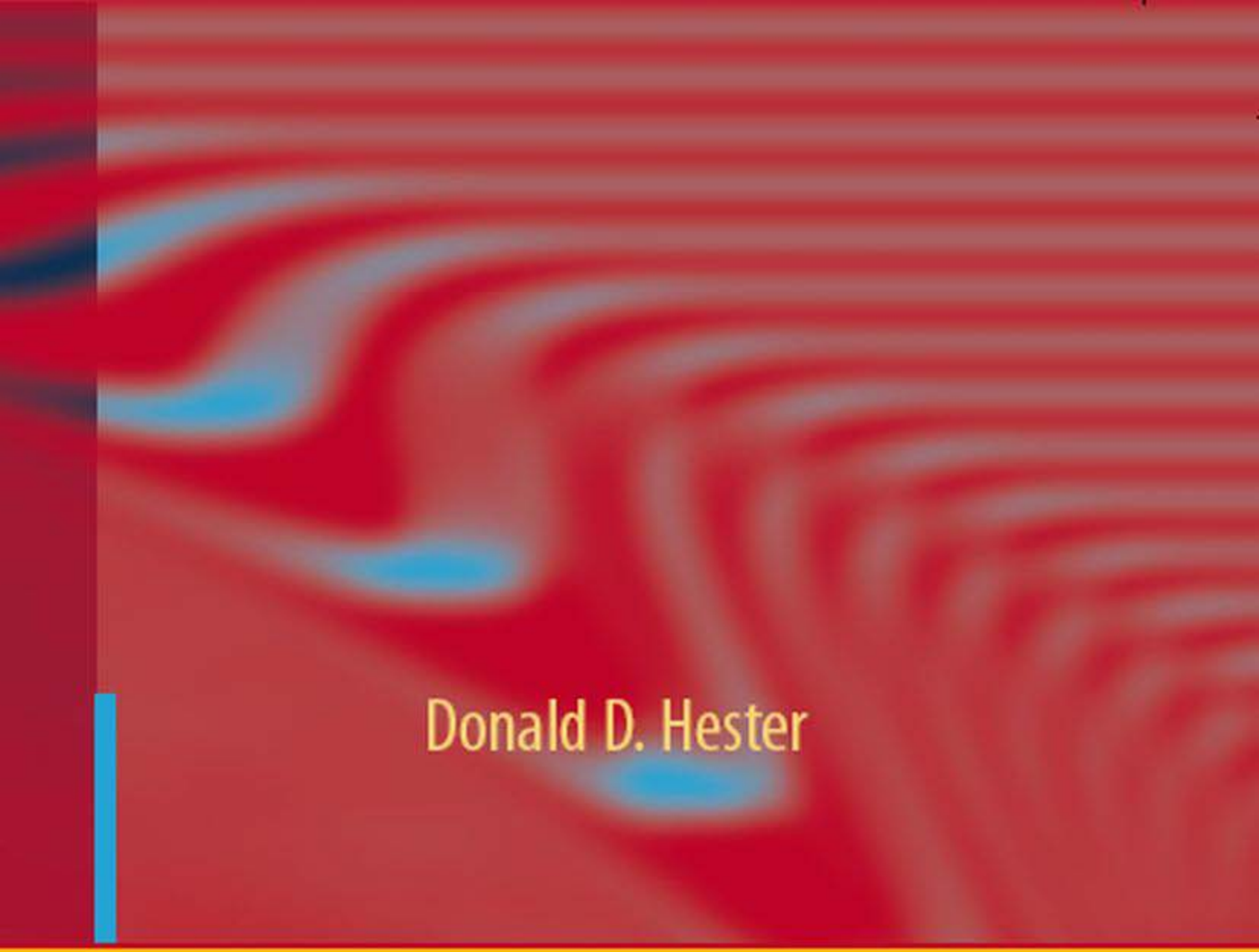

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Preface

In the forty years that I taught courses in finance and macroeconomics at Yale University and the University of Wisconsin, I have been amazed by the spectacular innovations that have occurred in finance and by the failure of textbooks and treatises to address this dynamism. This short volume describes what led to changes and what the changes mean for the conduct of monetary policy and financial markets. Change and innovation are unending and should always be the principal focus of financial institutions, regulators, and portfolio managers.

The first part of this monograph, chapters one through eight, describes the evolution of U.S. monetary policy from 1945 through 2007. In 1945 the portfolios of U.S. banks were heavily invested in government securities and interest rates were kept low by the Federal Reserve, because of a pledge to help finance the Second World War. In the ensuing years banks steadily shifted from securities to loans, and interest rates and the rate of inflation were volatile. Between 1955 and 1960, restrictive monetary policy and competitive pressures forced banks and other institutions to begin to develop new techniques in order serve their clients. In the following years the frequency of innovations and their complexity increased, which led to many changes in the formulation, sophistication, and conduct of monetary policy. Innovations continue to threaten the effectiveness of monetary policy and also the stability of financial markets, which in turn challenge regulatory policies that apply to financial institutions.

The second part of the monograph, chapters nine through eleven, examine changes in the practices of financial institutions in greater detail and analyze how innovations have affected flows of funds through financial markets and the distribution of income, risk, and wealth in the U.S.

My interest in banks dates from my undergraduate days at Yale when I worked as a research assistant for James Tobin. My dissertation on bank lending at Yale was partly supported by a Stonier Fellowship from the American Bankers Association. My first book was an empirical study of Indian banks that appeared in 1964. A later book, coauthored with James L. Pierce, Bank Management and Portfolio Behavior (Yale 1975), was a large empirical study of commercial and mutual savings banks in the U.S. After it appeared and a year spent as an academic visitor at the Federal Re-

serve Board, I have been generally working on financial market innovations and their consequences. In recent years, I have been particularly interested in changes in Italian banking, work that is summarized in Banking Changes in the European Union: An Italian Perspective (Carocci 2002), coauthored with Giorgio Calcagnini.

Monetary policy has always been a major focus of my research and teaching. My interest in a larger study of the effects of financial innovations can be traced to a conference organized by the International School on the History of Banking and Finance at the University of Siena and Professor Marcello De Cecco in 1989. Early drafts of chapters 9 and 10 of the present monograph were originally lectures at that conference. An early version of Chapter 6 has appeared as Chapter 1 in Monetary Policy and Institutions: Essays in Memory of Mario Arcelli (LUISS 2006). Comments that I have received on lectures given at the University of Siena, LUISS, the University of Ancona and the University of Bologna have been very helpful in sharpening my arguments. I am also grateful to my many colleagues and students at the University of Wisconsin – Madison for encouragement and invaluable interactions and suggestions over the years.

I am indebted to Niels Thomas of Springer Verlag who made several organizational suggestions that improved this book's appearance and accessibility. Dawn Duren very ably transformed my Word text into Springer's final template. Last, but certainly not least, this book could never have appeared without the unending encouragement and support of my wife, Karen. She read the penultimate draft and her suggestions vastly improved my exposition. I remain solely responsible for any remaining errors.

Madison, Wisconsin
February 5, 2008

Donald D. Hester

Contents

1 Introduction

The Federal Reserve System and its principal policy making group, the Federal Open Market Committee, have led the American economy along a challenging, obstacle-strewn path during the past sixty years. In the first part of the present volume I analyze this history in an attempt to explain why the path was taken and to predict what one can expect from monetary policy in the future.

The Federal Reserve System was established in 1914, after President Woodrow Wilson signed the Federal Reserve Act on December 23, 1913. It was intended to provide an "elastic" currency that would reduce the severity of continuing financial crises that plagued the U.S. economy. All nationally chartered banks and qualifying state chartered banks were members of the system. Its first twenty years were a period of learning and, ultimately, failure, as has been widely documented.[1] The Federal Reserve Act was repeatedly amended and the Federal Reserve System's monetary policy functions were fully specified for the first time in the Banking Acts of 1933 and 1935, which established the Federal Open Market Committee (FOMC). Monetary policy had been conducted in earlier years, but suffered from doctrinal and institutional confusion and obligations to fund the First World War. During the 1930s, large gold inflows were occurring that had the effect of expanding the monetary base. Fearing inflation, the Federal Reserve used its new discretionary powers to tighten reserve requirements three times in 1936 and 1937 by very large percentages and then largely offset the effects of these actions with open-market operation purchases through 1939. Shortly after Pearl Harbor was attacked in December 1941, the Federal Reserve assumed a passive role by agreeing to "peg" the yield curve so that Treasury costs of borrowing to finance the war would be contained.[2] With the cessation of hostilities in 1945, the Federal Re-

[1]There is a rich history of the evolution of the Federal Reserve System that has been concisely summarized by Dykes and Whitehouse (1989) and Crabbe (1989) in articles celebrating the 75th anniversary of the establishment of the Federal Reserve. See also Warburg (1930) and Meltzer (2003).

[2]The yield curve is a relation that plots yields to maturity on government securities against maturities of securities. Pegging the curve in this context implies that

serve would gradually play a more active role. Before analyzing policy, however, there are a few background matters that need attention.

1.1 Political Role of the Federal Reserve

As an institution created by law, the continuance of the Federal Reserve's charter is always subject to the tacit concurrence of the Congress. This means that it can never be completely independent of political pressures, which is entirely desirable in a democracy. The system was, nevertheless, conceived of as being at arm's length from concentrated economic and political power. It was initially protected from pressures that emanated from the money market in New York and from the federal government by establishing twelve equipotent semi-autonomous regional reserve banks that were only loosely controlled by the Federal Reserve Board. Protection from the New York market proved illusory, because the New York Federal Reserve Bank served as the managing agent for system transactions. Under its early governor, Benjamin Strong, it soon became the effective decision making center for the entire system. While the Board had the Secretary of the Treasury and the Comptroller of the Currency as *ex officio* members, they appear to have been ineffective in establishing Board policies.

When Strong died in 1928 a tragic power vacuum ensued, which effectively handcuffed the Federal Reserve during the greatest financial crisis ever faced by the United States. The Banking Act of 1935 addressed this problem by concentrating the power of the system in the newly constituted Board of Governors of the Federal Reserve System. However, it also tried to insure the Board's independence by removing the Secretary of the Treasury and Comptroller of Currency from the new Board of Governors, by giving each of the seven governors a fourteen-year appointment with staggered terms so that only one governor's term expired every two years, and by requiring that only one governor come from any one of the twelve

it is not allowed to shift or twist upward. As Meltzer points out, the Federal Reserve did not formally peg the curve; it only imposed a ceiling on the t-bill rate at 0.375%. ". . . but it established a pattern of rates that it maintained throughout the war and beyond." Meltzer (2003, p. 594). While the curve was effectively frozen by the Federal Reserve, adroit traders could and did obtain higher rates of return than the maximum yield paid on any given security because the curve was upward sloping. The price of a security is inversely related to its yield; a trader could "ride the yield curve" by buying a security with a high coupon, hold it for some time, and realize a sure capital gain as it approached maturity.

Federal Reserve Bank districts.[3] The FOMC consists of the seven governors, the President of the Federal Reserve Bank of New York and four other reserve bank presidents who rotate as active members of the committee.

This organizational structure continues to the present day, but has not insulated the Board from political pressure for a number of reasons. First, the Chairman of the Federal Reserve Board of Governors is very powerful because, within limits, he controls Board assignments, the flow of information from the Board's staff to other governors, regional Federal Reserve Bank budgets, and research resources. The Chairman typically has frequent contacts with and is pressured by prominent economic councilors of most administrations. Voting results from the FOMC are often unanimous, but there are dissents from the Chairman's recommendation and there have been a few reported occasions when a Chairman's vote was recorded in the minority.[4,5] As usual on committees, the Chairman expends a great deal of effort in forging coalitions and compromises.[6]

Second, in part because of this concentration of power, few Board members choose to complete fourteen-year terms. Thus, an administration appoints and the Congress approves Board members much more frequently than the 1935 act intended. Third, a Chairman's term is for four years. This means essentially that every new administration can appoint a new Chairman if it chooses. Fourth, Federal Reserve Bank presidents are appointed for five-year terms. Nominations for presidents are also subject to Board approval, so the independence of the FOMC is as compromised as that of the Board.

In part because of this lack of independence, the Chairman and other governors testify before committees of Congress quite frequently. In recent years, the Chairman also has been meeting weekly with the Secretary of the Treasury and other administration officials. Of course, there is an im-

[3]The 1935 Banking Act changed titles. Before the act the chief executive officer of a Federal Reserve Bank and the leader of the Federal Reserve Board were "governors"; after the act the chief executive officer of a bank is a "president" and the members of the Federal Reserve Board of Governors are "governors".

[4]Referring to the period 1965–1981, Woolley (1984, p. 61) reports: "For example, in FOMC votes on the monetary policy directive in a seventeen-year period, only 34 percent of votes involved any dissents at all, and of these split decisions, 60 percent involved only a single dissenting vote. That is, 86 percent of the time, FOMC decisions were unanimous or all but unanimous."

[5]See Kilborn (1985). For a reference to a similar event during G. William Miller's Chairmanship, see Greider (1987, p. 66).

[6]For a sense of the Chairman's power and how it is used, see Maisel (1973, Chap. 6), Blinder (1998, pp. 20−22), and Meyer (2004, Chap. 2).

portant distinction between communicating and control. The Federal Reserve can and does use powers that are specified by the Federal Reserve Act (as amended) without necessarily informing an administration or Congress. But there are limits, because intense political pressure can be brought to bear on the Board. Several vehicles such as the 1975 Congressional Continuing Resolution 133 and the Full Employment and Balanced Growth (Humphrey-Hawkins) Act of 1978 have required Federal Reserve Board Chairmen to explain and defend policies on a regular basis. The Humphrey-Hawkins Act expired in 2000, but semi-annual reports to the Congress in the format specified by the act continue to occur around February 20 and July 20 every year. Public authorities should be held accountable for their decisions!

Why does an element of independence reside with the Federal Reserve? There are several reasons. First, discretionary monetary policy is a technical undertaking that is not easily understood or explained. To implement policy in a timely fashion, it makes good sense to delegate decision making to an informed committee that can have a structured discussion and access to technical analysis. So long as the deliberations are disclosed in a timely fashion and are reviewable, the broad interests of citizens in a democratic society are well served. Not everyone agrees. This process of conducting monetary policy has led generations of politically conservative economists to argue for an alternative automatic rule like pegging the growth rate of some monetary aggregate or the level of some interest rate or having either measure follow some simple rule such as that proposed by John Taylor.[7] The difficulty with such rules, apart from Taylor's as is explained in the preceding footnote, is that they can become pernicious when financial innovations occur or when some emergency condition suddenly appears. War, banking crises, computer failures, and events like the failures of the Penn-Central Transportation Company in 1970 and Long-Term Capital Management in 1998 are examples of the emergency conditions I have in mind. Innovations are often pervasive irreversible changes that are likely to make any automatic policy rule obsolete and ultimately destructive.

[7]See Taylor (1993, p. 202). His rule was that, in the absence of extraordinary situations, a central bank should set a nominal short-term interest rate (like the federal funds rate) equal to a linear combination of the recent rate of inflation, the deviation of a four-quarter rate of inflation from the bank's desired rate of inflation, and the deviation of the percentage growth rate of real GDP from trend real GDP. His proposal has led to a very productive line of research that has been partly and conveniently described in Taylor (1999, Chap. 1)

Second, the Congress is a large and diffuse group of individuals who are besieged by special interests to vote one way or another. Some questions are so contentious that any decision might alienate a majority of constituents. Rather than being required to commit oneself, it is convenient to have an agency that is given the job of dealing with controversial or unpleasant matters.[8] Members of Congress can then explain to their constituents that they also don't like the handling of some matter, but it is out of their control because it falls under the jurisdiction of the Federal Reserve. Examples include a wide variety of regulations that the Board enforces, high or low interest rates, access to credit by minorities, and restrictive policies that increase unemployment. This arrangement allows congressional committees to hold hearings on Federal Reserve policies and allows members to express views that may console constituents without actually mandating changes in policy.

Third, monetary policy often has significant effects on other countries. It is diplomatically convenient to be able to say that the Federal Reserve is an independent agency whose actions are not necessarily those of the federal government. Indeed, one of the principal irritants to foreign governments in the days before the U.S. had a central bank was strong seasonal demand for funds in agricultural regions of the U.S. that drew gold from Europe. As noted above, an early assignment of the Federal Reserve was to provide an elastic currency that could mitigate these destabilizing seasonal flows.

Finally, the Federal Reserve has been given broad discretionary authority as a regulator of finance and bank holding companies, foreign banks operating in the United States, domestic banks, and other depository institutions. Indeed much of a Federal Reserve governor's time is expended on regulatory matters. This delegation of powers recognizes that banking practices and financial markets are constantly changing and that it is dynamically impossible for legislation to anticipate and proscribe practices and activities that have adverse consequences for individuals and institutions. An element of independence is unavoidable when such delegations occur. Retroactive legal redress is too costly, if indeed feasible.

1.2 Legislative Guidance

In addition to venting frustrations in hearings, every postwar Congress has extensively intervened with legislative initiatives that direct or limit the activities of the Federal Reserve or resolve "turf wars" that developed be-

[8]See Kane (1982) and Greider (1987, pp. 394, 428–429, and 532–534).

tween it and other government agencies. Several large investigations such as those of the Committee on Money and Credit (1958) and the Commission on Financial Structure and Regulation (1969) were undertaken by the Congress, although they did not immediately result in legislation. Many other initiatives originated with the Board itself when it sought additional powers to address newly perceived problems. It is not useful in the first part of this volume to attempt to summarize these legislative efforts, but they are considered in some detail in the second.

A brief survey of the evolution of legislation defining the Federal Reserve's macroeconomic mandate follows. The Federal Reserve Act of 1913 did not formally specify monetary policy goals that the new central bank was to pursue, beyond providing an elastic currency through the discount windows at regional Federal Reserve Banks.[9]

The Employment Act of 1946 did not mention the Federal Reserve, but specified that "it is the continuing responsibility of the Federal Government to use all practicable means . . . to foster and promote free competitive enterprise and the general welfare, conditions under which there will be afforded useful employment opportunities, including self-employment, for those able, willing, and seeking to work, and to promote maximum employment, production, and purchasing power (15 U.S.C. 1021.)."[10] This implicitly obligated the Federal Reserve to take into account how its policies affected employment in the United States.

After the severe recession of 1973–75, continuing high inflation, and a power void coinciding with the resignation of President Nixon, the Congress sought to define the Federal Reserve's macroeconomic policy posture formally in the Full Employment and Balanced Growth (Humphrey-Hawkins) Act of 1978. This act mandated that the central bank provide semiannual analyses of the state of the economy, objectives and goals that the FOMC had for monetary and credit aggregates, and their relation to unemployment and inflation rate goals that were defined in the Economic Report of the President and thus implied that there should be coordination between monetary and fiscal policies. After the expiration of the Humphrey-Hawkins Act in 2000, the FOMC has recently interpreted its charge as follows: "The Federal Open Market Committee seeks monetary and financial conditions that will foster price stability and promote sustainable growth in output".[11]

[9]See Judd and Rudebusch (1999).

[10]United States Congress Joint Economic Committee (1985, p. 1).

[11]Policy directive from the FOMC meeting of January 31, 2006.

1.3 Economic Guidance

Legislative guidance sets goals, but are they attainable? How can the Congress or the public know whether the Federal Reserve is actually behaving in a manner that will yield good results? A large and continuing controversy centers on whether discretionary policy is well founded and on whether disclosure is sufficient to insure that policy makers are acting in the public interest.[12] Part of the appeal of simplistic rules about the growth rate of a monetary aggregate is that they obviate this controversy. However, as noted above, these rules are seriously vulnerable to financial innovations and crises and they have not been adopted.[13]

Instead, an arcane logic has arisen that partly underlies discussions of monetary policy in the postwar period. The basic constructs are three sets of measures: targets, indicators, and instruments. Targets are goals that someone wishes to achieve, such as high employment, low inflation, a strong dollar, high growth, etc. Indicators are like touchstones; they signal whether a policy is good in the sense that it is achieving an analyst's weighted average of target variables. The importance of individual indicators has varied over time and across analysts.[14] Major indicators have been the monetary base, different monetary aggregates, unborrowed reserves, borrowed reserves, net free reserves, excess reserves, and selected nominal and real interest rates.[15] Instruments are tools that the Federal Reserve is able to use when conducting monetary policy. They have included open-market operations, reserve requirements, the discount rate, a large number of selective credit controls, and "moral suasion" (jawboning). As is described below, several of these instruments have been made obsolete by fi-

[12]See Simons (1936), Friedman (1948), Kydland and Prescott (1977), and Faust and Svensson (2001).

[13]The formal difficulty with innovations is that they change the relations among variables of interest in unpredictable ways that can make any rule unreliable and pernicious.

[14]The terminology of targets, indicators, and instruments is unfortunately not consistently used in discussions of monetary policy. Thus, sometimes targets are called "goals" and indicators are called "operating targets." Indicators such as monetary aggregates and bank credit measures are occasionally called "intermediate targets" and even instruments. For the last, see Blinder (1998, Chap. 2). *Caveat emptor*! For a useful discussion of the early evolution of operating and intermediate targets, see Wallich and Keir (1979). See also Kohn (1990).

[15]Net free reserves equals' excess reserves minus borrowed reserves or, equivalently, unborrowed reserves minus required reserves.

nancial innovations and regulatory changes. The logic is arcane because analysts often do not bother to describe the formal (mathematical) linkage between instruments, indicators, and targets. It has led to unending and unproductive controversy, but persists because it provides a platform and concepts that allow monetary policy to be quantitatively interpreted in public discourse.

An alternative and no less controversial approach resulted from attempts by econometricians to build formal macroeconomic models that incorporate policy instruments. There is no consensus about what model specification is best and the quality of time series data is too low to allow one to emerge. Financial innovations are just as damaging to formal econometric models as they are to simplistic rules. Further, while econometric and theoretical models attempt to describe the linkages between policy instruments and targets, they do not resolve controversies when analysts argue from different models that contradict one another.[16]

1.4 The Preparations for and Conduct of Open-Market Committee Meetings

While I have never attended an FOMC meeting, enough has been written and reported about one to provide a rough description of the process as it existed in the 1970s and 1980s, and probably at the time this is being written in 2007. In the decade ending 2007, the FOMC had eight scheduled meetings a year and a few unscheduled meetings. In recent years, after each meeting a brief statement summarizing the discussion is released and a "directive" is provided to the trading desk at the Federal Reserve Bank of New York, which establishes guidelines for the period ending in the next meeting. Each weekday between meetings, a telephone conference call involving all governors, one representative Reserve Bank president and some senior staff is held to discuss policy actions and events.[17]

An elaborate sequence of events commences after a meeting, in preparation for the next one. Staff at the Board adjust and update the Board's macroeconomic model, currently FRB/US, and use it to prepare a series of forecasts that describe the trajectory of the U.S. economy over roughly the ten quarters starting with next meeting. The forecasts differ because of dif-

[16]Indeed, it has been argued that indicators play an important role as a check on potentially unreliable forecasts that emerge from model-based or judgment-based approaches. See Kohn (1990, p. 2).

[17]For a recent statement of the daily ritual, see Board of Governors of the Federal Reserve System, (2005, pp. 40–41).

ferent assumptions about what is likely to transpire. At the same time another group of economists with specializations in different sectors of the economy work phone banks to gather information from other government agencies, trade associations, proprietary surveys, and nonfinancial firms in the private sector to get a "judgmental" picture of what these diverse groups believe is happening. Perhaps two weeks before the next meeting results from these two distinct groups are collated and a series of combined scenarios are assembled in a confidential "Green" book—so called because the cover of the book is green. Another group of Board economists collects information from financial markets and assembles a second confidential "Blue" book—with a blue cover. About midway between FOMC meetings, economists at the twelve Federal Reserve Banks survey conditions in each of their districts and provide a summary "Beige" book, which is in the public domain. This last book carries over the original spirit of the act establishing the Federal Reserve that its actions should be sensitive to the diverse interests and regions of the country.

Board members and bank presidents review these books in preparation for the coming meeting, where policy proposals are formalized. Federal Reserve banks also prepare materials for their bank presidents, who may not accept assumptions underlying the Board's forecasts. Participants at the meeting include all FOMC members, bank presidents who are not currently members, and senior staff. Depending upon who was the Federal Reserve Chairman at the time, there were variations in meeting formats, but the Chairman usually had the last word and proposed the wording in the directive and public summary statement, if there was one.

1.5 Initial Conditions

Twelve years of the Great Depression and four years of World War II had severely damaged and distorted the economy of the United States. There had been very limited private investment between 1931 and 1936 and during the war the stock of consumer durable goods was mostly depreciated because new goods were unavailable. Many manufacturing facilities had been converted to military production and had been very intensively used. As peace was achieved they would require large outlays for conversion to civilian production. While war production had reduced the civilian unemployment rate to about 1.9%, it was quite unclear what would happen when production facilities were reconverted and a large demobilization of military personnel took place. Rationing and rigid price controls were still in place.

In 1945 the Federal Reserve was obligated to peg the government securities yield curve. Treasury bills were yielding 0.375% and long-term bonds 2.5%. In December 1945, 57% of commercial banking assets were securities issued by the United States government, 22% were cash assets, and 16% were loans. Reserve requirements on reserve city and country Federal Reserve System member bank demand deposits were 20% and 14% respectively; the reserve requirement on member bank time deposits was 6%.[18] At the end of 1945 Federal Reserve Banks had total assets of $45 billion, which included $24 billion in government securities and $18 billion in gold certificates. Collectively, commercial banks had $160 billion in assets; with the exception of mutual savings banks, all other depository intermediaries were almost negligibly small. Because of traumatic experiences during the Depression, all depository financial institutions seemed to want highly liquid portfolios that could protect them from runs.

Households and firms held relatively large amounts of deposits and highly liquid government securities for similar reasons and because wartime shortages deterred them from acquiring goods. The markets for commercial paper and federal funds (funds traded overnight among commercial banks to meet their reserve requirements) had largely atrophied; interest rates were so low that it didn't pay firms or banks to deal in such assets.

It is convenient to organize the discussion in Part 1 using chapters that correspond to the terms of chairmen of the Federal Reserve Board. One or more brief tabular descriptions of the economy and monetary indicators for the corresponding period appear in each chapter.

[18]Most commercial banks in the United States were chartered by states and most state banks were small and not members of the Federal Reserve System. Unless state banks were members of the Federal Reserve System, they typically had reserve requirements that differed from and were less restrictive than those established by the Federal Reserve.

2 Marriner S. Eccles and Thomas B. McCabe: 1945–1951

The war with Japan ended in August 1945. The Federal Reserve had played a major role in the war effort by preventing the yield curve from rising and, especially, the rate on Treasury bills (hereafter, t-bills) from rising above 0.375%. As a result of its extensive purchases, the Federal Reserve's share of outstanding federal debt had risen by 50% between December 1939 and December 1945, more than half of which was in the form of t-bills.[1] The future course of the economy was very uncertain. A large number of economists feared that the economy might tumble back into a depression because of the expected large reduction in federal spending on the war and sharp reductions in armed forces personnel. Others recognized that production facilities had been severely depleted by high wartime operating rates and that stocks of consumer durables and housing were depleted by the Great Depression and wartime shortages. They feared that inflationary pressures would become very great, especially if rationing and price controls were removed quickly. Both would be removed in 1946. In addition to these concerns, the Federal Reserve was worried that a rise in interest rates might inflict large capital losses on banks and others who were holding bonds.[2] As a result, its initial policy in the postwar period was to continue pegging interest rates on government securities.

It is important to recognize that information available in 1945 was seriously incomplete as can be seen in Table 1. Quarterly National Income and Product Account (NIPA) statistics would not become available until 1947 and many financial measures that guided decisions in later periods were not available. The money stock measure, M1, is a rough approximation of the formally defined quantity, which the Federal Reserve began to report only in January 1959. The unemployment rate and civilian participation rates were redefined in 1948; comparable data for earlier years are not available.

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[1]See Goldenweiser (1951, pp. 197, 210).

[2]Interest rates and prices of bonds are inversely related; when market rates rise the prices of outstanding bonds fall.

Table 1. Summary Quarterly Data for 1945:1 through 1951:1

quarter	M1	dis-count rate	treas-ury bill rate	dis-count bor-rowing	unem-ploy-ment rate	civilian partici-pation rate	nomi-nal GDP	GDP defla-tor	annual % rate infla-tion	federal surplus	reserve bank credit
1945:1	n.a.	1.00	0.38	0.198	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	19.8
1945:2	n.a.	1.00	0.38	0.527	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	21.6
1945:3	n.a.	1.00	0.38	0.312	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	22.9
1945:4	n.a.	1.00	0.38	0.428	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	24.3
1946:1	n.a.	1.00	0.38	0.345	n.a.	n.a.	n.a.	n.a.	n.a.	-14.0	23.9
1946:2	n.a.	1.00	0.38	0.223	n.a.	n.a.	n.a.	n.a.	n.a.	- 6.6	23.4
1946:3	n.a.	1.00	0.38	0.132	n.a.	n.a.	n.a.	n.a.	n.a.	- 0.9	24.2
1946:4	n.a.	1.00	0.38	0.158	n.a.	n.a.	n.a.	n.a.	n.a.	0.9	24.4
1947:1	109.8	1.00	0.38	0.161	n.a.	n.a.	237.2	15.10	n.a.	5.9	24.2
1947:2	111.6	1.00	0.38	0.123	n.a.	n.a.	240.5	15.33	6.42	5.2	22.4
1947:3	112.6	1.00	0.74	0.117	n.a.	n.a.	244.6	15.60	8.46	2.0	22.5
1947:4	113.1	1.00	0.91	0.223	n.a.	n.a.	254.4	15.99	6.43	7.9	22.8
1948:1	113.1	1.25	0.99	0.219	3.7	58.7	260.4	16.11	3.29	7.7	21.8
1948:2	112.1	1.25	1.00	0.118	3.7	58.8	267.3	16.25	5.48	5.1	21.2
1948:3	112.2	1.41	1.05	0.103	3.8	59.0	273.9	16.56	4.14	1.4	22.1
1948:4	111.8	1.50	1.14	0.121	3.8	58.8	275.2	16.60	- 0.30	0.2	23.9
1949:1	111.2	1.50	1.17	0.142	4.7	58.9	270.0	16.53	- 2.99	- 3.4	22.7
1949:2	111.4	1.50	1.17	0.125	5.9	58.8	266.2	16.35	- 3.36	- 6.5	20.8
1949:3	111.0	1.50	1.04	0.093	6.7	59.1	267.7	16.26	- 0.96	- 6.5	18.6
1949:4	111.0	1.50	1.08	0.099	7.0	59.4	265.2	16.27	- 0.42	- 6.2	18.5
1950:1	112.0	1.50	1.10	0.095	6.4	58.9	275.2	16.22	0.17	- 8.4	18.4
1950:2	113.7	1.50	1.15	0.083	5.6	59.2	284.6	16.29	5.01	2.8	18.1
1950:3	114.9	1.61	1.22	0.128	4.6	59.3	302.0	16.63	7.99	13.5	19.0
1950:4	115.9	1.75	1.34	0.118	4.2	59.3	313.4	16.95	11.23	14.2	20.6
1951:1	117.1	1.75	1.37	0.261	3.5	59.3	329.0	17.58	8.42	17.2	22.9

Sources: Federal Reserve Bank of St. Louis FRED data bank and Board of Governors of the Federal Reserve System, (1976a). M1 was constructed by averaging monthly data from the last source, (p. 17). The inflation rate was constructed from the immediately preceding series (base 2000 = 100) as an arc elasticity, centered in each quarter. Data on the quarterly federal surplus are from the FRED data bank until 1947:1 and thereafter from the BEA web site. All dollar-denominated quantities are in billions of current dollars. The data reported in this and subsequent tables differ from information that was available to the Federal Reserve when it was making policy decisions, but generally not greatly. Later estimates are used in the hope that they are likely to be more accurate, but they are surely not error free.

