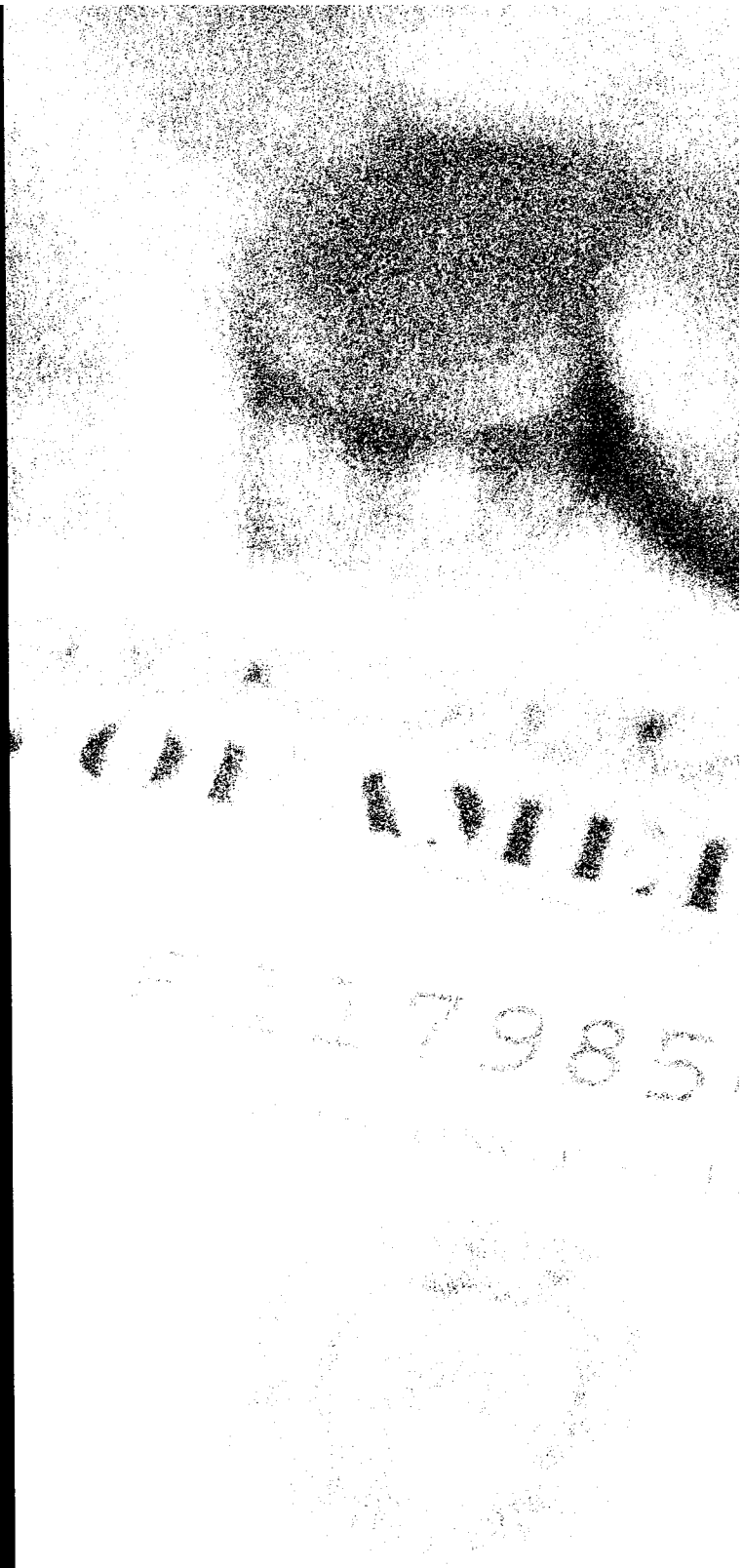

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