The discount window and t-bill interest rates in the table clearly indicate that the Federal Reserve was shielding bondholders against rising interest

rates through the first half of 1947 in the presence of strong inflation. Then, at the end of Chairman Eccles term, first the t-bill rate and then the discount rate were allowed to rise.[3] During these years the discount rate was always above the t-bill rate and, in this limited sense, a penalty rate. The rise in interest rates precipitated a controversy between the Eccles-era Federal Reserve and the Truman administration, which may have contributed to Eccles being replaced by McCabe as Federal Reserve Chairman.[4] Unlike Eccles, McCabe was a more passive leader. Eccles, who remained on the Board, and Allan Sproul, the President of the Federal Reserve Bank of New York, often presented FOMC positions to the public. Rising interest rates and a 1948 tax cut led to growing federal deficits as can be seen in the table. The tax cut turned out to be fortuitously well timed because the economy was entering a recession, as can be inferred in the table from the civilian unemployment rate and the fact that real GDP was lower in every quarter of 1949 than it was in the last half of 1948.[5,6]

Because of deflation beginning in the fourth quarter of 1948, it can be inferred that the real t-bill rate rose sharply then and stayed high into the second quarter of 1950, which implies that monetary policy was not expansionary. The Federal Reserve's efforts to raise short-term interest rates were not well timed, but were unlikely to have caused the recession. The recession ended in the first quarter of 1950 when real GDP rose rapidly.

A "normal" recovery from the recession was disrupted by North Korea's invasion of South Korea in June 1950. Apparently, U.S. consumers and firms vividly recalled World War II shortages, because they went on a buying binge that resulted in a high rate of inflation. Purchases of consumer durable goods jumped 20% in the third quarter and stayed high for the subsequent two quarters. Gross private domestic investment jumped

[3]Eccles was Chairman or Chairman Pro Tempore from November 15, 1934 through April 15, 1948.

[4]Eccles remained on the Federal Reserve Board until July 14, 1951, when he resigned. He was "demoted" to Vice Chairman by President Truman on April 15, 1948 when McCabe's appointment was approved by the Senate. See "McCabe Confirmed for Reserve Post," New York Times, (April 13, 1948, p. 39). For another interpretation of Eccles's demotion, see Meltzer (2003, pp. 656–657).

[5]Between the end of World War II and the early 1970s, the world was effectively in a quasi-fixed exchange rate system that had been constructed at the 1944 Bretton Woods conference. In such a system, fiscal policy is able to increase economic activity by cutting taxes and/or by increasing government spending.

[6]Real GDP in year 2000 prices equals one hundred times nominal GDP divided by the GDP price deflator. The real t-bill rate is the nominal rate minus the contemporaneous rate of inflation, as indicated by percentage changes in the deflator.

30% between the second and fourth quarters of 1950 and also stayed high for several more quarters. As is evident in the table, the GDP deflator rose rapidly after the second quarter. The annualized GDP inflation rate in the fourth quarter of 1950 reached 11%. In part because taxes were not indexed for inflation, the federal budget surplus rose rapidly toward the end of the period.

Because of inflation, real short-term interest rates were again negative. The Federal Reserve allowed nominal short interest rates to rise at the end of the period, but not by enough for investors to earn a positive real rate of return. The Federal Reserve recognized the problem and pushed hard to be released from its obligation to peg the yield curve and keep interest rates low. The Treasury continued to press for low rates so that war finance could be achieved inexpensively, as happened in World War II. The two agencies finally reached an agreement on March 4, 1951, the "Accord", in which the central bank agreed to abstain from raising interest rates during periods when the Treasury was auctioning bonds, but was allowed to push interest rates up at other times if it wished.[7] During the period when bonds were being auctioned, the Federal Reserve was said to be "even keeling." The negotiations leading to the accord had been very contentious and led to the resignations of Thomas B. McCabe and Marriner S. Eccles from the Board in March and July 1951, respectively.

There are two further features of this period that should be noted for the subsequent discussion. First, the M1 surrogate variable in Table 1, which was not a focus of discussion during this period, loosely rose and fell in consonance with nominal GDP. However, the income velocity of money, the ratio of GDP to M1, varied considerably over time. The income velocity of money was 2.2 in the first quarter of 1947, 2.5 in the fourth quarter of 1948, and 2.8 in the first quarter of 1951. During this period there was not a tight relation between GDP and M1.

Second, the amount of credit extended by the Federal Reserve, the final column in Table 1, was quite variable. One reason for this was a large inflow of gold to the U.S.; the stock of gold rose from $20.0 billion at the end of 1945 to a peak of $24.6 billion in September 1949 as a consequence of other nations' needs to pay for postwar reconstruction.[8] It was necessary

[7]For interesting and informative brief surveys of the extended struggle leading to the Accord, see Degen (1987, pp. 113–117) and Mayer (2001, Chap. 4).

[8]There was a shortage of dollars in the immediate postwar period that led countries to send gold to the United States, which was then converted to dollars at the price of $35 per ounce. At this time the Soviet Union was the principal innovator in establishing the postwar Eurodollar market when one of its banks began creat-

to offset this inflow with open-market sales of government securities by the Federal Reserve in order to avoid a potentially explosive expansion in banking system reserves. Inflows of gold would be negative in the subsequent twenty years, which would require open-market purchases. Another less important reason for fluctuations in Federal Reserve credit was that there were changes in reserve requirements on deposits at banks that were members of the Federal Reserve System. In 1945 reserve requirements on demand deposits were 20% at central reserve city and reserve city member banks and 14% at country member banks. Beginning in 1948 they were raised as the Federal Reserve desperately sought to fight inflation while keeping Treasury borrowing costs down. Reserve requirements were lowered to combat the recession in 1949 and then raised again in early 1951 as inflation reappeared.[9] Apart from small increases between 1968 and 1973, this would prove to be the last time that reserve requirements were raised in order to fight inflation; this policy instrument would effectively be abandoned for reasons that are explained in the following chapters. Finally, there were fluctuations in currency in circulation both in the U.S. and abroad that needed to be accommodated.

Both nominal interest rates and monetary aggregates were concerns of the central bank, but the emphasis was decidedly on the former during these years. Undoubtedly, the reason for this was the continuing awkward relation between the Federal Reserve and the Treasury that had its origins in the pegging of the yield curve during and after World War II. Nominal interest rates would remain the principal indicator of the thrust of monetary policy in the next twenty years.

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ing dollar-denominated deposits against which dollar-denominated drafts could be written. The drafts were widely accepted because they were backed by Soviet gold that could be converted into dollars. The Soviet Union was reluctant to use U.S. banks for fear that its dollar-denominated deposits would be confiscated. See Friedman (1971, p. 17).

[9]For details, see Board of Governors of the Federal Reserve System (1976a, p. 608). Friedman and Schwartz (1963, pp. 604–612) provide a useful discussion of changes in reserve requirements and other regulations during this period.

3 William McChesney Martin, Jr. 1951–1970

During the negotiations leading up to the Accord of March 4, 1951, William McChesney Martin, Jr. had been representing the Treasury, where he was an Assistant Secretary. He became Chairman of the Federal Reserve Board on April 2. Because of the extraordinary length of Chairman Martin's tenure, it is convenient to analyze it in two subperiods. The first, 1951:2–1960:4, coincides with the remainder of the Truman administration and the Eisenhower administration. The second, 1961:1–1970:1, coincides with the Kennedy and Johnson administrations, and the first five quarters of the Nixon administration.

3.1 Monetary Policy 1951:2–1960:4

The Korean War and the demobilization that followed the 1953 armistice dominated the early years of this subperiod. Table 2 provides information on some important measures of economic activity. The unemployment rate fluctuated with the dislocations from the new war until 1951:4, when it began to decrease for six quarters. Panic buying fell after 1951:1 and the inflation rate dropped to almost negligible levels.

Demobilization associated with the armistice of 1953 led to a sharp recession and the unemployment rate more than doubled between 1953:2 and 1954:3. The civilian labor force participation rate fell slightly with the recession as discouraged workers dropped out of the labor force. As can be inferred from the table, constant-dollar (real) GDP did not pass its 1953:2 peak until 1954:4. Automatic stabilizers and tax reforms that accelerated the rate at which capital could be depreciated caused the National Income and Product Accounts (NIPA) federal budget to have a deficit for the four quarters beginning in 1953:4; thus, fiscal policy was successfully counter cyclical in this recession.[1] As might be expected, the rate of inflation also

[1]Automatic stabilizers are individual and corporate income taxes, some welfare payments, and unemployment compensation that fluctuate counter cyclically. Thus, when economic activity slackens, taxes from private income fall so that the

Table 2. Substantive Measures of Economic Activity: 1951:2–1960:4

quarter	unem-ployment rate (%)	civilian participa-tion rate (%)	nominal GDP	GDP price deflator	annual % rate inflation	real federal funds rate	federal budget surplus	balance on current account
1951:2	3.1	59.2	336.7	17.69	1.33	n.a.	10.0	n.a.
1951:3	3.2	59.2	343.6	17.70	2.33	n.a.	5.3	n.a.
1951:4	3.4	59.4	348.0	17.90	2.00	n.a.	6.0	n.a.
1952:1	3.2	59.3	351.3	17.88	0.19	n.a.	6.9	n.a.
1952:2	3.0	59.0	352.2	17.91	2.68	n.a.	3.4	n.a.
1952:3	3.2	58.9	358.5	18.12	2.86	n.a.	1.1	n.a.
1952:4	2.8	59.0	371.4	18.17	0.58	n.a.	3.5	n.a.
1953:1	2.7	59.5	378.4	18.17	0.37	n.a.	4.3	n.a.
1953:2	2.6	58.9	382.0	18.21	1.14	n.a.	2.6	n.a.
1953:3	2.7	58.7	381.1	18.28	1.20	n.a.	3.5	n.a.
1953:4	3.7	58.5	375.9	18.32	1.08	n.a.	- 3.2	n.a.
1954:1	5.3	59.0	375.3	18.38	0.83	n.a.	- 3.3	n.a.
1954:2	5.8	58.9	376.0	18.39	0.54	n.a.	- 1.9	n.a.
1954:3	6.0	58.8	380.8	18.42	0.92	0.10	-1.3	n.a.
1954:4	5.3	58.5	389.5	18.48	1.53	- 0.54	0.0	n.a.
1955:1	4.7	58.5	402.6	18.57	1.80	- 0.46	3.6	n.a.
1955:2	4.4	58.9	410.9	18.64	2.33	- 0.83	6.7	n.a.
1955:3	4.1	59.6	419.5	18.78	3.50	- 1.56	4.9	n.a.
1955:4	4.2	60.0	426.0	18.97	4.03	- 1.67	7.8	n.a.
1956:1	4.0	60.0	428.3	19.17	3.16	- 0.68	8.5	n.a.
1956:2	4.2	60.1	434.2	19.28	3.72	- 1.03	6.7	n.a.
1956:3	4.1	60.0	439.3	19.52	3.31	- 0.50	7.8	n.a.
1956:4	4.1	59.8	448.1	19.60	3.59	- 0.67	7.3	n.a.
1957:1	3.9	59.7	457.2	19.88	4.16	- 1.22	6.1	n.a.
1957:2	4.1	59.6	459.2	20.01	2.55	0.45	4.3	n.a.
1957:3	4.2	59.6	466.4	20.13	1.20	2.03	4.4	n.a.
1957:4	4.9	59.5	461.5	20.13	2.23	1.03	- 1.5	n.a.
1958:1	6.3	59.3	454.0	20.35	2.81	- 0.95	- 3.2	n.a.
1958:2	7.4	59.6	458.1	20.42	1.94	- 1.00	- 8.3	n.a.
1958:3	7.3	59.7	471.7	20.55	2.31	- 0.98	- 6.4	n.a.
1958:4	6.4	59.3	485.0	20.66	1.46	0.70	- 3.5	n.a.
1959:1	5.8	59.2	495.4	20.70	0.46	2.11	3.7	- 1.4
1959:2	5.1	59.3	508.4	20.70	0.47	2.61	4.9	- 2.0
1959:3	5.3	59.3	509.3	20.75	1.31	2.27	2.5	- 0.5

government absorbs part of the shock and its deficit tends to rise. Similarly, unemployment compensation increases when insured employees are laid off.

Table 2. (cont.)

1959:4	5.6	59.3	513.2	20.84	1.71	2.28	1.8	- 0.8
1960:1	5.1	58.9	526.9	20.93	1.57	2.37	11.6	1.8
1960:2	5.2	59.6	526.1	21.00	1.46	2.24	8.1	2.5
1960:3	5.5	59.6	528.9	21.08	1.35	1.59	6.5	3.8
1960:4	6.3	59.6	523.6	21.15	1.02	1.27	2.1	4.8

Notes: Inflation rates for the GDP price deflator (base 2000 = 100) are constructed using an arc elasticity from the immediately preceding series. They are not likely to have more than two significant digits. The federal government surplus is the NIPA measure. Apart from the inflation rate and the real federal funds rate, all data are from the Federal Reserve Bank of St. Louis's FRED data bank in this and the six subsequent even-numbered tables. The current account balance (NIPA) and other dollar flows are measured in billions per year in these tables.

slowed in the recession. It would accelerate in the coming years, partly in response to the very aggressive monetary expansion in 1954:4 and all of 1955 that can be seen in Table 3.

An important change in 1954 was the re-emergence of the federal funds market after about a 25-year hiatus. As can be seen in Table 2, the real federal funds rate, the nominal rate minus the contemporaneous rate of inflation of the GDP price deflator, was negative during the mid-1950s, which was likely to have increased inflationary pressures during these years. The critical importance of a negative real rate of return on interbank lending would not be recognized for almost twenty-five more years.

The Federal Reserve's response to both wartime inflation and the subsequent recession is evident in the top half of Table 3. In March 1953 the FOMC decided that open-market operations should be conducted almost exclusively by trading short-maturity securities, a policy known as "bills only", because the volume of transactions in securities markets in these maturities was very large. The reasoning was that in such markets the disruptive (inefficiency) side effects of open-market operations were likely to be minimized.[2] The t-bill rate in Table 3 is one of several clear indicators of what the committee was doing. This rate rose almost monotonically between 1949:4 and 1953:2 as the FOMC fought inflation. As signs of a post armistice recession emerged, the committee forced the rate to fall rapidly until 1954:2, when it again reversed course. Nominal M1, another indicator, rose steadily but at a decreasing rate until the recession trough in 1954:1, when it accelerated. Using the GDP price deflator to construct real

[2]For a good discussion of this tactical stance, see Friedman and Schwartz (1963, pp. 632–635).

Table 3. Monetary Instruments and Indicators: 1951:2–1960:4

quarter	net free reserves	federal funds rate	M1	discount rate	treasury bill rate	discount borrow-ing	currency out-standing	reserve bank credit	10-yr. rate
1951:2	0.5	n.a.	118.2	1.75	1.49	0.3	27.5	23.8	n.a.
1951:3	0.5	n.a.	119.7	1.75	1.60	0.3	28.0	24.3	n.a.
1951:4	0.4	n.a.	121.9	1.75	1.61	0.4	28.8	25.0	n.a.
1952:1	0.5	n.a.	123.5	1.75	1.57	0.3	28.4	24.0	n.a.
1952:2	0.2	n.a.	124.5	1.75	1.65	0.5	28.7	23.8	n.a.
1952:3	- 0.3	n.a.	125.8	1.75	1.78	0.9	29.2	24.8	n.a.
1952:4	- 0.8	n.a.	127.1	1.75	1.89	1.4	30.1	26.3	n.a.
1953:1	- 0.7	n.a.	127.6	1.96	1.98	1.3	29.7	26.7	n.a.
1953:2	- 0.4	n.a.	128.4	2.00	2.15	0.8	29.9	25.8	3.00
1953:3	0.2	n.a.	128.6	2.00	1.96	0.5	30.2	26.3	2.92
1953:4	0.3	n.a.	128.7	2.00	1.47	0.4	30.6	26.7	2.64
1954:1	0.5	n.a.	129.1	1.85	1.06	0.2	29.8	25.5	2.44
1954:2	0.6	n.a.	129.1	1.54	0.79	0.1	29.8	25.6	2.35
1954:3	0.7	1.03	130.6	1.50	0.88	0.1	29.9	25.0	2.35
1954:4	0.4	0.99	132.0	1.50	1.02	0.2	30.3	25.8	2.47
1955:1	0.1	1.34	133.5	1.50	1.22	0.4	29.8	25.1	2.65
1955:2	0.1	1.50	134.6	1.71	1.48	0.4	30.0	24.9	2.76
1955:3	- 0.2	1.94	134.9	1.97	1.86	0.7	30.3	25.4	2.95
1955:4	- 0.4	2.36	135.1	2.37	2.34	0.9	30.8	26.2	2.91
1956:1	- 0.3	2.48	135.6	2.50	2.33	0.9	30.2	25.5	2.90
1956:2	- 0.4	2.69	135.9	2.72	2.57	0.9	30.5	25.4	3.08
1956:3	- 0.2	2.81	136.0	2.85	2.58	0.8	30.7	25.5	3.27
1956:4	- 0.1	2.93	136.6	3.00	3.03	0.7	31.3	26.2	3.47
1957:1	- 0.1	2.93	136.9	3.00	3.10	0.6	30.5	25.2	3.40
1957:2	- 0.5	3.00	136.9	3.00	3.14	1.0	30.8	25.2	3.63
1957:3	- 0.4	3.23	137.0	3.22	3.35	1.0	31.0	25.3	3.93
1957:4	- 0.3	3.25	136.2	3.24	3.31	0.8	31.5	25.6	3.63
1958:1	0.3	1.86	136.1	2.68	1.76	0.3	30.5	24.7	3.04
1958:2	0.5	0.94	137.6	1.84	0.96	0.1	30.8	25.1	2.92
1958:3	0.3	1.32	139.0	1.80	1.68	0.3	31.2	26.4	3.50
1958:4	0.0	2.16	140.7	2.30	2.69	0.5	31.8	27.4	3.80
1959:1	- 0.1	2.57	139.3	2.64	2.77	0.6	31.1	27.2	3.99
1959:2	- 0.4	3.08	140.5	3.18	3.00	0.8	31.6	27.6	4.26
1959:3	- 0.5	3.58	141.5	3.61	3.54	1.0	31.8	28.5	4.50
1959:4	- 0.4	3.99	140.3	4.00	4.23	0.9	32.3	28.9	4.58
1960:1	- 0.3	3.93	139.9	4.00	3.87	0.8	31.5	27.5	4.49

Table 3. (cont.)

1960:2	- 0.1	3.70	139.6	3.88	2.99	0.5	31.8	27.4	4.26
1960:3	0.3	2.94	140.9	3.23	2.36	0.3	32.0	28.1	3.83
1960:4	0.6	2.30	140.8	3.00	2.31	0.1	32.5	28.9	3.89

Notes: In this and subsequent tables all interest rates are expressed as percent per year. All quantities are in billions of dollars. Data on nominal M1 are seasonally adjusted. Data for M1 prior to the first quarter of 1959 are simple averages of monthly data from Board of Governors of the Federal Reserve System, (1976a, p. 19). Data on net free reserves before 1959, currency outstanding, and reserve bank credit have been constructed from the same source, pp. 528–532. In this and the six subsequent odd-numbered tables, all other information is from the Federal Reserve Bank of St. Louis FRED data bank.

M1, it can be seen that real M1 was essentially unchanged between 1952:4 and 1954:2.

A prominent theme in discussions of monetary policy during this period was that restrictive open-market operations could be effective by forcing banks into the discount window, which would serve to discourage them from extending credit.[3] In Table 3, borrowing by Federal Reserve member banks at the discount window rose almost monotonically to a peak of $1.4 billion at the end of 1952 and then fell to $0.1 billion in 1954:3. A very similar pattern exists for another indicator, net free reserves (excess reserves less discount window borrowings), which reflects the same argument. All indicator variables were sending similar signals about the direction, if not the intensity, of monetary policy actions in the first half of Table 3.

If banks were pressed for reserves, they were sometimes interpreted to be restricting lending by credit rationing rather than by raising loan interest rates. This argument was called the "availability of credit" doctrine.[4] It was an argument for believing in the efficacy of monetary policy; interest rates were suspect because some prewar surveys of business firms had re-

[3]See Young (1958, pp. 32–39).

[4]The doctrine was an early example of a large literature in the 1990s that attempted to describe credit channels through which restrictive monetary policy impacted the real economy; it had antecedents in the Patman Hearings of 1952. See United States Congress Joint Committee on the Economic Report (1952), Scott (1957), and Kareken (1957). There appeared to be little empirical support for the doctrine in the 1950s. See Hester (1962).

vealed that rates were not important to firms making inventory and fixed capital investment decisions.[5]

The recovery that began in 1954:2 was quite robust for the next five quarters and then uneven until 1957:3 when real GDP reached a peak. The civilian unemployment rate fell from 6.0% to 3.9% in 1957:1. Inflation was increasingly troubling during this recovery; the annual rate rose from 0.54% in 1954:2 to 4.16% in 1957:1. Monetary policy was attempting unsuccessfully to be anti-inflationary as can be seen from the steadily rising nominal interest rates, sluggish growth in M1 and reserve bank credit, and predominantly negative net free reserves in Table 3. The income velocity of M1 rose negligibly between 1951:2 and 1954:4 from 2.9 to 3.0, but then rose more rapidly reaching a peak of 3.8 in 1960:1, roughly paralleling the rise in the nominal t-bill interest rate.[6] However, real short-term interest rates were usually negative, as is illustrated by the real federal funds rate that is reported in Table 2. The Federal Reserve had seemingly allowed a small bubble to develop, even though its principal indicators at the time, nominal interest rates, monetary growth, discount window borrowing, and net free reserves, all indicated contractionary policies were in place. The policies were not strong enough to deter inflation, although the indicated tightening would suffice to precipitate another sharp recession that lasted from 1957:3 through 1958:4. The unemployment rate rose from 3.9% in 1957:1 to 7.4% in 1958:2 and then fell to 5.1% in 1959:2.

During this recession, the federal government budget again went into deficit, as automatic stabilizers came into play. Monetary policy was also expansionary, as can be seen in Table 3. Net free reserves rose from -0.4 billion dollars in 1957:3 to 0.5 in 1958:2 as borrowing from the discount window fell and the t-bill rate fell from 3.35% to 0.96%. The average rate of inflation was above 2% in calendar 1958.

The Federal Reserve began to tighten again in 1958:2 in a renewed attack on inflation. All of the principal indicators were signaling contractionary monetary policy through 1959:4. Inflation did weaken, but the unemployment rate rose unevenly from 5.1% in 1959:2 to 6.3% in 1960:4. The indicators reversed direction again in 1960, as monetary policy switched to combating the emerging third recession in this decade. It was

[5]See Andrews (1951) and Ebersole (1938). A similar, but decreasing, insensitivity to interest rates is reported in several postwar surveys of firms' project selection decisions. See Copeland and Weston (1988, pp. 47–49).

[6]Inventory-theoretic models of the transactions demand for money by Baumol (1952) and Tobin (1956) had predicted that an individual's ratio of cash balances to income would be inversely related to nominal interest rates and, thus, that an increase in velocity should be observed.

becoming apparent that the central bank could not simultaneously hit inflation and unemployment rate targets. Even worse, successive cyclical highs in the unemployment rate were rising over time; the Federal Reserve was losing the battle against unemployment and was making only slow progress against inflation.

The problem in part was that the number of independent policy instruments was too small to reach the two targets simultaneously, a problem that had been anticipated by Tinbergen (1952), when he observed that, in general, one required *n* independent policy instruments to reach *n* distinct targets. As noted above, all indicators tended to move together when the Federal Reserve acted. Changes in reserve bank credit indicate that open market operations were the principal policy instrument during this period, but open-market operations were also used to provide for an increasing demand for currency by the public and to offset changes in Treasury gold holdings.[7] Treasury gold holdings that had fluctuated between $21 and $23 billion during most of the decade began a long-term outflow in early 1958, which placed another constraint on monetary policy. The constraint existed because the U.S. had committed to convert dollars into gold at a price of $35 per ounce at the 1944 Bretton Woods conference on the postwar monetary system.

The discount rate was a relatively weak policy instrument because it priced funds that only a small number of banks needed to satisfy reserve requirements. The difference between the discount rate and either the rate on t-bills or federal funds was typically small. The relations among the discount rate, other short-term interest rates, and net free reserves would eventually be clarified in a widely circulated 1958 manuscript by James Tobin that would not be published until 1998. In Tobin (1998, Chapter 9) there is an extensive discussion of a bank's demand for net free reserves as a fraction of a bank's defensive assets, which implies in the absence of a federal funds market that there would be a negative relation between a bank's desired net free reserves and the ratio of the t-bill rate to the discount rate. Apart from the theory of banking, the importance of this contribution was to explain how several indicators could be sending different

[7]Because currency in circulation in Table 3 includes currency in bank vaults its interpretation is not clean. Because of the way (and changes in the way) required reserves are defined over time for banks that are members of the Federal Reserve System and other banks, the fraction of currency outstanding that is used to satisfy reserve requirements cannot easily be inferred before 1988. Currency outstanding also includes currency that is circulating outside the U.S. Currency outstanding and outside bank vaults is a large component of the money stock and must be interpreted with caution.

signals about the thrust of monetary policy and to explain how they were related to the discount rate.

With one minor exception, reserve requirements on member banks were steadily reduced between 1951 and 1960. Reserve requirements were generally higher on banks that were members of the Federal Reserve System than on other banks and nonbank depository intermediaries (thrifts) such as mutual savings banks, savings and loan associations, and credit unions. Nonbank depository institutions were rapidly capturing market share from member banks and nonmember bank assets were growing more rapidly than those of member banks. Further, the commercial paper market revived during this period and it was successfully competing with large member banks. In the commercial paper market, large firms with good credit ratings lent their excess cash to other firms with good credit ratings for short periods, at interest rates that were close to the federal funds rate. An obvious interpretation of the lowering of reserve requirements is that the central bank was trying to improve the competitive position of member banks and maintain its own power within the financial system.[8] Reserve requirements were effectively a tax on member banks, because a fraction of deposits had to be held as noninterest bearing cash. Partly to address this continuing tax inequity, in December 1959 the Federal Reserve began to allow vault cash to be used to satisfy reserve requirements at member banks. The tax on member banks was still higher than that on other depository intermediaries; such asymmetric levies are inherently inefficient. This inequity among banks would only be resolved in 1980 when Congress passed the Depository Institutions Deregulation and Monetary Control Act. A result of this paternalistic stance of the Federal Reserve was that reserve requirements were generally becoming a less preferred policy instrument for combating inflation.

Further confounding this picture, A.W. Phillips (1958) published a highly influential (and well-timed!) article, which argued that there was an empirical trade off between the rate of wage inflation and unemployment in the United Kingdom. It seemed that lower unemployment could only be achieved if an economy would accept a higher rate of wage inflation. His argument was extended to a tradeoff between unemployment and price inflation in the U.S. by Samuelson and Solow (1960). The possibility that monetary policy would face such an unpleasant dilemma when attempting to reach its goals led to a series of important academic contributions and controversies in the next decade.

[8]For an after-the-fact acknowledgement of this interpretation, see Burns (1973). For comprehensive discussions of reserve requirements see Feinman (1993) and Gilbert and Lovati (1978).

In light of the difficulties the Federal Reserve was having, there was a growing interest in the institutions and logic underlying the formulation of monetary policy. In part, this resulted in a large set of studies that were sponsored by the Commission on Money and Credit.[9]

3.2 Monetary Policy 1961:1–1970:1

Table 4 is a continuation of Table 2 and implies that the recession which began in 1960:2 was short lived; real GDP passed its previous peak in 1961:2 and the unemployment rate peaked at 7.0% in the same quarter. The recovery was sluggish because the unemployment rate was still 5.7% in 1963:2, but the rate of inflation was quite low. Consistent quarterly information on the balance of payments only became available in 1959. As can be seen in Tables 2 and 4, there was a continuing current account surplus beginning in 1960. The (unreported) gold stock at the Treasury continued to fall as foreign countries and their citizens exercised their rights to demand gold for the dollars they were accumulating until 1968, when the Treasury stopped selling gold to everyone but sovereign states. Dollars had been moving overseas as capital outflows when U.S. corporations and individuals acquired stakes in foreign countries.

The relative emphasis on monetary and fiscal policy changed with the arrival of the Kennedy administration. During the Eisenhower administration there had been only one major fiscal initiative that occurred when accelerated depreciation was introduced in 1954. Monetary policy had become hyperactive and increasingly unsuccessful during the Eisenhower years. The continuing recession led the Federal Reserve to maintain ease in the sense that net free reserves were substantially positive and discount window borrowing was negligible through the end of 1962, although this may partly reflect the fact that the discount rate was above the t-bill rate during this period. Banks collectively may have desired to hold net free reserves to avoid the high marginal cost of discount window borrowing.[10]

A continuing slowdown in capital formation and continuing losses of gold led to an early combined Federal Reserve-Treasury operation to *twist* the yield curve on treasury securities so that short rates would rise and long

[9]See Commission on Money and Credit (1963).

[10]Net free reserves was criticized as an indicator of monetary policy by A. James Meigs (1962) when he argued in his University of Chicago dissertation that it was unreliable because there was no close relation between net free reserves and the rate of growth of the money stock. This criticism presumes that the money stock was the indicator of choice—a view that was not universally accepted.

Table 4. Substantive Measures of Economic Activity: 1961:1–1970:1

quarter	unem-ployment rate	civilian participa-tion rate	nominal GDP	GDP deflator	annual % rate inflation	real federal funds rate	federal budget surplus	balance on current account
1961:1	6.8	59.6	527.9	21.19	0.86	1.14	2.5	5.4
1961:2	7.0	59.5	539.0	21.24	1.05	0.69	0.8	4.1
1961:3	6.8	59.2	549.4	21.30	1.30	0.39	2.5	3.8
1961:4	6.2	59.0	562.5	21.38	1.85	0.55	4.7	3.8
1962:1	5.6	58.9	576.0	21.50	1.47	0.99	2.4	3.1
1962:2	5.5	58.8	583.2	21.53	0.78	1.83	2.2	4.9
1962:3	5.6	58.8	590.0	21.58	1.11	1.73	3.1	4.2
1962:4	5.5	58.5	593.3	21.65	1.08	1.84	2.4	3.3
1963:1	5.8	58.6	602.4	21.70	0.85	2.12	4.2	4.0
1963:2	5.7	58.7	611.2	21.75	0.79	2.17	6.3	5.4
1963:3	5.5	58.6	623.9	21.79	1.89	1.44	5.9	4.7
1963:4	5.6	58.7	633.5	21.95	2.08	1.38	5.2	6.0
1964:1	5.5	58.7	649.6	22.02	1.11	2.35	2.0	8.3
1964:2	5.2	59.0	658.8	22.07	1.30	2.19	- 2.6	6.8
1964:3	5.0	58.6	670.5	22.16	1.78	1.68	1.3	7.6
1964:4	5.0	58.6	675.6	22.27	2.00	1.57	3.3	7.4
1965:1	4.9	58.7	695.7	22.38	1.88	2.10	7.6	5.8
1965:2	4.7	58.9	708.1	22.48	1.60	2.47	6.8	7.1
1965:3	4.4	58.9	725.2	22.56	2.01	2.06	- 0.4	6.0
1965:4	4.1	58.9	747.5	22.71	2.57	1.59	- 0.6	6.0
1966:1	3.9	58.9	770.8	22.85	2.98	1.57	5.0	4.8
1966:2	3.8	59.0	779.9	23.05	3.78	1.13	3.5	4.0
1966:3	3.8	59.2	793.4	23.29	3.92	1.49	1.4	2.8
1966:4	3.7	59.5	807.1	23.50	2.73	2.83	- 0.9	4.0
1967:1	3.8	59.3	817.9	23.61	2.00	2.82	- 9.7	4.4
1967:2	3.8	59.4	822.5	23.74	3.06	0.93	- 10.4	3.6
1967:3	3.8	59.7	837.1	23.98	4.17	- 0.28	- 8.5	3.2
1967:4	3.9	59.9	852.8	24.24	4.38	- 0.21	- 8.8	2.9
1968:1	3.7	59.5	879.9	24.51	4.26	0.53	- 6.0	1.8
1968:2	3.6	59.8	904.2	24.76	4.05	1.93	- 7.4	2.4
1968:3	3.5	59.6	919.4	25.01	4.79	1.15	1.5	1.7
1968:4	3.4	59.6	936.3	25.36	4.87	1.04	2.7	1.0
1969:1	3.4	59.8	961.0	25.63	4.65	1.91	14.6	1.8
1969:2	3.4	60.0	976.3	25.96	5.44	2.89	11.5	0.8
1969:3	3.6	60.2	996.5	26.33	5.45	3.54	5.6	1.6
1969:4	3.6	60.3	1004.6	26.67	5.43	3.51	3.2	2.9
1970:1	4.2	60.5	1017.3	27.06	5.57	3.01	- 2.3	4.0

rates would fall. The idea was that higher short rates would induce investors to hold interest-bearing short securities rather than gold, which paid no interest. Lower long rates were thought to encourage decisions to acquire plant, equipment, and houses.[11] To this end the Federal Reserve, abandoning the bills-only policy, bought long-term debt and repeatedly raised the maximum allowable interest rate that member banks could pay on time and savings deposits (Regulation Q).[12] Because it was believed that such deposits underlay mortgage loans and other long-term lending, relaxing the Regulation Q ceiling would increase the flow of funds into such assets and serve to drive their long-term interest rates down. In Table 5 it can be seen that the short-term rates on federal funds and t-bills rose relative to the constant maturity 10-year rate.

There has been considerable controversy about whether "operation twist" was responsible for this change in the yield curve. The Federal Reserve's portfolio of five-year and longer government securities rose by about $1 billion during 1961 and its holdings of very short-term securities fell some. However, it was reported by Modigliani and Sutch (1966) that short-term rates tended to rise relative to long rates when the economy was recovering from a recession and that the relation between the spread between long and short interest rates and the level of short rates in the early 1960s was not different from that in earlier postwar years. Because there were other simultaneous innovations in securities markets, like the introduction of negotiable certificates of deposit, and a vigorous competitive struggle for funds among depository intermediaries, it is unlikely that the effects of the operation can be identified.[13] Nevertheless, operation twist was part of monetary policy and short rates rose and rates on some long-term assets, such as mortgage loans, fell between 1961 and 1964. Gold outflows paused briefly in 1961 and again in 1964, possibly in response to

[11]A discussion of how this policy was implemented can be found in Council of Economic Advisors (1962, pp. 86–91).

[12]Regulation Q deposit interest rate ceilings were raised in January 1962, July 1963, November 1964, December 1965, and July 1966. Congress intervened to restrict increases in September 1966, because of stresses that were apparent in the savings and loan industry.

[13]The First National City Bank of New York introduced negotiable certificates of deposit in February 1961 in an attempt to acquire corporate funds in the face of growing competition from the commercial paper market. They were issued in denominations in excess of $100,000 by large banks, but were subject to Regulation Q deposit interest rate ceilings. Their viability was greatly enhanced when the ceilings were raised in January 1962. A secondary market was simultaneously created to enhance their liquidity. The competitive struggle for funds among intermediaries is described in the second part of this volume.

Table 5. Monetary Instruments and Indicators: 1961:1–1970:1

quarter	net free reserves	federal funds rate	M1	discount rate	treasury bill rate	discount borrow-ing	currency out-standing	reserve bank credit	10-yr. rate
1961:1	0.6	2.00	141.5	3.00	2.35	0.1	31.7	28.2	3.79
1961:2	0.5	1.73	142.6	3.00	2.30	0.1	32.1	28.1	3.79
1961:3	0.5	1.68	143.4	3.00	2.30	0.1	32.5	28.7	3.98
1961:4	0.5	2.40	144.7	3.00	2.46	0.1	33.4	30.3	3.97
1962:1	0.5	2.46	145.6	3.00	2.72	0.1	32.8	30.1	4.02
1962:2	0.4	2.61	146.6	3.00	2.72	0.1	33.4	30.9	3.87
1962:3	0.4	2.85	146.4	3.00	2.84	0.1	33.8	31.6	3.99
1962:4	0.4	2.92	147.3	3.00	2.81	0.1	34.7	32.4	3.90
1963:1	0.3	2.97	148.8	3.00	2.91	0.2	34.2	32.4	3.89
1963:2	0.2	2.96	150.2	3.00	2.90	0.2	35.0	33.0	3.96
1963:3	0.1	3.33	151.7	3.41	3.29	0.3	35.7	34.2	4.03
1963:4	0.1	3.45	153.2	3.50	3.50	0.3	37.0	35.5	4.12
1964:1	0.1	3.46	154.2	3.50	3.53	0.3	36.4	35.4	4.18
1964:2	0.1	3.49	155.2	3.50	3.48	0.2	37.2	36.1	4.20
1964:3	0.1	3.46	157.8	3.50	3.50	0.3	38.0	37.2	4.19
1964:4	0.1	3.58	159.8	3.71	3.68	0.3	39.0	38.6	4.17
1965:1	0.0	3.97	161.0	4.00	3.89	0.4	38.6	39.0	4.20
1965:2	-0.2	4.08	162.0	4.00	3.87	0.5	39.2	40.4	4.21
1965:3	-0.2	4.07	163.9	4.00	3.88	0.5	40.1	41.6	4.25
1965:4	-0.1	4.17	166.8	4.14	4.17	0.5	41.5	42.8	4.47
1966:1	-0.1	4.56	169.7	4.50	4.61	0.5	41.2	43.1	4.77
1966:2	-0.3	4.91	171.6	4.50	4.59	0.7	42.0	43.8	4.78
1966:3	-0.4	5.41	171.0	4.50	5.04	0.7	42.8	45.5	5.14
1966:4	-0.3	5.56	171.5	4.50	5.21	0.6	44.0	46.1	5.00
1967:1	0.1	4.82	173.2	4.50	4.51	0.3	43.4	46.6	4.58
1967:2	0.2	3.99	175.6	4.03	3.66	0.1	44.3	47.2	4.82
1967:3	0.3	3.89	179.5	4.00	4.30	0.1	44.9	48.3	5.25
1967:4	0.2	4.17	182.4	4.23	4.75	0.2	46.3	49.9	5.64
1968:1	-0.1	4.79	184.8	4.55	5.05	0.4	45.9	51.3	5.61
1968:2	-0.4	5.98	188.0	5.40	5.52	0.7	47.1	53.1	5.74
1968:3	-0.2	5.94	191.7	5.41	5.20	0.5	48.2	54.7	5.46
1968:4	-0.2	5.92	195.8	5.29	5.59	0.6	49.5	56.1	5.77
1969:1	-0.6	6.57	199.4	5.50	6.09	0.8	49.1	56.8	6.18
1969:2	-1.0	8.33	200.9	5.98	6.20	1.3	50.3	59.7	6.35
1969:3	-0.9	8.98	201.8	6.00	7.02	1.2	51.3	60.7	6.86
1969:4	-0.9	8.94	203.5	6.00	7.35	1.2	52.8	62.8	7.30
1970:1	-0.8	8.57	205.7	6.00	7.21	1.0	52.4	61.8	7.37

this operation and other policies soon to be described. However, overall, gold outflows continued and, as will be seen, additional pressures were brought to bear on banks and on U.S. investors who were attracted by high overseas interest rates.

Further, as interest rates on short-term assets rose, a series of financial innovations occurred. Because negotiable certificates of deposit were subject to reserve requirements, they were at a competitive disadvantage relative to commercial paper. This and the possibility that the Federal Reserve might not always allow banks to pay market interest rates on them put pressure on large banks to find new sources of funds.[14] With the support of the Comptroller of the Currency, James Saxon, national banks, which he supervised, were authorized to issue commercial paper and other interest bearing debt in the early 1960s. While some of these efforts to promote new sources of funds by national banks were legally challenged and eventually banned, banks became increasingly creative in finding other ways to raise funds that would be beyond the reach of the Federal Reserve.

An important early innovation was the "one-bank" holding company. Taking advantage of a loophole in the Bank Holding Company Act of 1956, which defined a bank holding company as a firm that held 25% or more of the equity of *two* banks, large banks began to undertake "congeneric transformations" in which banks converted themselves into bank holding companies that, in turn, held the outstanding shares of the single bank. As is discussed in the last part of this volume, the bank would continue to be regulated as before, but the one-bank holding company was not subject to regulations of supervisory agencies. A one-bank holding company could issue commercial paper and engage in other activities forbidden to banks until the Bank Holding Company Act was amended in 1970. This innovation largely nullified the impacts of reserve requirements and other regulations on banks, because a holding company could undertake the activities not available to banks. The Federal Reserve retained some residual regulatory power, because through regulatory enforcement it could make life difficult for a subsidiary bank.

An example of this residual power was the "Voluntary Foreign Credit Restraint" (VFCR) initiative that the Federal Reserve introduced in 1965. It was one of several unsuccessful U.S. government efforts to curb outflows of dollars during the 1960s; others included an Interest Equalization Tax, in which the Treasury taxed foreign interest income so that U.S. investors would not be able earn higher rates on foreign investments than on

[14]Another incentive for innovations at large banks was that the reserve requirement on net demand deposits was high for banks located in reserve cities and most large banks were located in reserve cities.

comparable domestic investments, and the Commerce Department's Foreign Direct Investment Program.[15] The VFCR sought to limit loans by U.S. banks to foreign individuals or firms that were not financing U.S. exports. The VFCR did not apply to foreign branches and subsidiaries of U.S. banks and thus created an enormous incentive for U.S. banks to establish offshore branches.[16] There were other incentives as well, because Regulation Q and reserve requirements did not apply to overseas deposits. The VFCR also did not apply to loans to Canadians, which could then be recycled to non-Canadian borrowers. As an illustration of this heavy-handed initiative, consider the following policy toward "temporary overages" on loans to foreigners:

> A bank whose claims on foreigners are in excess of either or both of its ceilings and which does not show improvements will be invited periodically to discuss with the Federal Reserve Bank in its district the steps it has taken and that it proposes to take to bring the amount of its claims under the ceilings.[17]

The proliferation of one-bank holding companies and overseas branches seriously weakened the Federal Reserve's ability to reach unemployment and inflation targets. Both establishments could provide credit in ways that were not linked to reserve requirements or the discount rate and were immune from the *quantitative* effects of open-market operations on bank reserves. Monetary policy was still potent, because open market operations would continue to impact interest rates. Banks and other financial institutions, savers, and borrowers are not indifferent to interest rates!

Returning to the chronology of monetary policy during the Kennedy administration, it is important to note that economic advisers to the president had a strong orientation toward fiscal policy. They believed that the increasingly incomplete recoveries from Eisenhower administration recessions were partly a consequence of an up trend in interest rates that the Federal Reserve had generated in its struggle against inflation, which had discouraged investment (capital formation). Operation twist was one pol-

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[15]In this program " . . . about 500 large nonfinancial corporations were asked to make a maximum effort to expand the net balance of (a) their exports of goods and services plus (b) their repatriation of earnings from the developed countries less (c) their capital outflows to such countries. They were also asked to bring liquid funds back to the United States." Council of Economic Advisors (1966, p. 166).

[16]There was an enormous expansion in the number of U.S. banks with offshore branches, the number of their offshore branches, and their offshore deposits in the years after 1965. See Hester (1981, p. 153).

[17]Board of Governors of the Federal Reserve System, (1971a, pp. 12–13).

icy, but it was unlikely to be sufficient. In 1962 an investment tax credit was introduced. Depending upon the service life of new capital equipment, a firm could deduct up to fifteen percent of the purchase price of new equipment from taxable income. This tax credit effectively increased the after-tax rate of return that profitable firms realized on new investment. Real nonresidential fixed investment that had been stagnant at about $137 billion (in chained 2000 dollars) in the years 1959–61 rose to $151 billion in 1962, $160 billion in 1963, $179 billion in 1964, and $210 billion in 1965. Corresponding data for real investment in equipment and software are $57 billion, $64 billion, $69 billion, $78 billion, and $92 billion.[18] Nonfinancial corporation security issuance increased with this explosion in investment, and may have been sufficient to override the effects of operation twist on some long rates. In other words, investors could have anticipated a further glut of new securities emerging from the tax credit, which would tend to drive long rates up. Thus, net funds raised in financial markets by nonfinancial, nonfarm corporate business rose from an average of $12.2 billion in the years 1959-61 to $12.8 billion in 1962, $12.2 billion in 1963, $14.8 billion in 1964, $20.6 billion in 1965, and $25.4 billion in 1966.[19]

Another fiscal policy concern of Kennedy administration economic advisers was that effective marginal tax rates on personal and corporate income had increased because of inflation, which had a depressing effect on GDP. This phenomenon, "fiscal drag," could be measured by the government's surplus or deficit when the economy was at full employment—then argued to be about 4%.[20] Its operation can be seen in Tables 2 and 4, if one looks at the federal surplus on different dates for some fixed level of the unemployment rate. Among the remedies for fiscal drag are to index tax rate brackets so that marginal rates are unaffected by inflation or to prevent inflation.[21] Because fiscal drag had been occurring for many years, a large tax cut would be necessary so that the budget would be approximately balanced at full employment. Because of Kennedy's assassination in November 1963, the tax cut would be a Johnson administration project. Personal and corporate taxes were cut 10% in both 1964 and 1965.

[18]Source: the Federal Reserve Bank of St. Louis FRED data bank.

[19]Source: Board of Governors of the Federal Reserve System (1979, p. 17).

[20]See Okun (1963).

[21]The administration attempted to fight inflation by introducing price-wage guideposts—a form of "jaw boning". See Council of Economic Advisors (1965, pp. 108−110). They were abandoned in 1966. Income tax bracket indexation would not occur until 1985.

As can be seen in Table 5, the Federal Reserve matched both these expansionary fiscal initiatives with increasingly restrictive actions that were prompted by a slowly rising rate of inflation and accelerating gold outflows.[22] The discount rate increased monotonically from 3% in 1963:2 to 4.5% in 1966:1 and net free reserves fell from $0.4 billion in 1962:4 to $ -0.4 billion in 1966:3.[23] Discount window borrowing increased from $0.1 billion in 1962:4 to $0.7 billion in 1966:2. Quarterly averages of both the federal funds and t-bill interest rates exceeded the discount rate for the first time in 1965, which may partly account for the negative net free reserves in 1965 and 1966.[24] Reserve bank credit rose sharply through the decade as the system compensated for gold losses and accommodated growing demand for U.S. currency.

Beginning with the Board's increase in the discount rate in December 1965, monetary policy seemed to become aggressively more restrictive, as evidenced by the rapid rise in nominal short-term market interest rates. As shown in Table 5, between 1965:4 and 1966:3 the federal funds rate increased 124 basis points and the t-bill rate 87 basis points. These interest rate increases were inadequate because they were barely keeping pace with rising inflation, as can be seen if one examines the real federal funds rate in Table 4. The unemployment rate fell monotonically from 5.6% in 1963:4 to 3.7% in 1966:4.

Nominal M1 in Table 5 rose almost monotonically, but at a slower rate than GDP; consequently the income velocity of M1 rose by about 33% between 1961:1 and 1970:1. Again, this might have been predicted because of rising nominal interest rates during this decade. Friedman and Schwartz reported that the income velocity of both M1 and M2 rose between 1945 and 1960, when interest rates were also rising.[25] They studied and advo-

[22]The gold stock was $16.9 billion in December 1961. In succeeding Decembers it was $16.0, $15.6, $15.4, $13.8, $13.2, $12.4, and $10.4 billion. The Treasury stopped selling gold to everyone but sovereign states in the last year, 1968. Source: Board of Governors of the Federal Reserve System (1976a, pp. 532–534).

[23]The Federal Reserve Board approved an increase in the discount rate in December 1965, which broke a long period of policy co-ordination between the Board and the Kennedy and Johnson administrations. President Johnson was irked by the Board's action because it correctly signaled that the growing covert mobilization for the Vietnam War was beginning to overheat the domestic economy.

[24]When banks can earn higher rates on funds lent in the federal funds market than funds cost at the discount window, they are likely to be more willing to run a risk of being temporarily short of reserves.

[25]Friedman and Schwartz (1963, p. 647). There was an especially sharp rise in both velocities in their chart after 1950, when the inflation rate rose because of the onset of the Korean War.

cated using a broader measure of money, M2, which consisted of M1 plus commercial bank time and savings deposits. The income velocity of M2 also rose between 1960 and 1970, but the increase was less than that of M1, presumably because interest rates on commercial bank time and saving deposits were rising in this decade. If interest rates on bank time deposits keep pace with other rates, there is no incentive to withdraw funds from time deposit accounts. Varying definitions of monetary aggregates are problematic. In a later volume, Friedman and Schwartz apparently disagree:

> The problem of definition [of the money stock] has received much attention—in our opinion far more than it deserves. So far as we can see, no issue of principle is involved, and no single definition need be 'best'. . . . The answer may well vary with time and place and may differ according to the theory accepted. Any evidence is necessarily tentative and subject to change as further evidence accumulates. . . . alternative totals, both narrower and broader than this one [M2], seem to us almost as satisfactory, and for some specific purposes more satisfactory. To judge from our experience, important substantive conclusions seldom hinge on which definition is used.[26]

The number of monetary aggregate measures published by the Federal Reserve would increase and their definitions would change considerably in the coming years as innovations occurred. As indicators, different measures would often send different signals about what was occurring in the economy. Given that M2 included M1, there was surprisingly little correlation between growth rates of the two aggregates in the 1960s and the 1970s.[27]

The mix of expansionary fiscal and somewhat restrictive monetary policy was about to cause serious side effects in mortgage and housing markets that resulted from an intensifying crisis in the savings and loan and mutual savings bank industries.[28] Net inflows of funds to these intermediaries fell by almost 50% between 1965 and 1966 and their net income was plummeting, because they had a negative "gap".[29] Their portfolios were heavily concentrated in mortgage loans. In September 1966 Congress in-

[26]Friedman and Schwartz (1970, pp. 1–2).

[27]See Hester (1981, p. 179).

[28]See Hester (1969, pp. 600–617).

[29]A gap at time *t* is defined by the difference between the values of fixed interest rate liabilities and fixed interest rate assets in a portfolio at some future date, when measured at *t*. When a gap is negative, rising interest rates cause losses because an institution must refinance relatively more liabilities than assets at recent higher interest rates.

tervened by imposing ceilings on interest rates that thrifts could pay on deposits and requiring the Federal Reserve to freeze or lower Regulation Q interest rate ceilings. This respite from competition, that had been initiated when operation twist was introduced and ceilings were first raised, allowed thrift institutions temporarily to regain their footing from a struggle they had been losing. Because of lags in the process of making mortgage loans by thrifts, residential investment (construction) would fall from $26.8 billion in 1966:1 to $20.5 billion in 1967:1 and would only pass its earlier nominal peak in 1967:4 when it reached $27.9 billion.[30] As a result, to an important extent the mobilization for the Vietnam War in a full employment economy was achieved by sacrificing the housing industry. Indeed, political pressures on the Federal Reserve became so intense that it began to ease up in September 1966, as is evident in Table 5.[31] Net free reserves began to rise and discount-window borrowing to fall in 1966:4 and nominal market interest rates fell in 1967:1. The rate of inflation fell for two quarters, but then began to rise in 1967:2, probably reflecting the lags with which monetary policy is transmitted to others in the economy.[32]

As inflation accelerated, the Federal Reserve again tightened by pushing the discount rate from 4.0% in 1967:3 to 5.5% in April 1968. In the same time frame, the nominal federal funds and t-bill rates rose sharply, borrowing from the discount window rose by $0.6 billion, and net free reserves fell by $0.7 billion. The real federal funds rate, which had fallen to ap-

[30]Because of the trauma in the mortgage market, borrowers increasingly approached the Federal National Mortgage Association (FNMA) for loans, which were financed by full faith and credit government debt. This led to a surging deficit, as can be seen in Table 4. The problem was resolved through a clever accounting move in 1968 when FNMA was spun off (privatized) and, therefore, removed from the federal budget. Because some of FNMA's loans had been subsidized, a second agency, the Government National Mortgage Association (GNMA) was created in 1968 to finance subsidized loans; subsidies were carried on a cash flow basis in the federal budget so that a further reduction in the deficit could be achieved. GNMA effectively popularized "securitization" when it began to issue pass-through securities that were backed by pools of insured mortgages.

[31]There were press reports at the time of mailings of small pieces of construction lumber (2" x 4"s) to the Board, which were x-rayed because of the possibility that they contained explosives. Security at Federal Reserve buildings was greatly strengthened in the mid 1960s. Lobbyists and witnesses before Congress were more effective than threatened violence in forcing an easing of monetary policy and in producing the changes described in the preceding footnote.

[32]There are three lags associated with the conduct of discretionary policy in a macroeconomic setting: a recognition lag, an implementation lag, and a response lag. Empirical estimates of the last tend to be between eleven and eighteen months. An early discussion of these lags appears in Metzler (1948).

proximately zero in 1967:3 only turned distinctly positive in 1968:2. However, during this period it can be seen in Table 5 that nominal M1 surged by $8.3 billion and reserve bank credit rose by nearly $5.0 billion; the latter reflected continuing gold out flows and a $2.2 billion increase in currency outstanding. Different indicators were now sending very different messages![33]

The Johnson administration tried to help in several ways. First, in October 1967 Congress suspended the investment tax credit. Second, in June 1968 the President signed the Revenue and Expenditure Control Act of 1968 that imposed a temporary income tax surcharge of ten percent that went into effect retroactively on January 1 for corporations and on April 1 for individuals. Third, the administration developed an initiative in March 1968, which specified that a group of countries actively trading gold to the private sector in the London gold market would henceforth cease this activity. Fourth, the administration supported an International Monetary Fund proposal that established Special Drawing Rights (SDRs), an international medium based on a basket of major currencies that could substitute for gold transactions when settling accounts. Finally, a requirement that currency and bank reserves have a 25% gold backing was repealed in 1968. This was necessary because gold outflows had reached the point where the Federal Reserve would not be able to increase the stock of outstanding Federal Reserve currency.

The results from the tax law changes can be seen in Table 4 where the federal surplus rose sharply in 1968 and 1969. These efforts had little effect on the rate of inflation, which continued to increase and also contributed to the rise in the surplus, because progressive income tax rate steps were not yet indexed to inflation. The Federal Reserve continued its fight against inflation by driving discount window borrowing up to $1.3 billion and net free reserves down to $ -1.0 billion in 1969:2. The nominal federal funds and t-bill interest rates approached 9.00% and 7.35% respectively in 1969:4; the real federal funds rate in Table 4 was 3.50% in the last half of 1969.[34] Stopping gold sales to the private sector allowed reserve bank

[33]For an interesting retrospective monetarist interpretation of the 1965–1979 inflationary period, see Mayer (1999).

[34]A technical change in the way reserve requirements were enforced occurred in 1968, when a system of lagged reserve requirements was introduced. Previously, reserve requirements were based roughly on an average of nearly contemporaneous daily deposit balances. As a convenience to banks, the new system determined required reserves on the level of deposits two weeks in the past. While controversy about the importance of this change exists, I believe it had a negligible effect on the conduct of monetary policy.

credit and nominal M1 to slow their rates of growth. However, the unemployment rate jumped sharply in 1970:1, in part because of an increase in the percentage of the adult population that was in the labor force.[35] As in 1960, the Federal Reserve seemed to be unable to combat inflation without also causing a recession, as might have been predicted by a Phillips Curve.

There was considerable controversy about the sources of this failure of monetary policy at the end of the record-long chairmanship of William McChesney Martin, Jr. First, one candidate explanation was Tinbergen's story about the numbers of targets and instruments; as in 1960 the Federal Reserve simply had too few policy instruments to achieve simultaneously so many targets, i.e. the inflation rate, the unemployment rate, and a positive gold inflow. Second, fiscal policy had been badly managed because taxes had not been raised in a timely fashion to finance the mobilization for the Vietnam War. The tax surcharge was too little and too late to stem the inflationary pressures that usually accompany war. Third, the fixed exchange rate system that emerged from the 1944 Bretton Woods conference was probably fatally flawed, because the U.S. could not credibly maintain its pledge to fix the price of gold at $35 per ounce. Fourth, the efficacy of monetary policy may have been severely compromised by the rapid growth of one-bank holding companies and overseas branches of U.S. banks. Financing for domestic purposes could be achieved through these entities without going through the domestic banking system. Finally, large U.S. firms could easily borrow dollar-denominated funds from foreign banks and were thus beyond the reach of the Federal Reserve. The Interest Equalization Tax, the Voluntary Foreign Credit Restraint Program, and the Commerce Department's Direct Foreign Investment initiative were ineffective in curbing dollar capital outflows. These explanations are not independent and all have some plausibility.

There was also a fierce debate among professional economists about whether there actually was a tradeoff between inflation and unemployment as Phillips and Samuelson and Solow had suggested. Milton Friedman presented one side in his presidential address to the American Economic Association in 1967.[36] Friedman argued that the Phillips Curve was an empirical relation that was not suitable for conducting policy, because any attempt to achieve an unemployment rate other than that corresponding to zero inflation would be accompanied by increasingly positive or negative rates of inflation. This occurred because the curve would twist as workers

[35]An important demographic trend that was becoming evident at the end of the 1960s and would become more pronounced subsequently was greatly increased female participation in the labor force.

[36]See Friedman (1968). A similar argument appeared in Phelps (1967).

adjusted their expectations about future rates of inflation. Therefore, the role of monetary policy was to achieve zero inflation, which he felt could best be achieved by a constant rate of growth of some monetary aggregate.

The Federal Reserve would not adopt his prescription, but his argument would continue to be repeated and refined to the present day. The other side was, in the extreme, represented by several different groups of econometric model builders who believed that by carefully specifying structural behavioral equations and manipulating the resulting system, it was possible to achieve highly desirable policies for an economy. This line of argument had its origins in Tinbergen's 1939 model of the U.S. economy, but was reaching a fever pitch at the time of Friedman's address.[37] The Federal Reserve was financing and would soon become proprietor of one of the more sophisticated of these emerging models and continues to make use of a successor model today. The Federal Reserve's successor and other contemporary models include equations that describe the formation of expectations.

At the very end of the Martin era, an important theoretical contribution appeared that would guide discussions of monetary policy for at least two decades. William Poole used a conventional static Hicksian IS/LM representation of the Keynesian framework to explore when monetary policy should be guided by a real interest rate, a real monetary aggregate, or some linear combination of the two.[38] He showed that the issue hinged on whether shocks impacted the money market, the goods market, or both markets. If shocks were concentrated in the money market, income should be controlled by pegging an interest rate. On the other hand, if shocks were concentrated in the goods market, monetary policy would be most successful if it controlled the stock of money. Because of an ongoing stream of innovations in financial markets, the money market was being bombarded by a series of systemic shocks, which would argue for emphasizing the control of a real interest rate. The real interest rate would eventually become the focus of monetary policy under Chairman Alan Greenspan in 1993.

[37]To get a sense for the state of econometric models in the 1960s, see Nerlove (1966) and Greenberger, Crenson, and Crissey (1976).

[38]See Poole (1970). The IS/LM model was first exposed in Hicks (1937).

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The recession that was announced by the jump in the unemployment rate in 1970:1 had actually begun in 1969:4; real GDP would not permanently move above the level it reached in 1969:3 until 1971:1, as can be inferred from data in Table 6. The new Chairman, Arthur F. Burns, had inherited a very challenging economy with high inflation and high interest rates. The situation would be further complicated when the Penn-Central Transportation Company defaulted on about $200 million of commercial paper over the weekend of June 19–21, 1970.

The Federal Reserve responded aggressively and successfully to this event by assuring banks of access to the discount window so that they might accommodate other corporations having difficulty rolling over their commercial paper. Its actions helped to prevent a collapse of the $40 billion commercial paper market. On June 24 the Federal Reserve took the opportunity to remove the Regulation Q ceiling on large certificates of deposits with a maturity of less than 90 days. Market interest rates fell through 1971:1 in response to this large intervention and the recession. The inflation rate continued to be high and the unemployment rate rose slowly to 6.0% in 1971:3. The federal government's deficit rose sharply because of high continuing defense spending and the operation of automatic stabilizers.

As can be seen in Table 7 market interest rates began to rise in early 1971. The increase was unusually rapid; it began in March when the nominal federal funds, t-bill, and 10-year rates were respectively 3.71%, 3.38%, and 5.70%. By July they were respectively 5.31%, 5.40%, and 6.73%. In part, the Federal Reserve pushed interest rates higher to counter rising inflation, but its main concern was trying to deter huge and ultimately highly profitable speculations that the dollar would be devalued against strong foreign currencies, such as the West German mark and Japanese yen. Offshore dollar-denominated assets were matched by large increases in foreign official holdings of U.S. Treasury securities as central banks attempted to protect the fixed exchange rate system that had been established

Table 6. Substantive Measures of Economic Activity: 1970:2–1979:3

quarter	unem-ployment rate	civilian participa-tion rate	nominal GDP	GDP deflator	annual % rate inflation	real fed funds rate	federal budget surplus	balance on current account
1970:2	4.8	60.4	1033.2	28.94	4.31	3.57	- 15.8	5.5
1970:3	5.2	60.3	1050.7	29.18	4.17	2.54	- 19.4	3.8
1970:4	5.8	60.4	1052.9	29.56	5.56	0.01	- 23.1	2.7
1971:1	5.9	60.2	1098.3	30.00	5.59	- 1.73	- 23.6	4.6
1971:2	5.9	60.0	1119.1	30.40	4.61	- 0.05	- 30.1	0.3
1971:3	6.0	60.1	1139.3	30.71	3.60	1.87	- 29.1	- 0.1
1971:4	5.9	60.3	1151.7	30.96	4.72	0.03	- 30.6	- 2.5
1972:1	5.8	60.3	1190.6	31.41	4.28	- 0.74	- 22.6	- 4.7
1972:2	5.7	60.4	1225.9	31.61	3.13	1.17	- 27.7	- 4.3
1972:3	5.6	60.5	1249.7	31.92	4.58	0.16	- 16.6	- 3.1
1972:4	5.4	60.4	1287.0	32.32	5.02	0.12	- 30.7	- 2.3
1973:1	4.9	60.4	1335.5	32.71	5.47	1.07	- 14.7	2.6
1973:2	4.9	60.8	1371.9	33.25	6.95	0.87	- 14.7	5.9
1973:3	4.8	60.8	1391.2	33.86	7.78	2.78	- 10.1	13.0
1973:4	4.8	61.1	1432.3	34.58	7.71	2.29	- 5.7	15.8
1974:1	5.1	61.3	1447.0	35.20	8.46	0.86	- 8.3	17.0
1974:2	5.2	61.2	1485.3	36.02	10.48	0.77	- 10.8	3.2
1974:3	5.6	61.3	1514.2	37.09	11.69	0.40	- 10.5	1.0
1974:4	6.6	61.3	1553.4	38.20	10.40	- 1.06	- 25.4	5.3
1975:1	8.3	61.2	1570.0	39.08	7.54	- 1.23	- 47.2	19.2
1975:2	8.9	61.3	1605.6	39.63	6.72	- 1.30	- 104.2	23.0
1975:3	8.5	61.3	1663.1	40.33	7.17	- 1.01	- 62.0	20.0
1975:4	8.3	61.1	1714.6	41.05	5.67	- 0.26	- 62.8	23.3
1976:1	7.7	61.3	1772.6	41.50	4.33	0.50	- 52.4	14.9
1976:2	7.6	61.5	1804.9	41.92	4.85	0.34	- 48.1	10.8
1976:3	7.7	61.7	1838.3	42.50	6.35	- 1.07	- 51.7	4.2
1976:4	7.8	61.8	1885.3	43.27	6.86	- 1.99	- 54.8	5.6
1977:1	7.5	61.8	1939.3	43.97	6.12	- 1.46	- 45.3	- 6.3
1977:2	7.1	62.2	2006.0	44.69	5.29	- 0.13	- 39.4	- 7.0
1977:3	6.9	62.2	2066.8	45.23	6.76	- 0.94	- 45.2	- 5.9
1977:4	6.7	62.6	2111.6	46.16	7.24	- 0.73	- 46.5	- 16.9
1978:1	6.3	62.8	2150.0	46.86	6.60	0.15	- 46.3	- 23.0
1978:2	6.0	63.1	2275.6	47.77	6.92	0.37	- 25.5	- 10.7
1978:3	6.0	63.2	2336.2	48.60	7.49	0.61	- 19.4	- 9.2
1978:4	5.9	63.5	2417.0	49.59	7.67	1.91	- 14.7	1.1
1979:1	5.9	63.7	2464.4	50.55	8.40	1.67	- 6.1	0.6
1979:2	5.7	63.4	2527.6	51.71	9.13	1.05	- 6.2	- 0.1
1979:3	5.9	63.7	2600.7	52.81	8.22	2.73	- 11.9	5.1

at the Bretton Woods conference in 1944.[1] The Federal Reserve was again trying unsuccessfully to hit several targets, inflation, unemployment, and the exchange rate, with essentially one instrument, open-market operations. Its actions were leading to increasing instability in short-term interest rates.[2]

This seriously deteriorating situation would be temporarily halted by a spectacular intervention by the Nixon administration that was described in a presidential speech on August 15, 1971. The intervention was designed with the help of Chairman Burns and, thus, represented a serious lapse in the continuing struggle to preserve Federal Reserve independence. It was intended, in part, to aid the Federal Reserve by adding policy instruments to the government's arsenal and included the following drastic actions:

1. Introduced a 90-day freeze on wages and prices.
2. Established a Cost-of-Living Council that would administer the freeze and devise post-freeze policy. (Chairman Burns served as adviser to the council.)
3. Abandoned the Bretton Woods commitment of the United States to convert dollars into gold at $35 per ounce.
4. Imposed a 10% surcharge on most imports.
5. Proposed a new one-year investment tax credit of 10%, to be followed by a permanent credit of 5%, if investments were in American-made equipment.

The implementation of this program was extremely complex and required many actions that are well described in Council of Economic Advisors' Economic Reports of the President, (1972–75). The initial wage and price freezes were followed by three subsequent phases that included many unavoidably arbitrary decisions that determined allowable rates of price and wage increase, exemptions, compliance orders, subsequent temporary freezes, situations where prior notification of increases were required, etc. The Cost-of-Living Council was terminated at the end of 1974. In addition

[1]Numerous newspaper and magazine reports at the time clearly exposed the extent of speculation. See, for example, "Pressure by Speculators Forced Action on Dollar," New York Times, August 16, 1971, p. 15. The transactions themselves were not transparent in summaries of U.S. international transactions because they were occurring overseas, but changes in foreign official assets in these summaries jumped from $6.9 billion in 1970 to $26.9 billion in 1971 and then fell to $10.5 billion in 1972. There is a large statistical discrepancy of $9.8 billion in the balance of payments accounts in 1971, which surely is associated with this overseas speculation. See Board of Governors of the Federal Reserve System (1981, pp 338–339).

[2]See Table 17 below.

Table 7. Monetary Instruments and Indicators: 1970:2–1979:3

quarter	net free reserves	federal funds rate	M1	dis-count rate	treasury bill rate	dis-count borrow-ing	repur-chase agree-ments	currency out-standing	reserve bank credit	10-yr. rate
1970:2	- 0.7	7.88	207.2	6.00	6.68	0.9	4.3	53.4	62.7	7.71
1970:3	- 0.7	6.70	209.9	6.00	6.33	0.9	2.8	54.7	64.2	7.46
1970:4	- 0.2	5.57	213.6	5.79	5.35	0.4	2.8	55.9	65.5	6.85
1971:1	- 0.1	3.86	217.2	4.96	3.84	0.3	3.0	56.0	66.9	6.02
1971:2	- 0.1	4.56	221.8	4.75	4.25	0.3	4.1	57.2	68.5	6.25
1971:3	- 0.5	5.47	225.6	4.96	5.01	0.7	4.1	58.9	71.1	6.48
1971:4	- 0.1	4.75	227.7	4.84	4.23	0.3	4.9	60.0	73.0	5.89
1972:1	0.1	3.54	232.2	4.50	3.44	0.1	4.8	60.0	74.1	6.03
1972:2	0.1	4.30	236.0	4.50	3.77	0.1	6.0	61.2	75.6	6.14
1972:3	- 0.2	4.74	241.0	4.50	4.22	0.4	6.5	62.7	76.3	6.29
1972:4	- 0.5	5.14	246.9	4.50	4.86	0.4	6.4	64.6	76.7	6.37
1973:1	- 1.3	6.54	251.8	5.11	5.70	1.5	7.5	64.9	78.2	6.60
1973:2	- 1.6	7.82	254.8	5.91	6.60	1.8	8.1	66.8	80.9	6.81
1973:3	- 1.7	10.56	257.7	7.26	8.32	2.0	11.3	68.4	82.7	7.21
1973:4	- 1.1	10.00	261.0	7.50	7.50	1.4	12.8	70.1	84.3	6.75
1974:1	- 1.0	9.32	265.2	7.50	7.62	1.2	13.2	70.8	85.6	7.05
1974:2	- 1.6	11.25	267.7	7.87	8.15	2.4	14.9	72.9	88.5	7.54
1974:3	- 1.6	12.09	270.1	8.00	8.19	3.3	16.2	74.7	91.5	7.96
1974:4	- 0.8	9.35	273.4	7.94	7.36	1.3	14.9	77.2	92.0	7.67
1975:1	0.0	6.30	275.1	6.87	5.75	0.2	13.3	77.4	91.6	7.54
1975:2	0.0	5.42	279.3	6.12	5.39	0.1	14.1	79.3	95.4	8.05
1975:3	- 0.1	6.16	284.5	6.00	6.33	0.3	14.9	81.8	93.9	8.30
1975:4	0.1	5.41	286.4	6.00	5.63	0.1	15.1	83.9	98.1	8.06
1976:1	0.2	4.83	290.6	5.60	4.92	0.1	15.7	84.5	100.9	7.75
1976:2	0.1	5.20	295.6	5.50	5.16	0.1	19.5	87.4	102.1	7.77
1976:3	0.1	5.28	298.6	5.50	5.15	0.1	22.0	89.6	105.3	7.73
1976:4	0.2	4.87	303.9	5.39	4.67	0.1	23.0	92.0	107.1	7.19
1977:1	0.1	4.66	311.2	5.25	4.63	0.1	23.6	92.3	108.6	7.35
1977:2	0.0	5.16	317.3	5.25	4.84	0.2	27.0	95.0	110.2	7.37
1977:3	- 0.4	5.82	322.3	5.42	5.50	0.7	29.5	97.7	112.2	7.36
1977:4	- 0.7	6.51	328.6	5.93	6.11	0.9	32.0	100.8	113.4	7.60
1978:1	- 0.2	6.76	335.6	6.46	6.39	0.4	33.3	101.7	116.2	8.01
1978:2	- 0.8	7.28	343.9	6.78	6.48	1.0	34.8	104.4	119.4	8.32
1978:3	- 1.0	8.10	349.8	7.50	7.31	1.2	36.4	107.4	126.9	8.49
1978:4	- 0.7	9.58	355.3	9.09	8.57	0.9	42.2	111.0	130.7	8.82
1979:1	- 0.8	10.07	360.3	9.50	9.38	1.0	46.7	111.6	127.0	9.11
1979:2	- 1.2	10.18	370.3	9.50	9.38	1.4	53.1	114.4	128.3	9.11
1979:3	- 1.0	10.95	378.4	10.21	9.67	1.2	55.3	118.3	132.1	9.10

to being adviser to the council, Chairman Burns chaired the Council's Committee on Interest and Dividends. Compliance with recommendations by the Committee on Interest and Dividends was *voluntary*.[3]

In December 1971 an attempt was made to reestablish a fixed exchange rate system at a conference held in Washington. The resulting Smithsonian Agreement led to a reduction in the gold value of the dollar; the price of an ounce of gold would be $38 per ounce instead of $35. This agreement was more form than substance, because the U.S. government did not agree to resume sales of gold or act to keep gold's price in a narrow band around $38 per ounce.[4]

The economy's response to these actions and the contemporaneous tightening of monetary policy is very difficult to interpret. In Table 6 it can be seen that the rate of inflation fell between 1971:2 and 1972:2 and then rose sharply. The unemployment rate fell steadily from 6.0% in 1971:3 to 4.8% in 1973:3. The current account balance was not much affected and the government's deficit remained sizable until the presidential election of 1972 was over.

The Federal Reserve took advantage of the administration's intervention by easing up. In Table 7 it can be seen that nominal interest rates were lower in 1972:4 than they were in 1971:3, although they had begun to rise in the first or second quarter of 1972. Similarly, net free reserves turned positive and borrowing at the discount window was very low in 1972:1 and 1972:2. This easing of policy contributed to a very rapid growth of M1 in the election year of 1972.[5]

The tone of monetary policy changed to substantial tightening between 1972:2 and 1973:3, when new quarterly record levels of (negative) net free reserves and borrowing from the discount window were established and the nominal federal funds interest rate reached 10.56%.[6] These actions coincided with a reduction in average quarterly increases of nominal M1, from $4.9 billion per quarter between 1971:4 and 1972:4 to $3.4 billion

[3] For a discussion of the conflicting demands that Burns faced when serving as chairman of the Federal Reserve Board and of the Committee on Interest and Dividends, see Mayer (1999, Ch. 6).

[4] See Pauls (1990, p. 897).

[5] The actions of the Federal Reserve and Chairman Burns were quite controversial and allegedly politically inspired during this period. For a discussion of the controversy, see Greider (1987, pp. 340–345).

[6] Events in 1972 and 1973 were made more difficult to interpret when the Federal Reserve adopted a new basis for imposing reserve requirements that was based on the amount of net demand deposits in a member bank. The number of different reserve requirements applicable to member banks increased and reserve requirements themselves varied more across banks.

over the next four quarters. Reserve requirements on net demand deposits at member banks were raised (for the last time) 0.5% in July 1973. The Federal Reserve also raised marginal reserve requirements on bank-related commercial paper and on large denomination certificates of deposit in May and the latter again in September. For the first time in four years the real federal funds rate was substantially positive, 2.78%, in 1973:3.

However, the rate of unemployment fell slightly through 1973 and the rate of inflation continued to rise. Because steps in the schedule for income taxes were not indexed for inflation, federal government revenues rose rapidly and the federal deficit fell to single digits at the end of 1973. Rising inflation and interest rates, restrictive fiscal policy, and political instability flowing from the Nixon administration's involvement in the Watergate investigation coincided with a collapse in equity prices; the Standard and Poor Industrial Stock Price Index (1941-1943 = 10) fell from 132.6 in February 1973 to 74.8 in December 1974.

On February 12, 1973, the Nixon administration proposed a second devaluation of the dollar relative to the SDR that had been defined in 1968; the implied price of an ounce of gold rose from $38 to $42.22. Japan simultaneously announced that the value of the yen would be allowed to float upward against the dollar. In the following month all major Western European countries allowed their currencies to float against the dollar. The trade-weighted average value of the dollar fell about 10% between 1972 and 1973; the dollar's value had been falling for some time, but its rate of decline increased between the Nixon speech of August 15, 1971 and the announcement of February 12, 1973.

Financial innovations were an important reason for the ineffectiveness of monetary policy. First, in Table 7 it can be seen that the volume of funds banks acquired through repurchase agreements doubled between 1972 and 1973.[7] These interest-bearing funds were mostly overnight contracts secured by U.S. government or government agency securities in which banks borrowed from corporate and state government demand deposit accounts near the end of a business day; the funds were returned to demand deposit accounts at the beginning of the following business day.[8]

[7]Data on the volume of repurchase agreements are not available before 1970:1 and they were not widely accessible until 1977. For a discussion of repurchase agreements, see Smith (1978).

[8]All such borrowings were collateralized by U.S. government or government agency securities and, hence, essentially free of default risk. These transactions were attractive to banks because, unlike deposits, funds acquired through repurchase agreements were not subject to reserve requirements and relatively costless because the interest rates on repurchase agreements were less than the federal

M1 was constructed by summing demand deposits at the end of a business day, so funds in overnight repurchase agreements were transaction balances that were not included in M1.[9] By not taking them into account, the Federal Reserve had seriously underestimated the rate of growth of transactions balances. Repurchase agreements had been around for a long time; they existed in the 1920s and were reintroduced in the late 1940s by New York security dealers. They do not appear to have been quantitatively important for monetary policy until 1973, when interest rates reached levels that made closely managing overnight cash assets important.

Second, some new liquid assets emerged during the early 1970s. Money market mutual funds (MMMFs) first appeared in 1972; they would rise to $4 billion in 1974 and then atrophy for a few years when short-term interest rates fell. Although checks could be written against balances in these funds, they were not as convenient as demand deposits for effecting transactions. Negotiable order of withdrawal (NOW) accounts also first appeared in 1972, but balances in these checkable accounts were quite modest in 1973 and 1974. Both MMMFs and NOW accounts would become much more important for interpreting monetary policy later in the decade.[10]

The rate of inflation as measured by the GDP price deflator averaged more than 10% in 1974. At the end of 1973, there was a quadrupling of oil prices that was coordinated by the Organization of Petroleum Exporting

funds rate. Corporations and state governments found them attractive, because interest was paid on transactions balances that might otherwise sit in noninterest-paying demand deposit accounts. Competitive pressures from security dealers induced large banks to participate in the market for repurchase agreements. Banks responded when they lost idle demand deposit balances to repurchase agreements arranged by security dealers.

[9]Evidence that these were transactions balances can be seen in the Federal Reserve's demand deposit turnover statistics. Turnover is the ratio of annualized demand deposit account debits to the average level of demand deposit balances. Seasonally adjusted demand deposit turnover for all banks had its largest postwar percentage increase, up to that time, in 1973. Similar large percentage increases occurred in 1974, 1976, and 1979 when large percentage increases in repurchase agreements also occurred. See Board of Governors of the Federal Reserve System, (1981, pp. 59−60). In all four years, there was a large percentage increase in the number of wire transfers of funds. See Hester (1981, p. 159) and Chapter 10 below.

[10]There was one other transient innovation, which occurred when the Federal Reserve and other regulatory agencies suspended interest rate ceilings on certificates of deposit with balances between $1,000 and $100,000 and maturities of at least four years in July 1973. Congress banned the issuance of such "wild card" CDs in November 1973.

Countries (OPEC).[11] The U.S. was a large importer of oil; other things equal, a rise in the price of imported oil should have reduced the rate of inflation of the GDP implicit price deflator in 1974.[12] The increased rate of inflation came from pricing decisions by domestic enterprises that were trying to protect themselves from the tax being imposed by OPEC. However, this strategy would prove unsuccessful because their customers were being squeezed and could not afford the higher costs.[13] A recession would inevitably accompany this administered-price increased rate of inflation, in part because, as noted above, the Federal Reserve had substantially increased real interest rates in 1973.[14]

The (unreported) Federal Reserve index of industrial production reached a peak in August 1973 and real GDP reached a peak in 1973:4, as can be inferred from Table 6. It would not be surpassed until 1975:4. The unemployment rate soared from 4.8% in 1973:4 to 8.9% in 1975:2—the highest quarterly rate so far in the postwar era. The new recession would, of course, be associated with higher unemployment, but part of the increase in unemployment resulted from an increase in the fraction of civilians sixteen and older participating in the labor force. The participation rate of females in the labor force had been rising since the mid 1960s; the overall participation rate began to grow faster in 1973:2 because of acceleration in female participation and other demographic changes. A large number of young "baby boomers" were swelling the labor force and the number of active military personnel fell sharply in the early 1970s.[15] The civilian participation rate would continue to rise through the decade and beyond because of the changing age distribution. The federal deficit grew rapidly be-

[11]To an unknowable extent, this increase in oil prices was a response by OPEC to the depreciating U.S. dollar. See Greider (1987, pp. 339–340). The trade-weighted value of the dollar fell about 25% between the middle of 1971 and the middle of 1973. The dollar value of a large number of traded goods rose sharply at about the same time as the OPEC shock. See Council on International Economic Policy (1975, pp. 1–38).

[12]Because imports are a negative item in constructing GDP, a rise in import prices lowers the implicit price deflator.

[13]For a similar interpretation, see Burns (1977, p. 986).

[14]For a very interesting contemporary analysis of the effects of restrictive monetary policy in the presence of external shocks, see Pierce and Enzler (1974).

[15]Baby boomers were born between 1946 and 1964. The fraction of the U.S. population with ages between 14 and 21 was at a maximum around 1975. The fraction of the U.S. population that was on active duty in the military was at a Vietnam War high in 1968; it fell almost 50% by 1979. Source: United States Bureau of the Census (1986, pp. 14, 326).

ginning in 1974:4 in this deepest postwar recession so far, because of the operation of automatic stabilizers.

The picture was further muddied by the resignations of Vice President Spiro Agnew in 1973 and then of President Richard M. Nixon in September 1974. Both were caused by scandals that led people in the United States and overseas to question the stability of the government and the value of the dollar. These embarrassments were complemented by a series of large bank failures that began with the failure of the Franklin National Bank in 1974, the largest bank failure in U.S. history at that time. The trade-weighted value of the dollar hit lows in July 1973 and again in March 1975. The Interest Equalization Tax and the Voluntary Foreign Credit Restraint Program of the mid 1960s were cancelled in January 1974, in part because dollars were now flowing into U.S. banks from OPEC countries that were accumulating large balances from the quadrupling of oil prices.

The Federal Reserve responded to these extraordinary conditions by allowing the nominal federal funds rate to rise from 10.00% in 1973:4 to 12.09% in 1974:3, although the real federal funds rate, shown in Table 6, fell steadily from its peak in 1973:3 to a negative 1.30% in 1975:2. As can be seen in Table 7, the discount rate peaked at 8% in 1974:3 and then fell steadily for the next several years. The t-bill rate hit a peak in the same quarter and traced a similar downward path, but the constant-maturity 10-year rate stayed relatively high until 1976:3. An interpretation of the high 10-year rate is that investors continued to be concerned about the reemergence of inflation and political instability. Net free reserves fell to $ -1.6 billion in mid 1974. Discount window borrowing soared to $3.3 billion, but most of this was by the failing Franklin National Bank. Quarterly increases in M1 continued to diminish until 1975:1, but the funds that banks raised through repurchase agreements doubled between 1973:2 and 1974:3 so that transactions balances continued to grow at a rapid rate. In February 1975 reserve requirements on net demand deposits were cut by 0.5%; a further cut of between 0.25% and 0.5%, depending upon size of bank, occurred in December 1976. Currency outstanding was growing more rapidly than M1 for reasons that were unclear at the time. In retrospect, it is likely that much of it was disappearing into offshore cash hoards.

Partly in response to arguments for tighter control of monetary aggregates, in January 1974 the FOMC began to set numerical specifications for "tolerance" ranges for the growth rates of M1 and M2 over two-month intervals. Similarly, inter-FOMC meeting ranges were established so that "the weekly average federal funds rate would be permitted to vary in an

orderly fashion."[16] The antecedents for these changes are captured in the following extracts:

> In the 1970's, increased emphasis has been given to monetary aggregates, principally measures of the monetary stock. In 1972 the FOMC introduced, on an experimental basis, reserves against private nonbank deposits as a guide to reserve provision in the interim between meetings. . . . There is little reason to permit sharp short-run swings in interest rates (for example, 4 or 5 percentage points over a month or so) in an effort to smooth out temporary variations in money and credit demand. Such extreme swings, and the associated uncertainties as to credit conditions generally, could reduce the efficiency with which financial markets function and tend to increase financing costs to ultimate borrowers.[17]

Finally, in May 1975 the Federal Reserve began to establish ranges for the monetary aggregate indicators, M1, M2, M3, and a broader credit measure.[18]

Assessing this performance is almost as challenging as the problems the Federal Reserve was facing, but superficially the results were not bad. The rate of inflation fell from 11.76% in 1974:3 to 4.19% in 1976:1. The unemployment rate fell very slowly from 8.9% in 1975:2 to 7.6% in 1976:2. The trade-weighted value of the dollar steadied in 1976 and 1977; it had roughly the same value that it had in 1972. Much of the recovery in the exchange rate was associated with large acquisitions of dollar-denominated deposits in U.S. banks, U.S. Treasury securities, and U.S. corporate securities by Middle East oil exporting countries in 1976 and 1977. Their securities acquisitions would fall considerably in succeeding years, as would the

[16]Board of Governors of the Federal Reserve System (1974, p. 333).

[17]Ibid, pp. 336–337.

[18]Definitions of monetary aggregates changed over time. In 1975 M1 was defined as averages of daily figures for (1) demand deposits of commercial banks other than domestic interbank and U.S. government, less cash items in the process of collection and Federal Reserve float; (2) foreign demand balances at Federal Reserve banks; and (3) currency outside the Treasury, Federal Reserve Banks, and vaults of commercial banks. M2 consisted of averages of daily figures for M1 plus savings deposits, time deposits open account, and time certificates of deposit other than negotiable CDs of $100,000 or more at large weekly reporting banks. M3 consisted of M2 plus the average of beginning and end-of-month deposits of mutual savings banks, savings and loan association shares, and credit union shares. Source: Board of Governors of the Federal Reserve System (1976b, p. 329).

international value of the dollar when they increased the rate of spending from their greatly increased oil earnings.[19]

However, trouble was lurking just below the surface. The real federal funds rate was negative on average from 1974:3 until 1978:4, which meant that large firms who could borrow at roughly the federal funds rate gained simply by holding representative tangible assets and financing them with borrowed funds. Federal government deficits were large and continuing; automatic stabilizers dampened the rate at which the economy slipped into recession, but were incapable of guiding it back toward full employment. Unemployment was high. Finally, a large bubble began to develop in the housing market. The purchase price of new houses rose from $35,500 in 1970 to $37,100 in 1973, but then doubled to $74,400 in 1979. Because new mortgage interest rates were only about 9% from 1974 through 1977 and 10% in 1978 and 1979, an average new house buyer also earned high rates of return, when financing with borrowed funds. The total outstanding mortgage debt on 1–4 family houses rose from $298 billion in 1970 to $416 billion in 1973 and then to $872 billion in 1979.[20] Most of these mortgages were made at fixed interest rates, which would have dire consequences for mutual savings banks and savings and loan associations in the coming years.

In judging this picture it is important to note that there was expansionary fiscal policy in the forms of tax cuts, extensions of unemployment insurance coverage for the long-term unemployed, expanded investment tax credits, and enhanced social security benefits. Many of these initiatives were temporary actions that came from the Congress rather than the new Ford administration. As can be inferred from the large deficit in Table 6, these efforts were concentrated in 1975:2 because of large temporary retroactive tax cuts that resulted in distributions of overpayments that quarter. Nixon's replacement as President, Gerald Ford, had proposed a larger permanent tax cut that was not enacted. His credibility as a leader suffered from the fact that he had never won even a statewide election, although he had been minority leader in the House of Representatives before being ap-

[19]Net acquisitions of U.S. government bonds and notes by Middle East oil exporting countries were $1.8 billion in 1975, $3.9 billion in 1976, $4.5 billion in 1977, $ -1.8 billion in 1978, and $ -1.0 billion in 1979. Net purchases of corporate securities by Middle Eastern countries were $3.2 billion in 1975, $3.0 billion in 1976, $3.1 billion in 1977, $1.7 billion in 1978, and $1.1 billion in 1979. Source: Board of Governors of the Federal Reserve System (1981, pp. 390, 403).

[20]Data on house prices are from a survey conducted by the Federal Home Loan Bank Board. Source: Board of Governors of the Federal Reserve System (1981, pp. 270, 281).

pointed to replace the discredited Agnew as Vice President. The Congress seemed also to be wary of the power the Federal Reserve was wielding and passed Continuing Resolution 133 that required the Chairman to defend and explain Board policies semiannually.

Both inflation and the unemployment rate began to rise in 1976:3, which undoubtedly contributed to President Ford's loss to Governor Jimmy Carter in the November election. The Carter administration proposed an intricate series of tax law changes that were intended to decrease the unemployment rate and achieve other fiscal objectives. The unemployment rate fell steadily from 7.8% in 1976:4 to 6.0% in 1978:2; the civilian participation rate in the labor force rose sharply from 61.8% to 63.1% over the same time span. Real GDP rose at a rapid pace from 1976:4 through 1977:3, after which it slowed for two quarters. The rate of inflation averaged over 6% per year during this period and then began to accelerate. The federal budget deficit continued to be large through 1978:1, even though the unemployment rate was falling. It began to fall in 1978:2, but the budget never reached a surplus in Table 6. The (unreported) merchandise trade deficit turned increasingly negative as the recovery continued, which is reflected in the balance on current account in the table.

Monetary policy continued to be accommodating through 1977:2, if judged by net free reserves and borrowing at the discount window. Both indicators suggest that policy became increasingly restrictive after that quarter for the remaining period shown in Table 7. A very similar pattern is evident in the four nominal interest rates shown in the table. Reserve bank credit grew rapidly between 1976:4 and 1979:3, but almost all of it was absorbed by rapidly growing currency that partly disappeared into offshore currency hoards. The amount of transactions funds held in the form of overnight repurchase agreements continued to grow very rapidly. The amount in outstanding repurchase agreements grew 140% between 1976:4 and 1979:3. Because this growing volume of transactions funds arguably contributed to rising prices, the real federal funds rate in Table 6 did not turn meaningfully positive until 1978:4.[21] By this indicator, monetary policy was excessively accommodating, in part because the Federal Reserve had failed to understand the significance of repurchase agreements.

[21]It is important to note that negative real federal funds interest rates in Table 6 are "ex post" rates; the inflation rate that underlies their calculation was unknown at FOMC meetings. However, their signs could reasonably have been estimated, because rates of inflation did not vary greatly from quarter to quarter, as can be seen in Table 6. For an interesting discussion of this and an unofficial interpretation of how the FOMC allowed negative real interest rates to persist, see Orphanides (2004).

Despite this monetary ease and rapidly growing volume of dollar-denominated transactions balances, the trade-weighted international value of the dollar had roughly the same value in June 1976 that it had in 1972 and was only a few percentage points lower in September 1977. The dollar's value then began to fall against all major currencies. Dollar liabilities of banks to foreigners and foreign holdings of U.S. government securities had been growing rapidly and apparently by the end of 1977 a glut had developed. As noted above in a footnote, OPEC countries had sharply reduced their acquisitions of dollar-denominated assets at this time. In Europe an effort was underway to establish a crude regional fixed exchange rate system, the "snake", in which western European continental economies attempted to limit fluctuations of their currencies relative to a market standard, the West German mark. This partial substitute for the dollar in international transactions evolved into a bookkeeping currency, the ecu, which was used to complete transactions in the European Community, until it fell to a wave of successful speculative attacks in 1992. The dollar's trade-weighted value fell about 15% between September 1977 and the end of 1979.

Arthur F. Burns's term as Chairman was not renewed in January 1978; G. William Miller succeeded him on March 8, 1978 and Burns resigned from the Board on March 31. Miller had been chairman of an industrial company, Textron, Inc. While Chairman Burns faced very challenging problems with mixed success, as the foregoing narrative conveys, his replacement by President Carter was all but inevitable given his close ties with the Nixon administration. The Federal Reserve's independence had been compromised in the public eye.

Chairman Miller's term would also prove to be challenging; he would resign on August 6, 1979 to become Secretary of the Treasury. During his seventeen months in office, the trade-weighted international value of the dollar declined about 9%, even though the FOMC took some forceful actions that increased nominal and real interest rates. Transactions balances that were in repurchase agreements rose by 67%, from $33.3 billion in 1978:1 to $55.3 billion in 1979:3. At the time the FOMC seemed to have no inclination to limit them.

Part of the explanation for the declining value of the dollar was that currency outstanding rose 15% during Miller's short tenure as Chairman.[22] The Federal Reserve must accommodate bank requests for currency, but was unwilling to force interest rates even higher by putting more pressure

[22]Very little of this increase in currency outstanding appeared in the vaults of member banks. See Board of Governors of the Federal Reserve System (1981, pp. 28–29). Much of the increase disappeared into overseas hoards.

on member banks beyond that evidenced by the negative net free reserves and increased borrowing from the discount window shown in Table 7. A likely reason for its reluctance is that balances in money market mutual funds grew very rapidly in 1978 and 1979, and probably would have grown even faster if interest rates were higher. These very liquid assets that first appeared in 1972 had been moribund for several years, but rose from $3.9 billion at the end of 1977 to $10.8 billion at the end of 1978 and to $45.2 billion at the end of 1979.[23] This nearly twelve-fold expansion was largely a market response to the rising short-term interest rates shown in Table 7 in 1978 and 1979. Yields on money market mutual funds tended to be about fifty basis points below the t-bill rate and were far above interest rates that banks and thrift institutions could pay on conventional time and savings deposits. Money market mutual funds were uninsured, but the funds had an institutional advantage because they yielded what they earned on investments in short-term assets, less a specified set of relatively low costs. This meant that unlike banks and thrifts they could not have a gap and were not vulnerable to changing interest rates.

The government became so alarmed by the possibility that banks and thrifts would be unable to compete with these funds that in June 1978 it approved a new type of time deposit, a money market certificate. Banks and thrift institutions could issue 6-month certificates that paid interest rates that were respectively equal to and 0.25% above the rate on 6-month t-bills.[24] This and subsequent similar new types of accounts were allowed without much concern about the time structure of cash flows from assets and liabilities on financial intermediary balance sheets.[25] This myopic policy would allow intermediation by depository institutions to continue in the short run, but would prove very costly to the government and taxpayers in the coming decade, as is explained in the second part of this volume.

Another 1972 innovation, NOW accounts, also began to grow rapidly in 1978, which prompted the Federal Reserve to introduce a new expanded monetary aggregate. It added balances in NOW accounts, automated transfer system (ATS) accounts, credit union share draft accounts, and demand deposit accounts at mutual savings banks to the earlier transactions medium indicator, M1.[26] The sum of all of these new components grew from

[23]Source: Board of Governors of the Federal Reserve System (1989, p. 40).

[24]The rate was the discount rate on 6-month t-bills. In March 1979, the twenty-five basis point premium that thrift institutions could pay over the rate commercial banks paid was annulled.

[25]See Council of Economic Advisors (1979, pp. 50–52).

[26]The new measure, M1B, was formally introduced on February 7, 1980. M1B was subsequently renamed M1 and is the quantity that is shown in the four subse-

$4 billion in January 1978 to $17 billion in December 1979. The new components would continue to grow at a much faster rate than the earlier M1 for many years.

In addition to redefining monetary aggregates and higher growth rates of non-deposit liabilities, there were important structural reforms that resulted from the enactment of the International Banking Act of 1978 and the Full Employment and Balanced Growth (Humphrey-Hawkins) Act of 1978. The former imposed regulations for the first time on branches and subsidiaries of foreign banks that were in the United States and made the Federal Reserve responsible for their enforcement. Reserve requirements were imposed on their demand deposits. The U.S. assets of these banks had been growing rapidly and were sizable. This reform undoubtedly made control of monetary aggregates quite tricky. The Humphrey-Hawkins Act of 1978 required the Federal Reserve to specify monetary and credit aggregate targets that it desired in 1979 and subsequently. Implementing these measures and achieving these targets proved to be very difficult.

Finally, OPEC orchestrated a second round of large oil price increases in 1979 that, as in 1973, was partially in response to the decreasing value of the dollar. Again, rising imported oil prices would increase the likelihood of both higher inflation and unemployment in the economy. Real GDP growth slowed and inflation increased markedly during the Miller Chairmanship. The federal deficit nearly disappeared, in part because of inflation that pushed taxpayers into higher tax brackets. The unemployment rate averaged about 5.9% and the civilian participation rate averaged 63.5%, the highest thus far in the postwar period.

In these turbulent years the Federal Reserve's ability to control events in the economy seemed limited and it and the existing large conventional macroeconomic models of the U.S. economy were criticized for failing to incorporate "rational expectations". See Lucas (1976). About eight years earlier a similar argument was used to attack the Phillips curve by Phelps (1967) and Friedman (1968). The Lucas critique was more general and argued that parameters in econometric models were unlikely to be stationary when discretionary policies were employed to control an economy. Households, firms, and other decision-making agents would recognize that macroeconomic policies were making their decisions sub optimal and

quent odd numbered tables in this volume. A further change was that demand deposits of foreign commercial banks and official institutions at U.S. commercial banks were subtracted from the new aggregate. As the text suggests, the distinction between the old and new M1 measures was not quantitatively important before 1978. These revisions are a part of a much larger reconstruction of monetary aggregates reported by the Federal Reserve. For details, see Simpson (1980).

change their behaviors, and thus parameters, accordingly. If the critique were true, the Federal Reserve's recently constructed large macroeconometric model was not likely to be a reliable guide to policy. The Lucas paper coincided with a period of very unsuccessful monetary policy, in which there were often negative real rates of interest. As will be seen in the next chapter, Chairman Paul Volcker responded to inflationary turbulence by forcing real short-term interest rates much higher. It remains unclear whether either the Lucas critique or negative rates explained the failures of the Burns and Miller Chairmanships, but in the 1990s the Federal Reserve did construct a new macroeconometric model that partly addressed the Lucas critique. The 1996 FRB/US model incorporated "model consistent" expectations. Such expectations are not necessarily rational, but they are constructed so that all decision makers in the model are constrained to have the same set of expectations.[27] The FRB/US model was still being used in 2007.

[27]See Brayton et al. (1997).

5 Paul A. Volcker: 1979–1987

Paul Volcker had been a member of the FOMC because of his position as President of the Federal Reserve Bank of New York, which he had held since August 1975. Unlike his predecessor, he had long been active in the Federal Reserve System, in banking, and at the Treasury where he had been Under Secretary for Monetary Affairs. He was appointed to the Board as Chairman on August 6, 1979. The situation seemed dire and is well summarized in the following statement:

> In any event, by September the growth of money and credit, developments in the real economy, and signs in commodity markets of an apparent worsening of inflationary expectations were giving unambiguous signals that more monetary restraint was needed. Pressures on the dollar reinforced these signals.[1]

During Volcker's first six weeks as Chairman, short-term interest rates rose at the most rapid rate ever in the history of the Federal Reserve.[2] On October 6, 1979 he announced at a press conference that the Federal Reserve would radically revise its approach to conducting monetary policy. The principal changes were:

1. Shifting the focus of monetary policy from interest rates to reserves available to banks,
2. Imposing an 8% marginal reserve requirement on "managed liabilities," so the requirement was applied to increases from that date in nondeposit liabilities of member banks and agencies and branches of foreign banks, including Eurodollar borrowings, funds acquired through repurchase agreements, and federal funds market borrowing from nonmember banks, and
3. Increasing the discount rate by 1%, from 11% to 12%.

The first two of these actions were landmarks that changed long established monetary policies. First, since World War II the Federal Reserve had been concerned that large changes in interest rates might create havoc

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[1]Council of Economic Advisors (1980, p. 54).
[2]Rattner (1979).

in the financial system by inflicting large capital losses on borrowers or lenders. Concerns about controlling interest rates dated from the time when the yield curve was pegged. One of the rationalizations for the availability of credit doctrine was the supposed existence of a "lock in" effect in which banks would be reluctant to sell long-term government securities if they were selling at a discount from par or cost, because capital losses would be revealed.[3] By focusing on nonborrowed reserves, large changes in the federal funds rate might and, indeed, did occur. This new policy was a sharp change from the Federal Reserve's stance as summarized by the extracts in the preceding chapter. Security dealers that financed large portfolios of securities overnight were expected to be particularly vulnerable. However, such short-run losses would be recouped when changes in rates were reversed. So long as rate volatility was temporary, the possibility of short-term losses might require dealers to reduce leverage, the ratio of liabilities to net worth, in their portfolios by taking smaller positions in securities markets, but no serious damage seemed likely. Moreover, the establishment of an options market and a futures market on financial instruments in 1973 and 1975, respectively, allowed dealers to hedge their positions.[4]

The shift of focus from prices (interest rates) to quantities (reserves) as indicators of monetary policy suggested the possibility that the Federal Reserve had accepted "monetarist" arguments that policy should be confined to controlling some monetary aggregate.[5] During his confirmation hearings, Volcker in fact characterized himself as a "pragmatic monetarist."[6] However, earlier he had derided theological disputes between monetarists and Keynesians in the academic community and worried about the quality of measures of monetary aggregates. As the following excerpt from an article at the time of his nomination suggests, he was not a convert to pure monetarism:

> He did accord the "so-called" monetary aggregates an important role "over time" in influencing the economy, but said "I frankly wish the money-supply

[3]Not everyone agreed that possible capital losses would be a serious problem for banks. For an insightful discussion, see Samuelson (1945).

[4]A hedge occurs in a financial market when a holder of a long (short) position in a market assumes an offsetting short (long) position in the same asset or liability in another market, thereby reducing risk.

[5]Karl Brunner, Milton Friedman, Allan H. Meltzer, and others had developed monetarism in a large number of contributions. Its underlying arguments are both political and economic and seem to vary considerably in published papers. A useful source that discusses and provides references to this large literature is Mayer (1990).

[6]Reich (1984).

> numbers were more reliable" than they have been lately. He counseled caution in evaluating their "very short-term" fluctuations.[7]

The Federal Reserve's Staff Director for Monetary and Financial Policy, Stephen H. Axilrod, described the change as follows:

> It signaled a shift to greater emphasis on reserve aggregates in carrying out monetary policy and, by implication, greater concern with achieving goals for monetary aggregates (especially M1) and less concern with interest rates.[8]

Second, introducing marginal reserve requirements on managed assets was an ambitious attempt to gain control of surging nondeposit financial assets and to respond to a continuing decrease in the number of member banks and the share of aggregate deposits that they held. Deposits of nonmember banks and foreign banks operating in the U.S. and especially deposits at U.S. bank offices overseas and at Edge corporation subsidiaries had been growing much faster than domestic deposits at member banks. Reserve requirements on deposits at nonmember banks were typically lower and/or less costly than those of member banks, prompting member banks to be large net purchasers from nonmember banks in the federal funds market. By imposing reserve requirements on increases in borrowing in this market from nonmember banks, the Federal Reserve penalized exploitation of a loophole.[9] Similarly, member banks had been borrowing growing amounts of Eurodollars from their overseas branches, which had not been subject to reserve requirements or to restrictions on the interest rates that branches could pay on deposits. Marginal reserve requirements on such borrowings partially closed a loophole, but were not totally effective because banks could encourage their domestic borrowers to obtain funds directly from overseas branches.[10] Foreign banks had also been borrowing nondeposit funds from their overseas offices. Marginal reserve requirements discouraged growth in such borrowing as well. Marginal re-

[7]Conderacci and Janssen (1979).

[8]Axilrod (1985, pp. 14–15).

[9]It had always been logically inconsistent to sum member and nonmember demand deposits when calculating the relation between member bank reserves and net demand deposits, because reserve requirements varied across banks. This inconsistency would soon be addressed in the Depository Institutions Deregulation and Monetary Control Act of 1980.

[10]The requirements would have some effect, because loans booked in offshore branches would be subject to the legal system in the country where the branch was located. Many borrowers are likely to have been deterred from going this route because of unfamiliarity with foreign legal systems.

serve requirements on increases in funds acquired through repurchase agreements addressed a growing problem that has been extensively discussed in the preceding chapter. It should be noted that the marginal reserve requirements were applied to the sum of funds acquired through all of these channels, not to funds acquired through each separately.

The increase in the discount rate was large, especially in the context of increases in short-term rates that had occurred since Volcker became Chairman. While increases in the discount rate were not new, this one signaled a willingness by the Federal Reserve to make large changes in interest rates over possibly long periods of time. The signal was not read this way at the time, but in retrospect perhaps it should have been. Soaring interest rates were about to prove very destructive. It was too late to avoid the destruction, because many firms were relying on borrowing for essential projects and thrift institutions could not avoid their consequences with their large negative gaps. Neither group had adequate hedges against fluctuations in interest rates in place.

The results from these extraordinary actions are not easy to discern because of (1) continuing increases in the price of imported oil, (2) the activation of the Emergency Credit Control Act of 1969 by President Carter on March 14, 1980, and (3) the signing of the Depository Institutions Deregulation and Monetary Control Act (DIDMCA) on March 31, 1980. The last extensively transformed the relation between depository institutions and the Federal Reserve and introduced other substantive changes that would be phased in over a period of up to eight years. It is discussed in some detail below, but its lengthy period of implementation makes interpreting its immediate effects highly speculative.

Crude material fuel prices in the Producers Price Index (1967 = 100) rose from 504 in January 1979 to 586 in August, 664 in March 1980, and 783 in December 1980. Imported oil prices, of course, rose much faster, but varied across countries. As an illustration, standardized crude petroleum from Venezuela had a price of $2.30 a barrel in 1970, $11.66 in 1975, $27.64 in 1980, and $33.84 in 1982.[11] As noted earlier, the impact of such shocks on the GDP deflator is complex, but appears to have been sharply positive.

President Carter's activation of the Emergency Credit Control Act of 1969 was one part of an intricate five-pronged anti-inflation program that was announced on March 14, 1980. The program included elements that dealt with federal budget discipline, restraints on credit, wage and price monitoring, energy conservation, and structural changes. The Credit Control Act authorized but did not require the Federal Reserve to place limits

[11]United States Bureau of the Census (1987, p. 460).

on new bank credit to firms and households, including department store credit, charge card balances, money market mutual fund balances, and thrift institution credit. Limits were imposed on institutions with outstanding credit lines in excess of $2 million and were enforced by requiring that all overages of levels on March 14 be subject to a reserve requirement of 15% that would be held by the Federal Reserve. The activation was canceled on July 3, 1980.

On April 3, 1980, the Federal Reserve raised the marginal reserve requirement on managed liabilities from 8% to 10% and imposed a surcharge of 3% on discount window borrowing by 270 banks that had more than $500 million in deposits; the standard discount rate at the time was 13%, so these large banks would pay 16%. The marginal reserve requirement on managed liabilities was reduced to 5% on June 12 and eliminated on July 24, 1980.[12]

Table 8 is a continuation of Table 6 that reports substantive measures of economic activity during Chairman Volcker's term. The unemployment rate rose sharply from 5.7% in 1979:2 to 7.7% in 1980:3, signaling a new recession, and the inflation rate remained high through 1981:1. It can be inferred from the tables that real GDP rose slowly until 1980:2, when it plunged—apparently in a wild reaction to the imposition of credit controls, although such an identification of causality is only conjectural given all that was occurring. The federal deficit widened in 1980:2 and 1980:3, largely reflecting the operation of automatic stabilizers. The international current account balance improved in 1980:3, because the recession reduced demand for imports. The rising unemployment rate arrested the increase in the civilian participation rate. Potential entrants to labor markets were deterred by the absence of jobs. Perhaps the most dramatic series in the table is the real federal funds rate, which fell to near zero in 1980:3. The reason for this sudden drop is clear from Table 9, which is an extension of Table 7 and presents time series of monetary instruments and indicators. The Federal Reserve quickly recognized that the credit controls were having a severe impact on the economy and rapidly expanded reserve bank credit in 1980:2. As a consequence, net free reserves rose and borrowing from the discount window fell in 1980:2 and 1980:3. The discount rate was reduced briefly to 10% and other short-term interest rates in the table fell in these quarters; M1B (labeled M1 in Table 9 and thereafter) grew rapidly.

The Board subsequently recognized that it had overreacted to the effects of the credit controls when M1 grew at annualized percentage rates of 22%

[12]See Feinman (1993, p. 589).

Table 8. Substantive Measures of Economic Activity: 1979:4–1987:2

quarter	unem-ployment rate	civilian participa-tion rate	nominal GDP	GDP deflator	annual % rate inflation	real federal funds rate	federal budget surplus	balance on current account
1979:4	6.0	63.8	2660.5	51.12	8.14	5.44	- 20.8	0.1
1980:1	6.3	63.9	2725.3	52.19	8.55	6.49	- 30.9	- 7.9
1980:2	7.3	63.8	2729.3	53.35	8.87	3.82	- 54.7	12.7
1980:3	7.7	63.7	2786.6	54.56	9.98	- 0.14	- 68.7	31.0
1980:4	7.4	63.7	2916.9	56.07	10.55	5.31	- 60.2	9.6
1981:1	7.4	64.0	3052.7	57.52	8.79	7.78	- 39.3	4.5
1981:2	7.4	64.1	3085.9	58.60	7.25	10.53	- 43.4	3.1
1981:3	7.4	63.7	3178.7	59.64	7.15	10.43	- 51.1	10.0
1981:4	8.2	63.8	3196.4	60.73	6.30	7.28	- 79.4	7.6
1982:1	8.8	63.8	3186.8	61.56	5.11	9.12	- 100.4	3.7
1982:2	9.4	64.0	3242.7	62.30	5.22	9.29	- 105.9	20.6
1982:3	9.9	64.1	3276.2	63.18	4.94	6.06	- 143.8	- 10.9
1982:4	10.7	64.1	3314.4	63.86	3.78	5.51	- 177.3	- 14.1
1983:1	10.4	63.8	3382.9	64.39	3.08	5.58	- 173.2	- 4.9
1983:2	10.1	63.9	3484.1	64.85	3.48	5.32	- 169.4	- 24.7
1983:3	9.4	64.2	3589.3	65.52	3.54	5.92	- 185.7	- 44.9
1983:4	8.5	64.1	3690.4	66.01	4.00	5.43	- 163.8	- 53.7
1984:1	7.9	64.0	3809.6	66.84	4.20	5.49	- 153.9	- 75.5
1984:2	7.4	64.5	3908.6	67.41	3.31	7.25	- 164.0	- 84.8
1984:3	7.4	64.5	3978.2	67.95	2.86	8.53	- 171.7	- 87.3
1984:4	7.3	64.5	4036.3	68.39	3.52	5.75	- 182.8	- 100.1
1985:1	7.2	64.8	4119.5	69.15	3.37	5.11	- 147.0	- 86.0
1985:2	7.3	64.8	4178.4	69.55	1.96	5.96	- 197.3	- 107.9
1985:3	7.2	64.7	4261.3	69.84	2.12	5.78	- 174.3	- 117.7
1985:4	7.0	65.0	4321.8	70.29	2.32	5.79	- 181.3	- 131.7
1986:1	7.0	65.0	4385.6	70.65	2.06	5.77	- 180.7	- 124.8
1986:2	7.2	65.2	4425.7	71.01	2.18	4.74	- 202.1	- 138.4
1986:3	7.0	65.4	4493.9	71.43	2.46	3.75	- 207.1	- 146.8
1986:4	6.8	65.4	4546.1	71.89	2.95	3.31	- 173.3	- 146.9
1987:1	6.6	65.5	4613.8	72.49	2.73	3.49	- 180.5	- 147.6
1987:2	6.3	65.5	4690.0	72.88	2.57	4.08	- 126.0	- 151.1

in August and 15% in September.[13] The money stock is generally understood to respond to injections of reserves with lags. As is evident in Table 9, in 1980:3 and 1980:4 the Federal Reserve sharply curtailed the growth in reserve bank credit. Short-term interest rates jumped to record levels, net free reserves tumbled, and discount window borrowing doubled in 1980:4. Again with a lag, M1 growth slowed dramatically between 1981:2 and 1981:4.

During the first year of Volcker's Chairmanship, funds acquired through repurchase agreements were below their peak in 1979:3; this was probably a consequence of the 8% marginal reserve requirements that had been announced on October 6, 1979. However, they began to grow rapidly again in 1980:3, which prompted the Federal Reserve Board to initiate policies to make them less convenient by discouraging "daylight overdrafts," a temporary and specious form of transactions media.[14] Money market mutual funds, another form of transactions media, continued to grow very rapidly; their yearend totals were $45.2 billion in 1979 and $76.4 billion in 1980. Much of these funds had been withdrawn from commercial banks and thrift institutions that were not allowed to match the very high interest rates that the funds paid.

These trends together with an accelerating loss in the number of commercial banks that were members of the Federal Reserve System prompted the passage of the Depository Deregulation and Monetary Control Act of 1980 (DIDMCA), which was signed into law by President Carter on

[13]There were a relatively large number of dissents in FOMC votes during this turbulent period. For an interesting discussion of Federal Reserve decision-making and actions during this period, see Greider (1987, Chaps. 6 and 13). The use of M1 as an indicator of monetary policy by the FOMC was becoming increasingly controversial in 1982, both in the committee and elsewhere, as can be inferred from Greider (1987, pp. 479–483, 489–494).

[14]A daylight overdraft occurs during a business day if a bank wires more funds or securities out of its account in a Federal Reserve Bank than it has in the account at the time of the transfer. Such overdrafts resulted more or less automatically when overnight repurchase agreements expired. For a discussion of this, see Hester (1982, pp. 310–312). In 1980 banks were not penalized for such overdrafts if they were covered by the end of a business day. The discouragement was quite mild in 1980; the Board merely asked Reserve Bank presidents to set up a system to discourage the practice. The Federal Reserve began to collect data on overdrafts in December 1984 and imposed net debit caps in March 1986. See Belton et al. (1987) for a description of these efforts. Penalties for and regulation of daylight overdrafts would be increasingly strengthened over the subsequent years. For a more recent discussion, see Richards (1995).

Table 9. Monetary Instruments and Indicators: 1979:4–1987:2

quarter	net free reserves	federal funds rate	M1	discount rate	treasury bill rate	discount borrowing	repurchase agreements	currency outstanding	reserve bank credit	10-year rate
1979:4	- 1.5	13.58	381.1	11.92	11.84	1.8	51.8	121.6	137.0	10.45
1980:1	- 1.7	15.05	388.1	12.51	13.35	1.9	46.9	122.3	136.9	11.99
1980:2	- 0.6	12.69	385.9	12.45	9.62	1.3	45.3	124.9	139.9	10.48
1980:3	- 0.3	9.84	399.3	10.35	9.15	0.8	54.0	128.9	140.3	10.95
1980:4	- 1.3	15.85	409.4	11.78	13.61	1.7	57.2	132.9	142.6	12.42
1981:1	- 0.9	16.57	415.0	13.00	14.39	1.2	60.5	132.6	141.4	12.96
1981:2	- 1.6	17.78	425.8	13.62	14.91	1.9	62.7	135.6	144.2	13.75
1981:3	- 1.0	17.58	426.9	14.00	15.05	1.5	63.8	138.4	146.5	14.85
1981:4	- 0.3	13.59	432.1	13.04	11.75	0.8	65.5	140.9	148.7	14.09
1982:1	- 1.0	14.23	442.4	12.00	12.81	1.6	68.8	141.2	149.7	14.29
1982:2	- 0.8	14.51	447.1	12.00	12.42	1.3	68.0	144.7	151.2	13.93
1982:3	- 0.3	11.01	452.1	10.83	9.32	0.7	69.8	148.2	153.5	13.12
1982:4	0.0	9.29	470.3	9.25	7.91	0.6	73.4	151.5	156.4	10.67
1983:1	0.1	8.65	484.0	8.50	8.11	0.6	75.8	152.4	156.2	10.56
1983:2	- 0.1	8.80	499.1	8.50	8.40	1.2	84.7	157.2	160.5	10.54
1983:3	- 0.5	9.46	510.4	8.50	9.14	1.5	84.7	160.9	165.5	11.63
1983:4	- 0.2	9.43	519.2	8.50	8.80	0.8	93.8	165.3	169.5	11.69
1984:1	0.0	9.69	528.0	8.50	9.17	0.7	99.1	168.1	169.2	11.94
1984:2	- 1.3	10.56	537.3	9.00	9.80	2.5	106.4	172.2	174.4	13.20
1984:3	- 0.2	11.39	541.7	9.00	10.32	7.1	110.6	176.3	177.4	12.87
1984:4	- 0.1	9.27	547.6	8.73	8.80	4.6	111.8	179.0	180.3	11.74
1985:1	0.3	8.48	562.2	8.00	8.18	1.4	109.5	179.1	181.6	11.58
1985:2	0.2	7.92	575.9	7.77	7.46	1.3	106.9	183.1	188.2	10.81
1985:3	0.2	7.90	596.3	7.50	7.11	1.2	108.1	187.9	192.2	10.34
1985:4	0.0	8.10	613.3	7.50	7.17	1.4	116.9	191.9	198.1	9.76
1986:1	0.7	7.83	626.6	7.37	6.90	0.8	123.6	192.3	202.1	8.56
1986:2	0.6	6.92	651.2	6.61	6.14	0.9	126.3	196.4	205.5	7.60
1986:3	0.4	6.21	678.8	5.83	5.52	0.9	134.5	201.1	212.3	7.31
1986:4	0.5	6.27	708.3	5.50	5.35	0.8	143.6	205.5	219.9	7.26
1987:1	0.8	6.22	731.5	5.50	5.54	0.6	149.1	207.2	224.9	7.19
1987:2	0.4	6.65	744.3	5.50	5.66	0.9	159.1	212.0	235.9	8.34

March 31, 1980.[15] This landmark legislation, consisting of nine titles, extensively restructured the rules applying to depository intermediaries and their relations with the Federal Reserve.[16] In this discussion, attention is restricted to the first three titles, which most directly concerned the conduct of monetary policy.

Title I effectively nullified the importance of membership in the Federal Reserve System by phasing in over an eight-year period uniform reserve requirements on all transactions balances and on all nonpersonal time deposits in all federally insured depository institutions, not just member banks. After the phase-in period, reserve requirements on transactions balances above an inflation indexed $25 million could be varied between 8% and 14%, and under some conditions supplemental interest bearing reserve requirements could be placed on transactions balances. All institutions subject to reserve requirements were to have access to the Federal Reserve discount window on the same terms as member banks. The Federal Reserve was empowered to impose reserve requirements on a broad class of eurocurrency transactions that included some borrowings from foreign sources, sales of assets by domestic depository institutions to their foreign offices, and loans made by their foreign offices to U.S. residents.[17]

The Federal Reserve was required in Title I to charge fees for all services it provided to depository institutions. Before DIDMCA, it had been providing a wide range of services at no charge to member banks in an attempt to discourage them from leaving the system. This practice had made a mockery of an efficient price system, because member banks could compete unfairly with other depository institutions that did not have access to Federal Reserve largesse. Further, because almost all Federal Reserve System profits are remitted to the Treasury, by giving away services the Federal Reserve was effectively spending general government revenues and

[15]The number of banks that belonged to the Federal Reserve System fell because of mergers, decisions to withdraw from the system, and conversions from national to state bank charters. (All national banks were required to belong to the Federal Reserve System, but state chartered banks were not.) Changes in the numbers of all commercial banks and banks belonging to the Federal Reserve System were respectively 171 and 8 in 1975, 41 and -30 in 1976, 32 and -91 in 1977, 7 and -105 in 1978, and -4 and -139 in 1979. Source: Board of Governors of the Federal Reserve System, (1981, pp. 494–495). Perhaps of greater importance, member bank transactions balances as a share of all transactions balances fell about 12% between 1973 and 1980. See Feinman (1993, p. 577).

[16]For a good summary of DIDMCA, see Federal Reserve Bank of Chicago (1983, pp. 7–27).

[17]Eurocurrency is a term that describes balances in a country's currency that are booked offshore.

thus engaging in fiscal policy. The fees forced banks to impose charges on their clients in order to recover the fees that they now had to pay. These new charges would lead the clients to change payment patterns in ways that are difficult to interpret. A mitigating change in this legislation was the introduction of required clearing balances that banks would keep with the Federal Reserve. The balances would help to avoid daylight overdrafts. While these balances did not pay explicit interest, they did generate credits that banks could use to pay the fees that the Federal Reserve now charged for the services it provided. Undoubtedly part of the rapid growth in credit card transactions during this period and subsequently can be attributed to the fees the Federal Reserve was required to begin charging.[18]

Title II began to address the problem of interest rate ceilings and the distortions and inequities they created, especially in mortgage markets when depositors shifted funds to securities and money market mutual funds that had no ceilings. The act extended authority to a new Depository Institutions Deregulatory Committee to maintain ceilings, but the committee was charged with devising a prudent strategy that would lead to the elimination of ceilings by the end of six years.

Title III authorized all depository institutions to offer negotiable order of withdrawal (NOW) accounts beginning in January 1981. The accounts differed from demand deposit accounts in that interest could be paid on transactions balances. The ban on paying interest on demand deposits in the Banking Act of 1933 was not changed. This title also increased the amount in a depository institution that an individual could have insured by the federal government from $40,000 to $100,000.

The provisions of these three titles changed the safety, cost, and attractiveness of deposits. As a consequence, the relations between various monetary aggregates and policy targets of the Federal Reserve were likely to change. Because of the Humphrey-Hawkins Act of 1978, the Board was obligated to announce desired ranges for the growth of the principal monetary aggregates, but was not required to keep their growth within the ranges. Because of changes in the definitions of monetary aggregates, institutional changes mandated by DIDMCA, and the spectacular growth of money market mutual funds (from $76.4 billion at yearend 1980 to $186.2

[18]Data on the volume of credit card transactions are not readily available. The claim that they were growing rapidly is based on data about revolving credit debt outstanding. In December 1980, $58.5 billion was outstanding. In subsequent Decembers the amounts outstanding in billions were $64.8 in 1981, $70.5 in 1982, $83.8 in 1983, $106.2 in 1984, $128.9 in 1985, $143.7 in 1986, and $161.8 in 1987. Source: Board of Governors of the Federal Reserve System (1991, pp. 242–245). See also Evans and Schmalensee (1999, pp. 133, 236, 237).

billion at yearend 1981), it has never been clear how one should interpret these ranges. I do not attempt to analyze the announced ranges and their changes in this discussion.

In the new environment established by DIDMCA, reserve requirements continued to be an awkward policy instrument. When the act became effective in September 1980, the first $25 million of average transactions deposits in a financial institution had a reserve requirement of 3% and remaining transactions deposits had a reserve requirement of 12%. The threshold where the higher rate came into effect was indexed to the rate of inflation; it reached $40.5 million at the end of Chairman Volcker's term. Because member banks with between $100 and $400 million and more than $400 million in transactions balances had reserve requirements respectively of 12.75% and 16.25% at the end of 1979, during the eight-year, phase-in period they would benefit from falling reserve requirements. Reserve requirements on transactions balances would rise at other banks and at thrift institutions during this transition period. Apart from indexation of the threshold and the lengthy interval over which the new requirements were introduced, the Federal Reserve did not change reserve requirements on transactions balances over the rest of the decade.

After cutting the discount rate to 10% in August 1980, the Federal Reserve began to push it up until it averaged 14% in 1981:3. Other interest rates shown in Table 9 echoed this movement with even larger increases than the discount rate. The greater increases of the market rates were partly a consequence of a series of large income tax cuts that the incoming Reagan administration had promoted and guided through Congress. The cuts were phased in over three years; 10% in 1981, 10% in 1982, and 5% in 1983. The growth rate of M1 and of funds raised through repurchase agreements slowed markedly in the last three quarters of 1981, particularly if one takes the high rate of inflation into account. Net free reserves fell and borrowing from the discount window rose, but neither changed much. In the new DIDMCA environment, the Federal Reserve seemed to be moving very cautiously when increasing pressure on depository institutions' reserve positions.

The mix of aggressively expansionary fiscal policy from tax cuts and restrictive monetary policy would have profound consequences on the U.S. economy, as can be seen in Table 8. Inflation reached a peak annual rate of 10.55% in 1980:4, and then fell unevenly to 1.96% in 1985:2. Real GDP recovered quickly from the recession that coincided with the activation of the Credit Control Act of 1969, so that a new peak was achieved in 1981:1. The unemployment rate held constant at 7.4% until 1981:4, when it began a series of large increases that ended at 10.7% in 1982:4. The real federal funds rate reached an all time quarterly average high of 10.53% in 1981:2,

before tracing a downward path that would continue almost to the end of Volcker's term.

High interest rates impacted many sectors of the economy. Agriculture was particularly hard hit because federal farm credit programs had been growing rapidly in the 1970s. Interest rates on federal farm credit program loans were floating rates that changed every six months. The rates were indexed to the cost of funds that Federal Land Banks, Federal Intermediate Credit Banks, and Banks for Cooperatives paid in security markets. When interest rates rose, farmers were caught because they had to pay more, but they could not raise prices on the crops that they sold. Under severe stress, they stopped buying farm equipment, which resulted in a wave of bankruptcies among farm equipment manufacturers. In order to raise cash, they also sold land, which resulted in sharp decreases in land prices. The problem was that farmers effectively had many short-term liabilities because of the way the credit programs priced loans. Their assets were long-term, with very inelastic secondary market demand. The yield from their assets was random, but tended to be negatively correlated with interest rates. When interest rates rose liabilities had to be refinanced at the new higher rates, but realized rates of return from assets fell as farmers engaged in distress sales. In a period of high inflation, an index of crude foodstuff and feedstuff prices fell from 259 (1967 = 100) in 1980 to 235 in 1985.[19]

Thrift institutions were devastated because they had large negative gaps. They held large amounts of fixed interest rate mortgage loans, but were forced to pay rising interest rates on their deposit liabilities in a failing attempt to keep depositors from switching to high yielding money market mutual funds. The interest rates paid by these funds rose almost point for point with money market rates. Thrifts offered new mortgage loans at high rates in an effort to survive, but ran into severe borrower resistance. As a consequence real residential construction (in 1982 $s) fell from $178 billion in 1978 to $105 billion in 1982.[20]

The crisis in the savings and loan and mutual savings bank industries became so severe that Congress was forced to intervene with emergency legislation, the Garn-St Germain Depository Institutions Act of 1982.[21] The first two titles of this act contained a number measures that would allow these financial institutions to continue to exist, postponing rather than effecting their restructuring. The third title attempted to address the "problem" of the surging growth of money market mutual funds by introducing

[19]Source: Council of Economic Advisors (1987, p. 315).

[20]Source: Ibid. p. 246.

[21]For a useful summary of this legislation, see Federal Reserve Bank of Chicago (1983, pp. 28–46).

two new liabilities that could be offered by depository institutions, a money market deposit account and a super NOW account.[22] This title thus overrode Title II of DIDMCA by effectively expediting the removal of interest rate ceilings. The Garn-St Germain Act also exempted the first $2 million of transactions balances at any depository institution from reserve requirements.[23] There were no interest rate ceilings and reserve requirements on personal money market deposit accounts, but a balance of $2,500 was required and there were restrictions on the number of transactions per month. The accounts were insured by the Federal Deposit Insurance Corporation and became available on December 12, 1982. The super NOW account also had a minimum balance requirement of $2,500 and no interest rate ceiling, but because it was a transactions vehicle it had a reserve requirement of 12%. It was available to anyone who was eligible to have an ordinary NOW account and became available on January 5, 1983. The introduction of these new insured accounts led to a temporary fall of assets in money market mutual funds, but they had resumed growing by midyear and had assets of $179.4 billion at the end of 1983.

Another serious problem that was aggravated by rising interest rates was the extensive portfolio of loans to developing countries on the books of large U.S. banks. Many of these loans were originated by large banks in response to deposit inflows from OPEC countries, when oil prices rose sharply in 1973 and again in 1979–1981. The oil producing countries temporarily accumulated large dollar-denominated surpluses that were often deposited in U.S. banks. The banks greatly expanded their dollar-denominated loans to developing countries. Some of these loans had floating interest rates that would rise when interest rates in the U.S. rose. Even loans with fixed rates would become very difficult to collect when the value of the U.S. dollar appreciated against developing country currencies. The Federal Reserve had been aware of an excessive amount of such loans by U.S. banks and the growing difficulty that they would have in being repaid, but failed to intervene.[24] Beginning in 1983, Chairman Volcker

[22]The problem, of course, was not money market mutual funds so much as high interest rates that were a consequence of expansionary fiscal policy and contractionary monetary policy, which was easily predictable from a simple Hicksian IS/LM diagram. Balances at money market mutual funds reached a maximum of $232 billion on December 1, 1982, before the new accounts were authorized. Source: Bennett (1983). Balances had been $186.2 billion at the end of 1981.

[23]As in the case of DIDMCA's threshold, this $2 million exemption threshold was indexed to rise with the rate of inflation.

[24]For a discussion of the Federal Reserve's handling of this emerging problem, see Greider (1987, pp. 432–440, 483–487, passim) and Mayer (2001, Chap. 11).

would be instrumental in arranging bailouts for a number of Latin American countries.[25]

Perhaps the most important long-run consequences of high real interest rates resulted from their effects on the trade-weighted international value of the dollar. The trade-weighted index reached a decade low of 84.65 (March 1973 = 100) in July 1980, when the Federal Reserve arguably had overreacted to the effects of the activation of the Credit Control Act of 1969. As real U.S. interest rates rose relative to those in other countries, the December values of the index rose to 91.99 in 1980, 105.21 in 1981, 119.22 in 1982, 132.84 in 1983, and 149.24 in 1984, before reaching a decade maximum of 158.43 in February 1985.[26] U.S. manufacturing firms encountered enormous pressures from foreign competitors that led to a wave of plant closings. The (unreported) soaring merchandise trade deficit only hinted at the changes. Partly because of renewed oil price increases and recessions in 1980 and 1982, the U.S. entered the decade with trade deficits of $25 and $28 billion in 1980 and 1981. The trade deficit was $36 billion in 1982 when spending on imports was low because of the recession, but then soared to $67 billion in 1983 and $113 billion in 1984.

Basic industries such as steel and automobiles suffered from cheap imports and experienced large losses. Those that survived invested heavily in the latest technologies and closed obsolete facilities. Somewhat surprisingly, given the high real interest rates, real gross nonresidential fixed investment in 1987 dollars only slipped slightly from $438 in 1980 to $421 billion in 1983 and then rose to $522 billion in 1985.[27] The U.S. was retooling in response to severe foreign competition; plant and equipment were being replaced with the latest high technology versions that would serve well in the coming decade. However, there were severe regional impacts, because new investment was occurring in different areas of the country than those where facilities were being closed.

In 1987 dollars, between 1980 and 1985 all merchandise durable goods imports rose from $134 billion to $237 billion, merchandise nondurable goods imports rose from $102 billion to $129 billion, and services imports rose from $54 billion to $88 billion. Constant (1987) dollar U.S. exports of durable goods fell from $161 billion to $139 billion over these years, exports of nondurable goods fell from $87 billion to $86 billion, and exports of services rose from $72 billion to $84 billion. While nothing is forever,

[25]See Greider (1987, pp. 517–521, 545–551) and Volcker and Gyohten (1992, Chap. 7).

[26]Source: Board of Governors of the Federal Reserve System (1991, p. 467).

[27]Data in this and the following paragraph are from Council of Economic Advisors (1994).

these changes in the composition of imports and exports have proven to be very long lasting. Thus, again in 1987 dollars, in 1992 the U.S. was still a net importer of durable goods (imports - exports = $45 billion) and a net importer of nondurable goods (imports - exports = $45 billion). The U.S. did resume its role as a net exporter of services (exports - imports = $55 billion). As can be seen in Table 8 and the three subsequent even-numbered tables, these continuing trade deficits led to a large and growing deficit in the balance of payments on current account.

Finally, the brief recession following the activation of the Credit Control Act of 1969 led to a doubling of the federal deficit in late 1980, which was reversed by the recovery in early 1981, again reflecting the operation of automatic stabilizers. The subsequent large Reagan administration tax cuts coincided with very large and persistent federal deficits that lasted through the end of the Volcker term. The events in these years would also finally and clearly demonstrate the profound change in the power of monetary policy in the U.S. economy that resulted from going to a floating exchange rate system, which occurred shortly after President Nixon's August 15, 1971 speech that effectively terminated the Bretton Woods System.

In the national income accounts, government deficits and trade deficits are connected by an identity; the trade deficit plus net private saving equals the government deficit.[28] The balance on current account includes the trade deficit, but it has other relatively small components that break the strict accounting identity. Until the large tax cuts in the 1981–1983 period, there had been no close relation between the federal surplus and the balance on current account in the foregoing even-numbered tables. There would be an increasingly close relation in the future that would emerge in several steps.

First, until the collapse of the Bretton Woods quasi-fixed exchange rate system in the early 1970s, real interest rates were constrained not to move excessively relative to real rates in other countries and exchange rates theoretically could not change. The scope for monetary policy by countries in a pure fixed exchange rate system is very limited, because exchange rates are partly determined by differences in real interest rates across countries. In fact, the Bretton Woods system was not a pure fixed exchange rate

[28]Specifically the identity is that the sum of the trade deficit (imports – exports) and net private saving (saving – investment) is equal to the government deficit (expenditures + net transfers – taxes). Because state and local governments tend to have close to balanced budgets, the government deficit can reasonably be interpreted as the federal government deficit. If net private saving were constant, then changes in the trade deficit in the national income accounts would equal changes in the federal government's deficit.

system, in part because of the artificial fixed relation between the dollar and gold, which eventually led to its abandonment. But as a first approximation it was, so until its demise inflexible real interest rates prevented any close linkage between the government and trade deficits. Instead, a higher government deficit was roughly matched by a rise in net private saving.

Second, as the system began to collapse in 1968, with the suspension of U.S. gold sales to foreign individuals and firms, there was a considerable increase in the volatility of interest rates that can be seen by comparing Tables 5, 7, and 9. As argued in the foregoing paragraphs, this volatility was largely a consequence of the Federal Reserve's seemingly futile struggle against inflation. So long as interest rate volatility was concentrated in nominal rather than real interest rates, exchange rates were not likely to be drastically affected. Between February 1973 and June 1978, only in a few widely separated months did the trade-weighted value of the U.S. dollar deviate from its mean by as much as six percentage points. Exporters and importers could not exploit such fleeting opportunities.

Third, the real federal funds interest rate acquired a sustained positive value in 1978:4 for the first time in the post Bretton Woods era, if one ignores the chaotic interval around the Nixon reelection, Agnew resignation, and Watergate incident that led to the Nixon resignation in 1974. The positive real rate in this earlier period is best viewed as a political risk premium and not a basis that traders could use to predict exchange rates. The positive rates beginning in 1978:4 were not high enough to make the dollar an immediately credible currency, although they almost stopped its fall in value. Partly because of renewed OPEC price increases in the interval between 1979 and 1981, the trade-weighted value of the dollar remained more or less constant until July 1980, the trough month resulting from monetary policy intervention to offset the effects of the activation of the Credit Control Act. After that, nominal interest rates and especially the real federal funds rate attained record levels and the trade-weighted value of the dollar rose convincingly, as noted above.

Fourth, with few restrictions on trade among major economies, the sustained rising value of the dollar led to a steadily increasing trade deficit. With flexible exchange rates, actions by the Federal Reserve to raise real interest rates caused the dollar to appreciate. The balance of trade replaced net private saving as the principal shock absorber in the identity, when the series of large Reagan era tax rate cuts increased the government's deficit. The potency of monetary policy rose relative to fiscal policy with the shift from a fixed to a flexible exchange rate regime, as had been predicted long

ago by Robert Mundell and Marcus Fleming.[29] In a pure flexible exchange rate system, fiscal policy would be almost completely ineffective as a policy instrument for affecting GDP. Because nations are unwilling to let their currencies float freely, fiscal policy still had some bite, but much less than in the 1960s at the time of the Johnson administration tax cuts and arguably much less than monetary policy.[30]

The Federal Reserve's restrictive policies to combat inflation were clearly causing enormous havoc in the economy and the FOMC began to ease in late 1981 and early 1982. Different indicators suggest different dates. Net free reserves were most negative and discount window borrowings highest in 1982:1, the nominal and real federal funds rates peaked in 1981:2, other market interest rates reached their maxima in 1981:3, and M1 rose very slowly between 1981:2 and 1981:3. Toward the end of 1982, Edwards reports that the Federal Reserve shifted from focusing on nonborrowed reserves to borrowed reserves.[31] Others claimed that the FOMC was shifting back to an interest rate indicator approach.[32]

Both reserve bank credit and currency outstanding rose sharply between 1980:2 and 1983:1 in Table 9, but currency outstanding rose much faster. The excess in the growth of currency outstanding over reserve bank credit reached $11.6 billion in 1983:1. Most of this currency excess showed up as vault cash of depository intermediaries, which rose from $11.3 billion in July 1980 to $21.5 billion in January 1983; it is best interpreted as resulting from phasing in DIDMCA and possibly from growing numbers of automated teller machines (ATMs), not expansionary monetary policy.[33] However, the currency component of M1 rose from 108.5 in 1980:2 to 133.6 in 1983:1. While information about who held the new currency in M1 is unavailable, a substantial share is likely to have disappeared into off-shore currency hoards. Funds acquired through repurchase agreements increased 67% between 1980:2 and 1983:1, as banks struggled to escape the pain of restrictive monetary policy and nonfinancial corporations and state and local governments sought to take advantage of high market interest rates. Most of the growth occurred before 1981:4, when nominal market interest rates were rising to their all time highs and the aforementioned marginal reserve requirements on them were being removed.

[29]See Mundell (1963) and Fleming (1962).

[30]See Pauls (1990, pp. 901–903).

[31]See Edwards (1997, p. 861).

[32]See Greider (1987, pp. 539–544).

[33]Source: Board of Governors of the Federal Reserve System (1991, pp. 28–29). Recall that currency outstanding includes currency in the vaults of depository institutions.

During the 1970s U.S. banks continued to expand the number of branches that they had in other countries, especially islands in the Caribbean Sea, which had time zones similar to those in the U.S. Often these branches were only "shells", a mail box and perhaps a small office or only a door with nothing behind it. Transactions with these branches were conducted under the legal code of the host country and branches were subject to banking regulations of the host country, but all accounts were managed by one of a bank's U.S. offices. During periods of high interest rates, market rates of interest could be paid on transactions balances in shell branches and they typically were not subject to reserve requirements or other U.S. regulations. Banks from other countries competed aggressively for large U.S. firm accounts with their own offshore branches. Transactions among firms could be completed almost as expeditiously offshore as on shore. Apparently in response to this growing practice of conducting transactions overseas, the Federal Reserve made a significant administrative change in late 1980 in an attempt to keep transactions visible to the monetary authorities.[34] Following the change, funds were immediately available on the day of a transfer rather than available on the following day as had been the rule. Funds were transferred back and forth between foreign branches and U.S. branches for settling transactions in the United States through CHIPS, the New York Clearing House Interbank Payment System.[35]

A further complication in interpreting monetary policy during this period was that the Congress had authorized banks to issue high-yielding, one-time-only "all savers certificates" in October 1981, which were one-year maturity time deposits. A large proportion of those would mature in October 1982 and it was unclear how these funds would be reinvested. It has been argued that maturing all savers certificates, the deposit types emerging from DIDMCA and the Garn-St Germain Act, and a falling in-

[34]In the November 1980 Federal Reserve Bulletin summary of legal developments, pp. 991–999, it was announced that transfers could be treated as collected funds on the day they were transferred. Before then, transfers in a day were not "good funds" (interpreted as being collected) until the following day. The change greatly increased the convenience of moving funds from Caribbean shell and other overseas branches.

[35]The number of and dollar volume of transfers through CHIPS grew vigorously between its inception in 1970 and 1997. Evidence for the importance of the regulatory change in the preceding footnote was the large increase in the number of participating banks between 1982 and 1985, from 99 to 142. Source: http://www.chips.org/stats.html.

come velocity of M1 led to a decision by the Federal Reserve to de-emphasize M1 as an indicator.[36]

The transmission of monetary policy actions to the rest of the economy is not instantaneous. Real GDP hit a low sometime in 1982:3 or 1982:4. The unemployment rate peaked in 1982:4 and, because of large numbers of discouraged unemployed people, the civilian participation rate fell to 63.8% in 1983:1. The GDP deflator inflation rate hit a low of 3.08% in 1983:1. The large income tax rate cuts led to record federal deficits. The operation of automatic stabilizers probably accelerated the growth of deficits, but deficits failed to fall during the recovery because of the large tax cuts.

The easing continued until about 1983:1, as judged by nominal interest rates, net free reserves, and discount window borrowing in Table 9 and the real federal funds rate in Table 8. M1 grew very rapidly between 1982:3 and 1983:3. From Table 8 it can be inferred that real GDP grew very rapidly between 1983:1 and 1984:2, which may have led the Federal Reserve to reverse course and begin to tighten again. Except for M1 the same indicators suggest that renewed tightening began in 1983:2 and continued through about 1984:3. The central bank's tightening seemed extreme because of the high rate of unemployment, but perhaps could be justified by a slight rise in the rate of inflation after 1983:1. The unemployment rate had fallen from 10.7% in 1982:4 to 10.1% in 1983:2 and would continue to fall through the renewed period of tightening to 7.4% in 1984:3. Discount window borrowing in 1984 was distorted by very large borrowing by the Continental Illinois National Bank and Trust Company, which failed and was the largest bank failure in U.S. history.[37]

Another and this time sustained course reversal toward easing began in 1984:4 (1985:1 for M1) as can be seen in all of the indicators; it continued nearly to the end of the Volcker term as Chairman. Net free reserves were modestly positive after 1984:4 and discount window borrowing fell after the Continental Illinois debacle was resolved.[38] The nominal federal funds

[36]See Axilrod (1985, pp. 18–19).

[37]Continental Illinois had been extending loans at a very rapid rate for several years and increasingly financing them with short-term funds borrowed in the money market. Its fragile condition had been evident for many years, but was conspicuously exposed when a small commercial bank in Oklahoma, Penn Square, failed in July 1982. Penn Square had sold at least $1 billion in loan participations to Continental Illinois. Bank regulators had failed to rein in this lending activity by the seventh largest U.S. bank.

[38]Greider argues that the decrease in discount window borrowing resulted from a fear by banks that such borrowing would indicate a weak condition, like that of

rate and other market interest rates drifted down slowly through 1985 and then more rapidly in 1986 and early 1987. The real federal funds rate remained high until 1986:2, when it began to fall. Funds raised through repurchase agreements were essentially flat from 1984:2 through 1985:3, when they again began to grow vigorously—almost 50% between 1985:3 and 1987:2.

M1 grew rapidly from 1985:1 to the end of the Volcker term, far in excess of the range the Federal Reserve had set in its Humphrey-Hawkins semiannual reports to the Congress. Part of the explanation is that during early 1986 M2 (which includes M1 as a component) was growing at a lower than desired rate so that there was an inconsistency in attempting to keep both aggregates growing in their desired ranges. As the year progressed, the rates of growth of M2 and M3 rose, but never approached the growth rate of M1.[39] This embarrassingly high rate of growth of M1 led the FOMC effectively to eliminate M1 as an indicator, as the following suggests:

> The FOMC elected not to establish a specific target range for M1 at this time because of uncertainties about its underlying relationship to the behavior of the economy and its sensitivity to a variety of economic and financial circumstances. . . . Given these circumstances, the appropriateness of different rates of M1 growth cannot be assessed in isolation; rather, the movement of this aggregate necessarily will be evaluated in the light of expansion in M2 and M3, growth of the domestic economy, and emerging price pressures, which in turn are partly related to changes in the value of the dollar.[40]

Among the economic and financial circumstances referred to in this statement was the final removal of ceilings on interest rates paid on all deposits (except demand deposits) as mandated in Title II of DIDMCA. M1

Continental Illinois. Banks avoided the window for this reason, which made borrowed reserves a misleading indicator. See Greider (1987, pp. 637–638).

[39]It is important to reemphasize that definitions of monetary aggregates were changing over time. In 1986, M1 was defined to be the sum of currency held by the public, nonbank travelers' checks, net demand deposits, other checkable deposits such as funds in NOW and Super NOW accounts, balances in automatic transfer accounts, and credit union share drafts. M2 was defined to be the sum of M1, savings and small denomination time deposits, money market deposit accounts, shares in non-institutional investor money market mutual funds, overnight repurchase agreements, and certain overnight Eurodollar deposits. M3 was defined to be the sum of M2, large time deposits, large denomination term repurchase agreements, institutional investor money market mutual funds, and certain term eurodollar deposits.

[40]Board of Governors of the Federal Reserve System (1987, p. 3).

was a heterogeneous aggregate in that interest could be paid on some, but not all, of its components. During the Volcker years, the Board had never formally accepted M1 as the primary indicator of monetary policy and, thus, was not monetarist. Volcker's statement on October 6, 1979 spoke only of controlling reserves available to banks. Reserve bank credit also rose rapidly from 1985:1 and more rapidly than currency outstanding. Between January 1983 and May 1985, vault cash at depository institutions was essentially constant; it then rose slowly from $21.8 billion to $24.8 billion in June 1987.[41] The interpretation of changes in both reserve bank credit and vault cash is made difficult by the continuing phase in of DIDMCA and growth in the number of ATMs.

As the recovery proceeded, the merchandise trade deficit continued to widen; it was $122 billion in 1985, $145 billion in 1986, and $160 billion in 1987. The trade deficit was driven by imports that rose from $248 billion in 1982 to $338 billion in 1985, $368 billion in 1986, and $410 billion in 1987. Exports had been flat between 1982 and 1985, but then rose slightly in 1986 and 1987. The balance on current account reported in Table 8 reflects this trade deficit and was the same order of magnitude as the federal deficit.[42]

While the trade-weighted value of the dollar decreased from its February 1985 peak of 158.43 to 125.80 in December 1985, 105.64 in December 1986, and 97.78 in June 1987, the trade deficit was very slow to respond. Part of the explanation for the falling exchange rate was the decrease in real interest rates in the U.S. relative to real interest rates abroad. Another part was an agreement concluded in September 1985 by the Group of Five (France, Japan, United Kingdom, United States, and West Germany) that the dollar had appreciated excessively relative to the currencies of the other conferees. This "Plaza Hotel" agreement resulted in efforts by these

[41]Source: Board of Governors of the Federal Reserve System (1991, pp. 29–30).

[42]It is important to understand that the reported federal budget surplus in even numbered tables in Part 1 is for the unified budget, which is the sum of the on- and off-budget surpluses. The distinction between the reported surplus and the on-budget surplus becomes important only after 1984, when the Social Security Administration began to accumulate a sizable trust fund—a sharp break from its previous practice, which was roughly to equate inflows and outflows. This change implies a different interpretation of government surpluses. After 1984 the budget surplus overstates federal government saving, because Social Security Trust fund surpluses are liabilities of the federal government that must be paid out to Social Security beneficiaries in the future. The net off-budget saving of the Social Security Administration has trended higher through 2007and is expected to exceed $200 billion a year by 2008. Council of Economic Advisors (2007, p. 323.)

countries to take policy actions, both monetary and fiscal, that would allow the dollar to fall in value. Monetary policy actions took the form of interventions in foreign exchange markets through swap transactions that were designed to curb currency fluctuations and through open-market operations. Fiscal policy actions would attempt to limit the extent of government deficits in the various countries.[43]

In the last five quarters of Volcker's term, sizable decreases in nominal and real interest rates led to a significant fall in the unemployment rate between 1986:3 and 1987:2. Automatic stabilizers began to slow the economy's growth and the federal deficit fell sharply in 1987:2. The rate of inflation, which had fallen to 1.96% in 1985:2, began to rise slowly as labor markets tightened and the civilian participation rate began to rise. Beginning in late 1985, Volcker found himself in an increasing number of conflicts with the Reagan administration and its appointees to the Board on a variety of regulatory and monetary policy issues involving "nonbank banks," secondary market security dealers, abandoning M1 as an indicator, and a vote on a discount rate change in which he was nearly on the losing side (saved by an *ex post facto* vote change).[44] After eight challenging and turbulent years, Volcker was not offered a third term as Chairman by President Reagan and resigned from the Board on August 11, 1987.

[43]See Pauls (1990, pp. 905–906).

[44]A bank was defined as a firm that both accepts demand deposits and makes commercial and industrial loans. A nonbank bank was a firm that either accepts demand deposits or makes commercial and industrial loans, but not both. Volcker believed that the Federal Reserve needed to have jurisdiction over nonbank banks. For an early discussion of the growing conflicts between the Reagan administration and Volcker, see Kilborn (1985). The problem of nonbank banks was partially addressed in the Competitive Equality in Banking Act of 1987, which extended the definition of a bank to include any institution insured by the FDIC. For a discussion, see Alvarez (2006) and Chapter 10 of this volume.

6 Alan Greenspan: 1987–2006

The recovery that had begun in Volcker's last years continued into the beginning of Alan Greenspan's long term as Chairman. Like Volcker, Greenspan had considerable experience in both the private sector where he had managed a consulting firm, Townsend and Greenspan, and in the public sector where he had been Chairman of the Council of Economic Advisors during the Ford administration. Because of the extraordinary length of his term as Chairman, it is again convenient to consider it in two subperiods, 1987:3–1995:2 and 1995:3–2005:4.[1]

6.1 Monetary Policy 1987:3–1995:2

As can be seen in Table 10, which is a continuation of Table 8, the unemployment rate continued to fall until 1988:3 and the civilian participation rate rose, as discouraged workers reentered the labor market. Real GDP grew strongly if unevenly until 1990:3, but because of the large Reagan-era tax cuts and rapidly rising defense expenditures, the NIPA federal deficit was essentially flat until 1989:4. The balance of payments deficit began to fall in 1988, because the falling international value of the dollar allowed U.S. exports to rise substantially faster than U.S. imports. Because of the aforementioned national income identity, net private saving also fell substantially. The rate of inflation fell through the end of 1987, but then rose and averaged about 3.75% per annum through 1991:1.

Monetary policy had been tightened in the last quarter of Volcker's term, 1987:2, as measured by all indicators shown in Table 9. In its successor, Table 11, tightening continued after Greenspan took over, but there was vacillation in some indicators after the stock market experienced a very sharp short-term collapse on October 19, 1987, and a wave of bank failures crested in 1989. The nominal federal funds rate rose from 6.22% in 1987:1 to 9.73% in 1989:2 and stayed above 8% until 1990:4, as the

[1]For a colorful informal discussion of the first fourteen years of the Greenspan chairmanship, see Mayer (2001, Chap. 10).

Table 10. Substantive Measures of Economic Activity: 1987:3–1995:2

quarter	unem-ployment rate	civilian participa-tion rate	nominal GDP	GDP deflator	annual % rate inflation	real federal funds rate	federal surplus	balance on current account
1987:3	6.0	65.6	4767.8	73.43	2.93	3.91	- 134.4	- 150.7
1987:4	5.8	65.7	4886.3	73.96	3.14	3.77	- 139.1	- 153.6
1988:1	5.7	65.8	4951.9	74.59	3.60	3.06	- 142.4	- 123.5
1988:2	5.5	65.8	5062.8	75.30	4.13	3.03	- 131.0	- 106.5
1988:3	5.5	66.0	5146.6	76.14	3.71	4.27	- 128.0	- 102.9
1988:4	5.3	66.1	5253.7	76.71	3.75	4.72	- 136.4	- 116.0
1989:1	5.2	66.4	5367.1	77.58	4.16	5.29	- 111.4	- 98.8
1989:2	5.2	66.4	5454.1	78.32	3.32	6.41	- 128.6	- 91.5
1989:3	5.2	66.5	5531.9	78.88	2.79	6.29	- 139.5	- 80.3
1989:4	5.4	66.5	5584.3	79.43	3.77	4.85	- 140.9	- 82.7
1990:1	5.3	66.7	5716.4	80.38	4.69	3.56	- 168.6	- 79.4
1990:2	5.3	66.5	5797.7	81.31	4.07	4.17	- 171.4	- 70.2
1990:3	5.7	66.5	5849.4	82.03	3.25	4.91	- 164.9	- 81.1
1990:4	6.1	66.4	5848.8	82.65	3.86	3.88	- 183.1	- 49.5
1991:1	6.6	66.2	5888.0	83.63	3.63	2.79	- 158.4	56.7
1991:2	6.8	66.3	5964.3	84.17	2.70	3.16	- 211.7	18.0
1991:3	6.9	66.1	6035.6	84.76	2.46	3.19	- 232.7	- 10.2
1991:4	7.1	66.1	6095.8	85.21	2.25	2.56	- 252.1	- 10.7
1992:1	7.4	66.3	6196.1	85.72	2.30	1.73	- 288.5	- 10.7
1992:2	7.6	66.6	6290.1	86.19	1.99	1.78	- 291.7	- 34.6
1992:3	7.6	66.6	6380.5	86.58	1.94	1.32	- 316.1	- 41.9
1992:4	7.4	66.3	6484.3	87.03	2.59	0.45	- 293.4	- 60.5
1993:1	7.1	66.2	6542.7	87.71	2.65	0.39	- 300.6	- 43.9
1993:2	7.1	66.3	6612.1	88.19	1.96	1.04	- 268.0	- 68.2
1993:3	6.8	66.3	6674.6	88.57	1.91	1.15	- 274.0	- 70.7
1993:4	6.6	66.3	6800.2	89.04	2.26	0.73	- 251.3	- 98.8
1994:1	6.6	66.6	6911.0	89.58	2.05	1.17	- 232.2	- 79.5
1994:2	6.2	66.5	7030.6	89.95	2.12	1.82	- 190.3	- 102.1
1994:3	6.0	66.5	7115.1	90.53	2.20	2.28	- 211.3	- 113.2
1994:4	5.6	66.7	7232.2	90.95	2.20	2.97	- 215.5	- 126.1
1995:1	5.5	66.8	7298.3	91.53	1.98	3.83	- 215.2	- 100.7
1995:2	5.7	66.6	7337.7	91.86	1.65	4.37	- 195.3	- 107.1

FOMC fought inflation. Other nominal interest rates exhibited similar patterns.

With the exceptions of 1988:2 and 1988:3, M1 had almost no growth until 1990:1 and real M1 (adjusted for inflation) fell. Because of the deemphasis on controlling M1 that was implicit in Chairman Volcker's February 1987 Humphrey-Hawkins Report to the Congress, it might be reasonable to interpret the FOMC as focusing on M2 or some other monetary aggregate rather than attempting to constrain the economy with extremely restrictive monetary policy. Indeed, the Federal Reserve's subsequent reports to Congress clearly indicate that realized growth rates for M2 and M3 were near the bottom of or below the ranges that the FOMC had reported to be their desired growth rates.[2] Between 1987:3 and 1989:4, currency outstanding grew by $6.7 billion more than reserve bank credit, and more than the increase of $4.4 billion in vault cash at depository institutions.[3] Discount window borrowing rose in 1988 and 1989 when a large number of commercial bank failures occurred, the largest number per year since the early 1930s. Funds raised through repurchase agreements peaked in 1989:1 and then began a sustained decline, the first since 1970. However, their level in 1989:4 was only slightly lower than it was in 1987:3. In 1989:2 the real federal funds rate, reported in Table 10, rose to its highest level since 1984:3. Not surprisingly, this restrictive policy contributed to inducing a second fall in stock market prices that began in October 1989 and continued through much of 1990 and a recession that was evidenced by a decrease in real GDP in 1990:4.

Other forces were at work and it is important to put this tightening of monetary policy in context. In addition to a wave of bank failures, several other institutional changes were underway. First, as a result of the Tax Reform Act of 1986 major adjustments were occurring in real estate markets. This act reduced the attractiveness of commercial real estate investments to passive investors, by limiting their ability to use depreciation allowances on structures when filing their income tax returns. There had been a steady increase in vacancy rates in offices and other business properties that began with the recession that occurred in 1980. Beginning in 1987 there were

[2]This information is available in semi-annual summary reports of the Federal Reserve Board, "Monetary Policy Objectives," that were submitted pursuant to the Full Employment and Balanced Growth (Humphrey-Hawkins) Act of 1978 on February 23, 1988, July 13, 1988, February 21, 1989, July 20, 1989, and February 20, 1990.

[3]As noted earlier, depository institutions were increasingly satisfying their reserve requirements with vault cash instead of reserve balances with Federal Reserve banks – perhaps partly because of more ATMs.

Table 11. Monetary Instruments and Indicators: 1987:3–1995:2

quarter	net free reserves	federal funds rate	M1	discount rate	treasury bill rate	discount borrowing	repurchase agreements	currency	reserve bank credit	10-year rate
1987:3	0.4	6.84	745	5.65	6.04	0.8	174	217	235	8.88
1987:4	0.7	6.92	753	6.00	5.86	0.8	181	223	243	9.12
1988:1	0.7	6.66	759	6.00	5.72	1.1	178	225	242	8.42
1988:2	0.5	7.16	773	6.00	6.21	2.9	186	231	250	8.91
1988:3	0.2	7.98	783	6.29	7.01	3.2	191	236	254	9.10
1988:4	0.6	8.47	785	6.50	7.73	2.3	195	241	259	8.96
1989:1	0.6	9.44	784	6.70	8.54	1.7	196	247	259	9.21
1989:2	0.4	9.73	776	7.00	8.41	1.8	194	246	266	8.77
1989:3	0.3	9.08	779	7.00	7.84	0.7	185	249	261	8.11
1989:4	0.6	8.61	789	7.00	7.65	0.4	173	253	264	7.91
1990:1	0.5	8.25	798	7.00	7.76	1.3	168	256	268	8.42
1990:2	0.5	8.24	807	7.00	7.75	1.3	168	263	275	8.68
1990:3	0.3	8.16	815	7.00	7.48	0.8	170	271	282	8.70
1990:4	0.8	7.74	822	6.93	6.99	0.3	157	279	288	8.40
1991:1	1.4	6.43	833	6.17	6.02	0.3	141	285	285	8.02
1991:2	0.8	5.86	850	5.66	5.56	0.3	134	289	288	8.13
1991:3	0.5	5.64	866	5.40	5.38	0.7	132	294	295	7.94
1991:4	0.8	4.82	888	4.56	4.54	0.2	131	300	303	7.35
1992:1	0.9	4.02	924	3.50	3.89	0.1	132	303	307	7.30
1992:2	0.9	3.77	950	3.50	3.68	0.2	131	308	307	7.38
1992:3	0.7	3.26	975	3.01	3.08	0.3	136	316	318	6.62
1992:4	1.0	3.04	1015	3.00	3.07	0.1	140	325	328	6.74
1993:1	1.1	3.04	1034	3.00	2.96	0.1	143	330	337	6.28
1993:2	0.9	3.00	1063	3.00	2.97	0.1	155	339	348	5.99
1993:3	0.7	3.06	1094	3.00	3.00	0.3	166	349	358	5.62
1993:4	0.9	2.99	1122	3.00	3.06	0.2	169	357	368	5.61
1994:1	1.1	3.21	1136	3.00	3.24	0.1	169	364	374	6.07
1994:2	0.8	3.94	1143	3.25	3.99	0.2	179	375	384	7.08
1994:3	0.6	4.49	1151	3.75	4.48	0.5	185	385	392	7.33
1994:4	0.7	5.17	1150	4.38	5.28	0.3	189	394	400	7.84
1995:1	0.9	5.81	1148	5.08	5.74	0.1	202	399	403	7.48
1995:2	0.7	6.02	1146	5.25	5.60	0.2	208	408	412	6.62

additional capital losses on commercial properties as passive investors sought to dispose of their holdings.[4]

[4]See Hester (1993, p. 127).

Second, the Tax Reform Act of 1986 also phased out over a five-year period the deductibility of most interest charges on individual income tax returns, thereby penalizing purchases made on credit. The major exception was interest on residential mortgage loans, which would make home ownership doubly attractive. A house purchaser would acquire both a place to live and a vehicle that could be used to borrow funds on a tax-deductible basis, if a house were refinanced in the future. Largely in response to the Tax Reform Act, depository institutions began to extend large amounts of home equity lines of credit, which permitted homeowners to borrow flexibly against equity in houses. This act would eventually lead to considerable increases in house prices, construction, and the ratio of debt to equity of homeowners.

Third, the crisis in the thrift industry that had been postponed by the passage of the Garn-St Germain Act of 1982 and several subsequent pieces of legislation would begin to be resolved in 1989 when the Financial Institutions Reform, Recovery, and Enforcement Act (FIRREA) was passed. In part, this lengthy and wide ranging act created entities that would take over and liquidate failed thrift institutions and large amounts of nonperforming loans and repossessed real estate, which would serve to depress real estate prices for several years to come.

The recession was relatively brief in terms of real GDP (in year 2000 dollars), which fell from a peak of $7,131 billion in 1990:3 to $7,041 billion in 1991:1 and passed its previous peak in 1991:4. Its brevity was in part attributable to U.S. military expenditures that were incurred when repelling Iraq's invasion of Kuwait in 1991. The unemployment rate rose from 5.3% in 1990:2 to 7.6% in 1992:2 and then slowly decreased to 5.5% in 1995:1. The inflation rate decreased from a peak of 4.69% in 1990:1 to 1.94% in 1992:3 and then averaged about 2.25% through mid 1995. The recession reduced the demand for imports in 1991 and early 1992, which led to a temporary decrease in the trade deficit. The balance of payments on current account in Table 10 improved much more than the trade deficit because of grants of funds by foreign governments to the U.S. in return for its assuming the lion's share of the burden of the war in Kuwait. The federal deficit, which rose because of the war and automatic stabilizers, reached a maximum in 1992:3 and then began to fall because the economy slowly recovered from the recession and Bush and Clinton administration tax increases came into effect.

The Federal Reserve did not immediately respond to the deteriorating economy, as can be seen in Table 11. In 1990:3 net free reserves fell and, with the exception of the t-bill rate, nominal interest rates were at or near their recent highs. M1 was growing because of rapidly rising amounts of currency outstanding, only a small fraction of which was going into de-

pository institution vault cash. The real federal funds rate in Table 10 was 4.91% in 1990:3 and had risen for two consecutive quarters. All of these indicators began to signal easing in 1990:4.[5] They continued to signal easing until 1994:1, when a sharp reversal toward renewed tightening became evident.

The reason for the slow response to the emerging recession is not clear, but the long subsequent period of easing may be partly explained by the fragile condition of the portfolios of many financial institutions. Banks and, in particular, thrift institutions were holding large numbers of residential real estate loans that were becoming increasingly dubious because of the ongoing marketing of real estate that the government had acquired through the agencies established in FIRREA. Banks also had many commercial real estate loans that were not performing well. Finally, the recently instituted Basel bank capital standards put pressure on banks to rebuild their net worth.[6] The Federal Reserve's paternalistic policy of keeping interest rates low would help depository institutions. The cost of deposits would be low while depository institutions would continue to earn high interest income or realize capital gains on their portfolio of long-term assets. A negative gap is desirable when interest rates fall or remain at a newly low level! There was little apparent cost to continuing ease, because the inflation rate continued to be low.

Further actions to help troubled depository institutions took the form of reductions in reserve requirements. In December 1990 the reserve requirement on nonpersonal time deposits and eurocurrency liabilities was reduced in two steps from 3% to 0% for large weekly reporting banks.[7] The same requirement was reduced to zero for other depository institutions in January 1991. The maximum reserve requirement on transactions balances was reduced from 12% to 10% for both groups of institutions in April 1992.

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[5]Another indicator provided an exception. M2 persistently grew at a rate that was well below the FOMC's targeted range. This sluggish growth foreshadowed the 1993 de-emphasis of M2 as a reliable indicator of monetary policy. See Council of Economic Advisors (1993, p. 52).

[6]Specifically, in 1988 major central banks agreed that commercial banks should have a minimum ratio of capital to assets of 8%, of which at least half should consist of capital, surplus, and undistributed profits. Further, banks should have enough capital so that it equaled or exceeded the sum of 1.6% of interbank risk exposures and agency securities, 4% of residential mortgage loans, and 8% of all other loans and risky assets. The standards eventually were called "Basel I".

[7]The Federal Reserve allowed small institutions to file information about their deposit liabilities less frequently (quarterly) than large institutions.

These cuts in reserve requirements and other innovations would result in large decreases in the amount of reserves depository institutions carried at Federal Reserve banks.[8] To avoid growing restrictions and penalties on daylight overdrafts, institutions needed to increase funds on deposit at Federal Reserve banks. These funds took the form of required clearing balances, which resulted from the enactment of DIDMCA. To establish such balances, an institution contracted with its Federal Reserve bank to maintain an average balance over a time interval that coincided with the period over which its reserve requirements were enforced, traditionally one or two weeks. As explained above, these balances did not pay interest explicitly, but they yielded credits that could be used to pay for services that the institution received from the Federal Reserve. The amount of such balances rose sharply in 1991 after the cuts in reserve requirements.[9] The sizable expansion of required clearing balances changed the relation between desired net free reserves and the ratio of the discount rate to the t-bill rate, because clearing balances earned implicit interest. The amount of required clearing balances a bank chooses to contract for is an element that was missing from earlier models of bank cash management.

In addition to depository institution fragility, the incoming Clinton administration put substantial pressure on the Federal Reserve to continue easing, even before it took office, because it desired a higher rate of growth of GDP.[10] Arguably this pressure and Clinton administration plans to raise taxes led to reluctance to tighten on the part of the central bank.

In his July 20, 1993 report to the Congress, as required by the Full Employment and Balanced Growth (Humphrey-Hawkins) Act of 1978, Chairman Greenspan reported that:

> The historical relationships between money and income, and between money and the price level have largely broken down, depriving the aggregates of much of their usefulness as guides to policy. At least for the time being, M2 has been downgraded as a reliable indicator of financial conditions in the economy, and no single variable has yet been identified to take its place. . . . In these circum-

[8]Depository institution reserve balances with Reserve Banks were $30.2 billion in December 1990; corresponding yearend balances were $26.7 billion in 1991, $25.4 billion in 1992, $29.4 billion in 1993, $24.7 billion in 1994, and $20.4 billion in 1995. At the end of 2000, reserve balances were $7.0 billion; the further diminution largely reflects the effects of retail deposit sweeps, which are described below. Source: Board of Governors of the Federal Reserve System (1996 and 2002, Table 3).

[9]See Edwards (1997, pp. 869–871). For a good discussion of required clearing balances, see Stevens (1993).

[10]See Greenhouse (1993a and 1993b).

> stances, it is especially prudent to focus on longer-term policy guides. One important guidepost is real interest rates, which have a key bearing on longer-run spending decisions and inflation prospects. . . . The level of the equilibrium real rate—or more appropriately the equilibrium term structure of real rates—cannot be estimated with a great deal of confidence, though with enough to be useful for monetary policy. Real rates, of course, are not directly observable, but must be inferred from nominal interest rates and estimates of inflation expectations. . . . Currently, short-term real rates, most directly affected by the Federal Reserve, are not far from zero; long-term rates, set primarily by the market, are appreciably higher, judging from the steep slope of the yield curve and reasonable suppositions about inflation expectations. This configuration indicates that market participants anticipate that short-term real rates will have to rise as the head winds diminish, if substantial inflationary imbalances are to be avoided.[11]

With this de-emphasis of M2 and the 1986 Volcker reservations about the meaning of M1, the Federal Reserve again clearly signaled that it did not accept monetarism.[12] It had never specifically accepted the monetarist dogma, but it might have been interpreted as having tacitly accepted it at times—especially between 1979 and 1982. Moreover, while denying that any single variable existed to replace M2, Greenspan seemed to be focusing on one variable when he effectively announced that tightening in the form of rising real short-term interest rates was on the horizon, if market expectations were to be interpreted as being rational.[13] The Federal Reserve also signaled in September 1993 that it feared development of a bubble in stock market prices if interest rates were any lower.[14] Perhaps as a result of difficulties in the 1970s with negative real federal funds rates, the Federal Reserve seemed determined not to allow the low real rates of 1993 to continue.[15]

Pre-1994 data in Table 10 did not suggest that a strong case for tightening existed. However, there was a sizable increase in outstanding con-

[11]Board of Governors of the Federal Reserve (1993, pp. 9–10).

[12]For a discussion of monetarism, see Mayer (1990).

[13]There is an important issue raised by Greenspan's reference to the term structure of interest rates. Taken literally, he seems to be implying that there is a continuum of interest rate indicators. The Federal Reserve's macroeconomic models, currently the FRB/US model, and its predecessor, the MPS model, address this issue by imposing a sophisticated set of equations that allow the term structure of interest rates to be linked to a single indicator, the short-term federal funds rate. For a discussion, see Brayton et al. (1997).

[14]See Greenhouse (1993c).

[15]See Bradsher (1994).

sumer installment debt that commenced in late 1993[16] and the Commodity Research Bureau's spot market index of commodity prices began to rise rapidly in October 1993.[17] Real GDP had increased relatively rapidly in 1993:4, but the unemployment rate was still 6.6% in that and the following quarter. The balance of payments on current account was again worsening because of a continuing rise in the merchandise trade deficit. An increase in interest rates might be expected to increase the value of the dollar in 1994 and, hence, the trade deficit. With the benefit of hindsight, tightening in early 1994 was an inspired action, because the unemployment rate began to fall very rapidly until 1995:1 and the dollar's value also fell. Perhaps because of the sharp increase in the real federal funds rate at the bottom of Table 10, inflation was well contained. Because of seeming public confusion about Federal Reserve policies: ". . . the FOMC in [February] 1994 began announcing changes in its policy stance immediately. In 1995, it sought to make its announcements clearer by explicitly stating its short-term objective for open-market operations, which is currently a target level for the federal funds rate."[18]

Federal Reserve actions raised the nominal federal funds rate in Table 11 from 2.99% in 1993:4 to 6.02% in 1995:2. Nominal M1 fell for three consecutive quarters ending in 1995:2 while currency outstanding continued to expand rapidly.[19] By implication, transactions deposits fell considerably, if M1 were accurately measuring them. In six quarters, funds raised through repurchase agreements rose 23% to a new quarterly high in 1995:2, as market interest rates rose. Significantly, the constant maturity 10-year interest rate peaked in 1994:4 and would not pass this level again for the remainder of the decade. Evidently traders of this long-term security were also persuaded that inflation was contained. Other consequences of tightening were that the growth of real GDP slowed dramatically in 1995:1 and 1995:2 and the unemployment rate rose 0.2% in 1995:2.

[16]See Board of Governors of the Federal Reserve System (1996, pp. 153–154).

[17]Source: http://www.crbtrader.com/crbindex/.

[18]Edwards (1997, p. 862).

[19]The currency component of M1 was growing especially rapidly between the late 1980s and 1995, during the breakup of the U.S.S.R. It appears to have served as an important store of value and medium of exchange in Eastern Europe and elsewhere during this period. See Porter and Judson (1996), who report that more than half of U.S. currency was abroad in 1995. This also occurred in other countries: ". . . the Bundesbank now estimates that between 30 and 40 per cent of the stock of DM notes are circulating abroad . . ." (Issing 2001, p. 17).

In January 1994, an important innovation, retail sweep programs, occurred that partly explains the decline in M1 mentioned in the preceding paragraph.[20]

> In a retail sweep program, a depository institution sweeps amounts above a predetermined maximum level from a depositor's checking account (either a demand deposit or an interest-bearing checking account) into a special-purpose money market deposit account (MMDA) created for the depositor. If the balance in the checking account falls below some minimum level, funds are moved from the MMDA back into the checking account to bring the checking account balance to the specified maximum level. The maximum and minimum levels are set by the depository institution on the basis of the depositor's pattern of activity.[21]

Thus, after 1993, transactions deposit balances reported in M1 no longer measure transactions balances available to households and small businesses. Swept balances are conceptually similar to negotiable certificates of deposit, Eurodollar balances, and overnight repurchase agreements that large corporations used to manage funds, with one important difference. Corporations gained income and flexibility, often at the expense of banks that were forced to meet competitive challenges. Banks gained from introducing retail sweep programs because in 1994 there were no reserve requirements on MMDAs, whereas there were 10% reserve requirements on checking account balances. There is no reason to believe that depositors gained because of this innovation.

The Federal Reserve has disclosed no attempt to measure the amounts in retail sweep accounts other than to ask banks to report the initial amounts that were swept when they introduced sweep programs.[22] Evidently, the Federal Reserve no longer believes that information about the aggregate volume of transactions balances is worth knowing or perhaps knowable. Its position is quite defensible and should have been assumed much earlier, perhaps as early as 1951 when bank credit cards were introduced by the Franklin National Bank; the unused limits on them are very similar to transactions balances.

Finally, an independent reason for the declining burden of reserve requirements is associated with the rapid growth of ATMs that was occurring in the 1990s. Cash balances in ATMs are included in the calculation

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[20]See February 1996 Humphrey-Hawkins Report to Congress, as reproduced in the Federal Reserve Bulletin (1996, p. 300).

[21]Edwards (1997, p. 870).

[22]In August 1997 the estimated volume of reservable deposits initially swept was $226 billion. Ibid.

of a bank's vault cash, which can be used to satisfy a bank's reserve requirement. Cash holdings that are used for this important transactions technology reduce the onus of reserve requirements.

6.2 Monetary Policy 1995:3–2005:4

As can be inferred from Table 12, the slowdown was quite brief; real GDP grew more vigorously in 1995:3 and the unemployment rate fell almost monotonically to levels not seen since the late 1960s. The inflation rate remained low, in part because the real federal funds rate was kept reasonably high until 2001:1. The falling rate of unemployment encouraged workers to enter the labor force and the civilian participation rate in the labor force reached its postwar high in 2000:1. As noted above, the participation rate had risen considerably since the early 1970s because of demographic changes and a large rise in the percentage of women who were in the labor force. However, it has always had an important cyclical component, because workers become discouraged and drop out of the labor force whenever the unemployment rate rises and their own perceived chances of getting a job fall. Because of the Bush and Clinton tax rate increases, the expansion in economic activity, and rising federal trust fund off-budget surpluses the unified federal deficit fell and turned into a surplus beginning in 1998:1.[23] The surplus was nearly $200 billion in calendar year 2000. The deficit in the balance on current account soared to a record of $423.5 billion in 2000:3, which coincided with a record trade deficit on goods and services.[24]

Perhaps because of the slowdown in 1995, the Federal Reserve allowed the nominal federal funds and discount interest rates to fall 50 and 25 basis points respectively in 1996:1 and then let the former increase 25 basis points in 1997:2. The Federal Reserve can be interpreted as attempting to keep the real federal funds rate between 3.5% and 4.5%, which historically

[23]The change in Social Security Administration budgeting began after 1984, as noted in an earlier footnote; its effects were particularly pronounced after 1996.

[24]A growing trade deficit and federal surplus imply a sharply falling private saving rate, because of the aforementioned NIPA accounting identity. The reasons for the low saving rate and the trade imbalance are unclear.

Table 12. Substantive Measures of Economic Activity: 1995:3–2005:4

quarter	unem-ployment rate	civilian participa-tion rate	nominal GDP	GDP deflator	annual % rate inflation	real federal funds rate	federal surplus	balance on current account
1995:3	5.7	66.6	7432.1	92.29	1.89	3.90	- 198.7	- 86.9
1995:4	5.6	66.5	7522.5	92.73	2.24	3.48	- 178.7	- 69.3
1996:1	5.5	66.5	7624.1	93.33	1.98	3.38	- 182.1	- 83.3
1996:2	5.5	66.7	7776.6	93.66	1.33	3.91	- 143.1	- 97.8
1996:3	5.3	66.8	7866.2	93.95	1.68	3.62	- 133.1	- 122.4
1996:4	5.3	67.0	8000.4	94.45	2.34	2.94	- 108.7	- 97.8
1997:1	5.2	67.0	8113.8	95.05	1.59	3.69	- 89.2	- 110.1
1997:2	5.0	67.1	8250.4	95.21	1.01	4.51	- 69.1	- 86.0
1997:3	4.9	67.2	8381.9	95.53	1.34	4.19	- 35.0	- 104.8
1997:4	4.7	67.2	8471.2	95.85	1.16	4.35	- 30.0	- 140.0
1998:1	4.6	67.1	8586.7	96.09	0.84	4.68	13.0	- 144.6
1998:2	4.4	67.0	8657.9	96.25	1.06	4.44	28.9	- 181.1
1998:3	4.5	67.1	8789.5	96.60	1.42	4.11	60.4	- 209.2
1998:4	4.4	67.2	8953.8	96.93	1.50	3.36	53.0	- 214.7
1999:1	4.3	67.2	9066.6	97.33	1.52	3.21	79.4	- 220.8
1999:2	4.3	67.1	9174.1	97.67	1.40	3.34	104.6	- 262.0
1999:3	4.2	67.0	9313.5	98.01	1.55	3.55	107.8	- 300.1
1999:4	4.1	67.1	9519.5	98.43	2.65	2.66	122.7	- 312.6
2000:1	4.0	67.3	9629.4	99.32	2.64	3.04	212.7	- 362.8
2000:2	4.0	67.2	9822.8	99.75	1.89	4.38	181.4	- 381.1
2000:3	4.1	66.9	9862.1	100.26	1.84	4.68	191.2	- 423.5
2000:4	3.9	66.9	9953.6	100.67	2.42	4.05	172.5	- 419.2
2001:1	4.2	67.1	10021.5	101.48	3.13	2.46	156.6	- 411.0
2001:2	4.5	66.8	10128.9	102.25	2.34	1.99	123.6	- 376.3
2001:3	4.8	66.7	10135.1	102.68	1.83	1.67	- 88.6	- 352.5
2001:4	5.6	66.8	10226.3	103.19	1.73	0.40	- 4.7	- 341.8
2002:1	5.6	66.6	10333.3	103.57	1.44	0.29	- 208.5	- 421.0
2002:2	5.8	66.7	10426.6	103.94	1.46	0.29	- 241.4	- 459.4
2002:3	5.8	66.6	10527.4	104.33	1.86	- 0.12	- 247.3	- 463.6
2002:4	5.9	66.5	10591.1	104.91	2.65	- 1.21	- 294.6	- 489.1
2003:1	5.8	66.3	10705.6	105.72	2.18	- 0.93	- 290.2	- 530.8
2003:2	6.2	66.5	10831.8	106.06	1.68	- 0.43	- 365.5	- 512.9
2003:3	6.1	66.2	11086.1	106.61	2.12	- 1.10	- 451.4	- 509.9
2003:4	5.9	66.1	11219.5	107.19	2.93	- 1.93	- 381.5	- 495.5
2004:1	5.6	66.0	11405.5	108.18	3.68	- 2.68	- 411.1	- 539.4
2004:2	5.6	65.9	11610.3	109.16	2.96	- 1.95	- 374.1	- 616.3

Table 12. (cont.)

2004:3	5.4	66.0	11779.4	109.79	2.90	- 1.47	- 361.9	- 619.2
2004:4	5.4	66.0	11948.5	110.67	3.49	- 1.56	- 335.4	- 721.6
2005:1	5.3	65.8	12154.0	111.76	3.18	- 0.71	- 298.0	- 714.5
2005:2	5.1	66.0	12317.4	112.45	2.99	- 0.05	- 287.5	- 710.1
2005:3	5.0	66.2	12558.8	113.41	3.43	0.03	- 394.3	- 674.7
2005:4	4.9	66.1	12705.5	114.39	3.41	0.51	- 293.2	- 841.0

would coincide with periods of moderately restrictive monetary policy.[25] The real federal funds rate rose above 4% when the unemployment rate fell to about 5%. The 1997:2 increase in the nominal federal funds rate coincided with an even larger increase in the real federal funds rate from 3.69% in 1997:1 to 4.51% in 1997:2. This large increase in the real rate unfortunately occurred just as a balance of payments crisis developed in East Asia, and may have contributed to the severity of that crisis.

Both of these interest rates fell dramatically in 1998:4 after another crisis developed in September 1968 at a large hedge fund, Long-Term Capital Management, which had borrowed $200 billion from banks in the U.S. and elsewhere. Short-term interest rates were allowed to rise again in 1999:2 and they exceeded their 1995:3 highs in 2000:2; the real federal funds rate rose above 4% in that same quarter. The 10-year constant maturity rate peaked in 2000:1 and then decreased irregularly until the end of the period. It should be interpreted as correctly forecasting that the extraordinary period of expansion was about to end. It was not the only indicator suggesting that trouble lay ahead. After a long string of gains, the monthly average of the Standard and Poor stock index peaked at 1,485 (1941–1943 = 10) in August 2000 and fell to 1,331 in December.

Although the Federal Reserve has de-emphasized monetary aggregates, it is instructive to examine nominal M1 between 1995:3 and 2000:4 in Table 13. It fell about 7% between 1995:3 and 1997:2, grew about 1.5% between 1997:2 and 1998:3, and then jumped about 1.4% in the quarter after the collapse of Long-Term Capital Management. Movements in M1 still have some value as an indicator of what the FOMC is doing in the short run! In 2000:4 it was roughly unchanged from its level in 1998:4. Overall, M1 fell between 1995:3 and 2000:4, even though one of its seasonally ad-

[25]As I read the postwar period, the Federal Reserve was being restrictive whenever the real federal funds rate was above 3%. Before Greenspan, the real federal funds rate as calculated in this volume exceeded 3% in the quarters 1969:3–1970:2, 1979:4–1980:2, and 1980:4–1986:4. They were all periods in which the Federal Reserve was aggressively fighting high inflation.

Table 13. Monetary Instruments and Indicators: 1995:3–2005:4

quarter	net free reserves	federal funds rate	M1	discount rate	treasury bill rate	discount borrowing	repurchase agreements	currency	reserve bank credit	10-year rate
1995:3	0.7	5.80	1144	5.25	5.37	0.3	206	411	411	6.32
1995:4	0.9	5.72	1132	5.25	5.26	0.2	201	415	415	5.89
1996:1	1.1	5.36	1121	5.08	4.93	0.0	200	416	413	5.91
1996:2	0.8	5.24	1119	5.00	5.02	0.2	213	421	419	6.72
1996:3	0.6	5.31	1103	5.00	5.10	0.4	212	430	425	6.78
1996:4	0.9	5.28	1083	5.00	4.98	0.2	211	438	432	6.34
1997:1	1.1	5.28	1076	5.00	5.06	0.1	215	443	436	6.56
1997:2	0.9	5.52	1064	5.00	5.05	0.3	222	449	449	6.70
1997:3	0.8	5.53	1069	5.00	5.05	0.5	230	457	451	6.24
1997:4	1.3	5.51	1069	5.00	5.09	0.2	248	468	461	5.91
1998:1	1.5	5.52	1076	5.00	5.05	0.1	265	473	467	5.59
1998:2	1.3	5.50	1077	5.00	4.98	0.2	275	479	476	5.60
1998:3	1.3	5.53	1076	5.00	4.82	0.3	278	489	483	5.20
1998:4	1.4	4.86	1091	4.66	4.25	0.1	288	503	496	4.67
1999:1	1.2	4.73	1097	4.50	4.41	0.1	303	512	505	4.98
1999:2	1.1	4.75	1101	4.50	4.45	0.1	302	524	518	5.54
1999:3	0.8	5.09	1097	4.60	4.65	0.3	309	537	530	5.88
1999:4	1.0	5.31	1111	4.87	5.04	0.3	324	574	567	6.14
2000:1	1.2	5.68	1113	5.19	5.52	0.2	346	572	565	6.48
2000:2	0.7	6.27	1108	5.70	5.71	0.4	354	566	559	6.18
2000:3	0.5	6.52	1101	6.00	6.02	0.5	361	570	560	5.89
2000:4	1.0	6.47	1093	6.00	6.02	0.3	361	577	569	5.57
2001:1	1.4	5.59	1100	5.11	4.82	0.1	360	584	577	5.05
2001:2	1.1	4.33	1116	3.83	3.66	0.2	379	591	584	5.27
2001:3	5.9	3.50	1160	3.06	3.17	1.3	366	607	607	4.98
2001:4	1.4	2.13	1168	1.64	1.91	0.1	367	623	620	4.77
2002:1	1.3	1.73	1186	1.25	1.72	0.1	379	637	633	5.08
2002:2	1.1	1.75	1183	1.25	1.72	0.1	376	650	648	5.10
2002:3	1.2	1.74	1188	1.25	1.64	0.3	395	661	658	4.26
2002:4	1.6	1.44	1206	0.94	1.33	0.2	442	670	672	4.01
2003:1	1.7	1.25	1236	n.a.	1.16	0.0	489	681	698	3.92
2003.2	1.6	1.25	1268	n.a.	1.04	0.1	519	690	713	3.62
2003:3	2.2	1.02	1292	n.a.	0.93	0.2	490	696	719	4.23
2003:4	1.5	1.00	1300	n.a.	0.92	0.1	496	709	729	4.29
2004:1	1.2	1.00	1320	n.a.	0.92	0.1	522	714	734	4.02
2004:2	1.6	1.01	1339	n.a.	1.08	0.1	533	721	744	4.60

Table 13. (cont.)

2004:4	1.7	1.93	1369	n.a.	2.01	0.1	497	748	778	4.17
2005:1	1.6	2.47	1370	n.a.	2.54	0.1	469	751	783	4.30
2005:2	1.5	2.94	1369	n.a.	2.86	0.2	503	756	787	4.16
2005:3	1.4	3.46	1367	n.a.	3.36	0.4	521	765	796	4.21
2005:4	1.7	3.92	1370	n.a.	3.83	0.2	552	776	809	4.49

justed components, currency in the hands of the public, rose from $367.3 billion in July 1995 to $529.9 billion in December 2000.[26] The measured transactions deposit component of M1 fell during this five-year period of rapid economic expansion, in large part because of the introduction of retail sweep accounts. Household transactions balances probably did not fall. However, it is again likely that much of the increment to the currency component disappeared into overseas currency hoards.[27]

Funds acquired by all depository institutions through overnight and term repurchase agreements rose about 80% between 1995:3 and 2000:4. Information is not available about the fraction of repurchase agreements that were overnight. Recall that overnight repurchase agreements are funds that are likely to be used by corporations and governments to effect transactions during the day.

Finally, it should be noted that the volatilities of net free reserves and discount window borrowing in Table 13 are much lower than in the preceding odd-numbered tables. Low volatility is in large part a consequence of growing required clearing balances and vault cash in ATMs.[28] As in the case of monetary aggregates, these two indicators were no longer very informative about monetary policy. A legal announcement in the Federal Reserve Bulletin (88:482–483) reported a decision by the Board to abandon using the discount rate as a policy instrument in 2002. It was replaced by an interest rate on discount window primary credit that was one percentage point above the Federal Reserve's desired federal funds rate. Depository institutions that were judged to be in good financial condition were allowed to borrow funds at this rate for short periods. Thus, the Board had effectively adopted a penalty bank rate such as had long existed at the Bank of England and that is similar to Lombard rates, at which temporary funds are offered by the European Central Bank. Depository institutions

[26]These sums are smaller than those shown in Table 13 because they exclude vault cash in depository institutions.

[27]For a useful discussion of currency, see Lambert and Stanton (2001).

[28]If a bank had enough ATMs, they determined a bank's minimum cash holding rather than reserve requirements.

that did not qualify to borrow at the primary rate might be allowed to borrow from the Federal Reserve at a higher penalty secondary rate.[29]

The negative signals from the 10-year constant maturity rate and the Standard and Poor Index proved accurate in 2001:1, when the unemployment rate rose 0.3% and real GDP began to fall. The recession as measured by decreasing real GDP would continue for two more quarters, but the unemployment rate would rise relentlessly from 3.9% in 2000:4 to 6.2% in 2003:2. Because of tax cuts sponsored by the incoming administration of President George W. Bush and the sluggish economy, the large federal surplus of 2000 would slip into a large deficit beginning in 2002:1. The deficit in the balance on current account fell during the recession and would not exceed its previous peak until 2002:2, mainly because of falling demand for imports. The recovery would eventually induce a rise in imports and a continuing stream of new record deficits in the balance on current account. The rate of inflation fell during the recession and stayed very low during the early quarters of the recovery. Indeed Federal Reserve governors openly discussed the possibility of deflation occurring.[30] However, the rate of inflation increased in 2003:4 and subsequently. In addition to the foregoing, on September 11, 2001 hijacked airliners attacked the World Trade Center in New York and the Pentagon in Washington and the Bush administration launched retaliatory attacks on Afghanistan and Iraq (with Great Britain and Australia as minor partners in the latter). All of these events would result in increased government spending obligations in the coming years.

Perhaps equally ominously, major equity markets continued to fall; the monthly average Standard and Poor Index was 1,145 in December 2001, 899 in December 2002, and 838 in February 2003. A rally in equity prices began in March 2003; the average was 1,081 in December 2003, 1,199 in December 2004, 1,262 in December 2005 and 1,424 in January 2007. Many individuals, including Chairman Greenspan, had been suggesting the possibility that a bubble was developing in equity markets, especially the NASDAQ, for several years.[31]

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[29]For a discussion of the reasoning behind this change, see Madigan and Nelson (2002).

[30]See, for example, Bernanke (2003) and Meyer (2004, Chap. 10).

[31]From the transcript of a September 24, 1996 FOMC meeting, Greenspan stated: "I recognize that there is a stock market bubble problem at this point." In a speech on December 5, 1996, Greenspan spoke of "irrational exuberance" when discussing the stock market. Source: Roach (2002). See also Browne (1999) and Shiller (2000).

The Federal Reserve responded to the new recession by aggressively lowering its desired level of the nominal federal funds rate from 6.50% in 2000:4 to 1.00% at the end of 2003.[32] As is evident in Table 13, most of the action occurred in 2001; the desired rate was 1.75% in 2002:1. The short duration of the recession, as measured by decreases in GDP, was surely partly attributable to this rapid 4.75% reduction in this desired rate, but similar to that of the 1990 recession. The large rate reduction may also have curbed the increase in the rate of unemployment, but labor market conditions were very slow to recover as can be seen in the civilian labor force participation rate in Table 12. In 2005:4 the participation rate was 66.1%, although the unemployment rate had decreased to 4.9%. The recovery in employment in the early 1990s was also very sluggish (a "jobless recovery") and together these recessions may signal a changing business cycle profile.

Apart from 2001:3, which was distorted by the terrorist attacks on the United States, net free reserves were always positive and discount window borrowing was almost negligibly low. Largely because of its currency component, M1 rose strongly between 2000:4 and 2004:4, after which it was essentially constant through the remainder of the Greenspan tenure. Funds acquired through repurchase agreements rose irregularly by 54% between 2000:4 and 2005:4. As in the top half of Table 13, changes in monetary aggregates continued to be relatively uninformative about how monetary policy was proceeding.

In Table 12 it can be seen that the real federal funds interest rate fell to near zero in 2001:4 as it did in 1992 and 1993 in the preceding recession, and was there or below for the fourteen subsequent quarters. It remains to be seen whether this long monetary policy expansionary stance will yield good results. After the events in the 1970s, the Federal Reserve had been hesitant to keep the real rate low for extended periods. Beginning in July 2003, the slope of the yield curve temporarily increased, as can be seen in the last column of Table 13. This suggests that traders in security markets briefly anticipated that interest rates were likely to rise. At least, that is the way Chairman Greenspan read such tea leaves in 1993 in his Humphrey-Hawkins testimony. The FOMC did begin to raise the target nominal federal funds rate at what it called a "measured pace" in June 2004 from 1.00% to 4.50% in January 2006, but the real rate was only borderline positive in 2005:3. Chairman Greenspan has characterized the decrease in

[32]There are potentially serious technical problems in conducting monetary policy when nominal interest rates approach zero, as the Bank of Japan discovered. For interesting discussions of them, see Clouse et al. (2000) and Eggertsson and Woodford (2003).

long rates after 2004:2 as a "conundrum".[33] With the unemployment rate near 5% in mid 2005, the continuation of a negative real federal funds rate suggests that the FOMC had adopted very different tactics from what it employed in the 1990s; the consequences of its actions are more reminiscent of the turbulent 1970s. The unemployment rate was 4.9% in 2005:4.

An unusual feature of the years in which Greenspan was chairman was a falling personal saving rate, the ratio of personal saving to disposable income. It was above 8% in 1986, Volcker's last full year; between 1987 and 1992 it was about 7%; it slowly dropped to about 2% between 2002 and 2004; and was less than 1% in 2005, 2006, and early 2007. In the last year of his term, Chairman Greenspan and James Kennedy of the Board's staff coauthored an extremely interesting study that attempted to provide insight into why saving was so low.[34] Using data on mortgage lending and terminations, they reported estimates of the amount of net equity that had been extracted each year from the housing market between 1991 and 2005:1. It was a steadily increasing amount that reached about $600 billion in 2004. Thus, an interpretation of the falling personal saving rate was that homeowners were replacing saving out of disposable income with funds that were being accumulated through asset transactions. These transactions are appropriately not included in the national income accounts and, therefore, are not in the calculated personal saving rate. A second paper by Greenspan and Kennedy (2007) attempted to estimate the extent to which net equity withdrawals financed personal consumption expenditures. They report that perhaps 3% of such expenditures came from equity withdrawals. They also report a sharp decrease in both saving and in equity withdrawals in 2006. As is reported in the second part of this volume, low interest rates appear to have induced homeowners to accept more risk by increasing the ratio of mortgage loans to the market value of their housing assets.

It is challenging to evaluate the Board's monetary policy under Chairman Greenspan. The strong points are that the FOMC successfully kept the inflation rate low and achieved a relatively high rate of growth, at least until 2000. It very aggressively responded to weaknesses in equity markets in 1987, 1989, and 2000, to stresses from the terrorist attacks of September 11, 2001, and to real estate market problems in the early 1990s. However, it was less responsive to market surges; for example, it did little to contain evident asset bubbles in equity and real estate markets. As is discussed above and in Chapter 10, the Board under Greenspan relaxed many regulations on banks, which is a likely consequence of his market-friendly phi-

[33]Federal Reserve Board's semiannual Monetary Report to the Congress, Testimony of Chairman Alan Greenspan, February 16, 2005.

[34]Greenspan and Kennedy (2005).

losophy that is amply evident in his recent memoir.[35] Like his predecessor, mentor, and one-time professor Arthur F. Burns, Greenspan ventured into other policy realms. He supported the first Bush and Clinton administration efforts to raise taxes and efforts by the second Bush administration to lower taxes, the last based on the risible argument that an income tax decrease was needed because the market might run out of federal debt, hindering open-market operations.

The long streak of negative real federal fund interest rates after 2000 surely amplified a likely bubble in housing markets, as it did in the 1970s, and was at variance with policy recommendations that flowed from a conventional Taylor model.[36] His successor, Benjamin S. Bernanke, inherited some potentially serious problems when he became Chairman on January 31, 2006, as will be seen in Chapter 7.

[35]See Greenspan (2007).

[36]See Taylor (2007) for a discussion of how the FOMC's target federal funds rate deviated from that recommended by a conventional Taylor model since 2002. For a defense of the FOMC's decisions, see Kohn (2007b).

7 Benjamin S. Bernanke 2006–

Chairman Bernanke's background differs from those of his two immediate predecessors. He had been a professor of economics at Princeton University for many years. He and Arthur F. Burns are the only two chairmen with such an academic history. He was on leave from Princeton and a member of the Federal Reserve Board from August 5, 2002 through June 21, 2005, when he resigned from both positions to become Chairman of the Council of Economic Advisors. He had many publications and public statements while holding these positions, which among other things suggest that he would like to have the FOMC set specific inflation targets.

A subcommittee on communications chaired by Board Vice Chairman Donald L. Kohn, with two Federal Reserve Bank Presidents as members, was established early in Bernanke's term to examine how the actions and intentions of the FOMC could be more clearly transmitted to the public. While specific inflation targets have not been formalized, on November 14, 2007 the FOMC announced that it would revise and increase the frequency of its Monetary Reports to the Congress from two to four per year. The revised reports will include information about FOMC members' average predictions of the personal consumption expenditure inflation rate and real GDP and distributions of the predictions over a horizon of three years. Because forecasts of the inflation rate over three years must reflect the consequences of FOMC policy decisions, this new communications policy has been interpreted in the press as being inflation targeting "lite."

Including Bernanke there are four new governors that have been appointed to the Board in 2006 and early 2007 and there are still two vacancies on the Board in November 2007. Two of the new governors, Frederic Mishkin and Randall Kroszner, also have extensive academic backgrounds. With this much change in the Board's membership and several new Reserve Bank presidents, it is likely that the strategy and tactics of the FOMC will change considerably in the coming years, but the nature of the changes is not yet fully evident. Perhaps a clue to the changes lies in the recent widespread academic acceptance of the importance of inflation ex-

pectations when designing optimal monetary policy.[1] However, there are many possible measures of inflation, and people may rationally form expectations about several different measures. It remains to be seen whether focusing narrowly on one or more expected rates of inflation is helpful in the design of monetary policy. As noted in the preceding chapter, Chairman Greenspan opined that:

> The level of the equilibrium real rate—or more appropriately the equilibrium term structure of real rates—cannot be estimated with a great deal of confidence, though with enough to be useful for monetary policy. Real rates, of course, are not directly observable, but must be inferred from nominal interest rates and estimates of inflation expectations.

An early change occurred in March 2006, when the Board ceased publication of M3 and stopped publishing information on its non-M2 components, repurchase agreements and eurodollar holdings. This is a continuation of the de-emphasis of monetary aggregates that began with Chairman Volcker's 1986 announcement that the FOMC would no longer focus on M1. Information about repurchase agreements has been useful when describing events in the foregoing chapters and, fortunately, quarterly information about these funds continues to be available in the Federal Reserve's Flow of Funds Accounts.[2]

Under Chairman Bernanke the FOMC continued to raise the target federal funds rate by 25 basis points at every meeting until the meeting of August 8, 2006. Under Chairmen Greenspan and Bernanke, the FOMC had raised the target federal funds rate in seventeen consecutive meetings − cumulatively by 4.25%. In August 2006 there was growing evidence of a glut of houses for sale and falling house prices in both the primary and secondary housing markets, which may have triggered the pause in rate increases that continued through the meeting of August 7, 2007.[3]

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[1]Expectations were stressed in seminal contributions in Friedman (1968) and Lucas (1976), but were also central to Keynes's thinking. See Kahn (1984), Keynes (1937), and Robinson (1975).

[2]The sum of commercial bank federal funds and security repurchase agreement borrowings has been strongly increasing. Between 2005:1 and 2007:2, successive end-of-quarter net federal funds and repurchase agreement liabilities outstanding of all commercial banks were 1019, 1076, 1102, 1085, 1126, 1188, 1212, 1236, 1281, and 1327 billion dollars. Source: Board of Governors of the Federal Reserve System, Flow of Funds Accounts of the United States, March 8, 2007 and September 17, 2007, p. 86.

[3] The median price of houses (including land) sold in thousands of dollars was 236.4 in 2005:3, 243.6 in 2005:4, 247.7 in 2006:1, 246.3 in 2006:2, 236.2 in

In the Board's February 2007 Monetary Report to the Congress, Bernanke reported that conditions in the economy were benign, with a slightly higher inflation rate emanating in part from high energy prices in early 2006 seemingly controlled. Specifically, he acknowledged that core inflation, which excludes food and energy prices, was higher in 2006 than in 2005, but said that: "Measures of long-term inflation expectations, however, remained well anchored."[4] He characterized conditions in the economy as favorable for 2007 and 2008, although he reported that delinquency rates on subprime mortgage loans with variable rates had increased "markedly" and that "the outlook for real economic activity is uncertain."[5] In part, the uncertainty was due to large inventories of unsold houses and to estimates in the press of between one and two million foreclosures on single-family houses in the coming several years.[6]

As can be seen in Tables 12 and 14, the real federal funds rate had reached a six-year high in 2006:3, at a level that historically corresponded with restrictive monetary policy. The FOMC was tilting against a higher than desired rate of inflation in its preferred indicator, the core personal consumption expenditures index (PCE), which excludes food and energy expenditures. Also, continuing and rising expenditures associated with a "surge" in the U.S. military intervention in Iraq surely contributed to inflationary budgetary pressures of an uncertain magnitude. Because monetary policy initiatives tend to impact the economy in the words of Milton Friedman "with long and variable lags," it is not surprising that Bernanke viewed the outlook for real economic activity as uncertain.

2006:3, 245.1 in 2006:4, 255.9 in 2007:1, 240.2 in 2007:2 and 238.6 in 2007:3. The time pattern of mean housing prices (including land) was at a seventeen-month low of $291,800 in November 2006; it was $329,400 in March and then hit a new low of $288,000 in September 2007. The rise in prices in early 2007 is a bit perplexing because there were large inventories of unsold houses in mid 2007 and foreclosures were rising nationally, especially in the subprime market. Decisions to accept bids and offers in heterogeneous regional housing markets often make aggregate statistics difficult to interpret.

Source: http://www.economagic.com/em-cgi/data.exe/cenc25/c25m01

[4]Board of Governors of the Federal Reserve System, Monetary Report to the Congress, February 14, 2007, p. 1.

[5]For a good discussion of subprime mortgages, see Gramlich (2007).

[6]To illustrate: "Almost 8 per cent of subprime mortgages— more than 450,000 loans—were either in foreclosure or in arrears of more than three months in the fourth quarter of last year, according to the mortgage bankers." Porter and Bajaj (2007).

Table 14. Substantive Measures of Economic Activity: 2006:1– 2007:2

quarter	unemployment rate	civilian participation rate	nominal GDP	GDP deflator	annual % rate inflation	real federal funds rate	federal surplus	balance on current account
2006:1	4.7	66.1	12965	115.36	3.39	1.07	- 220	- 786
2006:2	4.6	66.1	13155	116.34	2.87	2.04	- 240	- 812
2006:3	4.7	66.2	13267	117.03	2.01	3.24	- 239	- 851
2006:4	4.5	66.3	13392	117.52	2.93	2.32	- 182	- 728
2007:1	4.5	66.2	13552	118.75	3.39	1.86	- 219	- 756
2007:2	4.5	66.0	13756	119.52	1.76	3.49	- 191	- 736

In his July 2007 Monetary Report to the Congress, Bernanke largely reiterated his view of the state of the economy; the FOMC's predictions about inflation were little changed, but it still worried about the possibility of an increase in the core inflation rate because food and energy prices were rising rapidly. As can be seen in Table 14, the GDP deflator inflation rate had risen in 2006:4 and in 2007:1. However, in 2007:2 it fell sharply and the real federal funds rate reached a new high. The Committee slightly reduced its estimates of real economic growth for the second half of 2007 and 2008.

Bernanke acknowledged that the problems with subprime mortgage loans and mortgage-backed securities were worsening. In testimony about the report before the Senate Banking Committee he stated that: "The credit losses with subprime have come to light and they are fairly significant. Some estimates were on the order of between $50 and $100 billion of losses associated with subprime credit problems." On that same date, July 19, 2007, it was announced that two large hedge funds that had invested in subprime loans and were managed by the brokerage firm Bear Stearns Companies, Inc. were in dire circumstances. One was essentially worthless and the other had lost 90% of its value.

The July Monetary Report also stated that: "In the first quarter of 2007, an estimated 325,000 foreclosure proceedings were initiated, up from an average quarterly rate of 230,000 over the preceding two years; about half of the foreclosures this year were on subprime mortgages." and that: "Subprime mortgages originated in late 2005 and 2006 have shown unusually high rates of early delinquency, suggesting that some lenders unduly loosened underwriting standards during that period."

Table 15. Monetary Instruments and Indicators: 2006:1–2007:3

quarter	net free reserves	federal funds rate	M1	treasury bill rate	discount borrowing	currency	reserve bank credit	10- year rate
2006:1	1.4	4.46	1379	4.39	0.1	787	817	4.57
2006:2	1.6	4.91	1382	4.70	0.2	793	824	5.07
2006:3	1.2	5.25	1370	4.91	0.4	794	829	4.90
2006.4	1.5	5.25	1369	4.90	0.2	802	839	4.63
2007:1	1.5	5.26	1368	4.98	0.3	806	848	4.68
2007:2	1.4	5.25	1375	4.74	0.1	810	853	4.85
2007:3	1.8	5.07	1370	4.30	0.9	813	856	4.57

In the following days volatility in U.S. equity market prices increased and major stock market indices fell several percentage points. Failure rates of nonbank mortgage originators increased and there were reports of markets for mortgage-backed securities and related derivative contracts lacking liquidity and indeed seizing up. The New York Federal Reserve Bank trading desk was reported to have injected about $19 billion into the market on August 9 and about $39 billion on August 10 in an attempt to restore stability, but the FOMC did not change its target federal funds rate from 5.25%. On August 9 the European Central Bank injected 94.8 billion euros, because it sensed the European securities markets had become illiquid as short-term rates rose.

In the following week there was more turbulence and the New York Bank trading desk continued its unusually large involvement. There were reports of difficulties in placing commercial paper, which meant that borrowers would resort to back-up lines of credit at commercial banks.[7] On August 17, the Board surprisingly reactivated an old instrument, the discount rate, by lowering it fifty basis points and indicated that Federal Reserve Bank discount windows would be willing to extend funds to borrowers for up to 30 days or more against good collateral, which included mortgage loans and mortgage-backed securities. The target federal funds rate and the margin requirements on discount window loans were unchanged. I interpret the discount rate change to be more evidence of the Board's efforts at improving communication than substance, because the volume of discount borrowing is typically quite small, as can be seen in

[7]A long-standing practice in the market for commercial paper is that an issuer obtains a commitment from a commercial bank for a loan in the event that the issuer is unable to retire or roll over paper when it matures. This commitment was usually a safety device that was infrequently activated. However, in the turbulent 2007 markets, it has been activated frequently and may threaten the stability and liquidity of banks that provided this option.

Table 15.[8] However, the reactivation of the instrument is important. It is a good tool for drawing attention to changes in the Board's interpretation of events in the economy that was effectively used in the past, such as in December 1965 under Chairman Martin and in October 1979 under Chairman Volcker when the Board raised the discount rate.

To reinforce this interpretation, consider the following statement from the FOMC that was also released on August 17:

> Financial market conditions have deteriorated, and tighter credit conditions and increased uncertainty have the potential to restrain economic growth going forward. In these circumstances, although recent data suggest that the economy has continued to expand at a moderate pace, the Federal Open Market Committee judges that the downside risks to growth have increased appreciably. The Committee is monitoring the situation and is prepared to act as needed to mitigate the adverse effects on the economy arising from the disruptions in financial markets.[9]

In the following days conditions in banking and capital markets continued to deteriorate in both the U.S. and Europe. On August 27, 2007 it was announced that the number of unsold houses in the U.S. was at a 16-year high. Recall that 1991 was a year in which agencies established by FIRREA were attempting to liquidate the carryover from the savings and loan debacle. The highly regarded S&P Case-Shiller index of housing prices in 20 metropolitan areas was falling. Write-offs of credit card debt in the first half of 2007 were one-third higher than in the comparable period in 2006.[10] The Conference Board's consumer confidence index experienced a large drop, the largest in two years, on August 28. The Federal Reserve "temporarily" relaxed regulations on financial holding companies that had limited the amount of financing that their banks could extend to in-house brokerage firms. Both the Bank of America and Citibank were given permission to lend these affiliated firms $25 billion, an increase of

[8]On August 22, 2007, four large commercial banks, Citigroup, Bank of America, JP Morgan Chase, and Wachovia disclosed that they had each borrowed $500 million from the Federal Reserve discount window, so there might be some substance to its easing of terms of lending. However, the borrowing apparently was done after prodding by Federal Reserve officials, who were attempting to remove the stigma of borrowing, and thus again was largely symbolic. See Dash (2007).

[9]Source: http://www.federalreserve.gov, August 17, 2007.

[10]Source: Scholtes (2007). The importance of this rise is unclear, because there was a drastic change in the U.S. bankruptcy law in 2005, which precipitated a very large number of filings before it came into effect. As a result the 2006 write-offs were probably abnormally low.

about 200% over what was previously permitted.[11] The significance of this action is unclear, but it may allow more funds to reach cash-short market institutions and it seemed to establish an unfortunate precedent of weakening barriers between insured deposits and capital markets when crises arise. Between August 10 and August 26, the effective federal funds interest rate continued to be well below the Federal Reserve's announced target rate, for reasons that are unclear. Options markets were signaling that the target federal funds rate would be cut by 50 basis points before the end of the year.

The title of the annual Federal Reserve Bank of Kansas City Economic Symposium at Jackson Hole, Wyoming beginning on August 31 was "Housing, Housing Finance, and Monetary Policy." In his opening remarks at the Symposium, Chairman Bernanke reported that:

> The cutback in residential construction has directly reduced the annual rate of U.S. economic growth about 3/4 percentage point on average over the past year and a half. . . .
>
> As you know, the financial stress has not been confined to mortgage markets. The markets for asset-backed commercial paper and for lower-rated unsecured commercial paper market [sic] also have suffered from pronounced declines in investor demand, and the associated flight to quality has contributed to surges in the demand for short-dated Treasury bills, pushing T-bill rates down sharply on some days. . . .
>
> Diminished demand for loans and bonds to finance highly leveraged transactions has increased some banks' concerns that they may have to bring significant quantities of these instruments onto their balance sheets. These banks, as well as those that have committed to serve as back-up facilities to commercial paper programs, have become more protective of their liquidity and balance-sheet capacity. . . .
>
> Although this episode appears to have been triggered largely by heightened concerns about subprime mortgages, global financial losses have far exceeded even the most pessimistic projections of credit losses on those loans. In part, these wider losses likely reflect concerns that weakness in U.S. housing will restrain overall economic growth. But other factors are also at work. Investor uncertainty has increased significantly, as the difficulty of evaluating the risks of structured products that can be opaque or have complex payoffs has become more evident. Also, as in many episodes of financial stress, uncertainty about possible forced sales by leveraged participants and a higher cost of risk capital

[11]Source: Unsigned editorial, (2007), "What Looks and Sounds Like a Bailout," New York Times, August 28, p. A22.

> seem to have made investors hesitant to take advantage of possible buying opportunities.[12]

This somber summary suggested that the FOMC was likely to cut its targeted federal funds rate at its next meeting on September 18. This expectation was further supported by news on September 6 that the number of homes entering foreclosure proceedings was at a record high in 2007:2 and on September 7 that U.S. employment decreased in the month of August and was revised sharply downward for each of the preceding two months. Weekly average loans to depository institutions from Federal Reserve Bank discount windows rose from $1.1 billion in the week ending September 5 to $2.9 billion in the week ending September 12, but then fell back to $2.4 billion in the week ending September 19.[13]

As the options markets had predicted, the FOMC cut its target federal funds rate to 4.75% at its meeting on September 18 and the Board reduced its primary lending rate to 5.25%. The statement at the close of the FOMC meeting was:

> Economic growth was moderate during the first half of the year, but the tightening of credit conditions has the potential to intensify the housing correction and to restrain economic growth more generally. Today's action is intended to help forestall some of the adverse effects on the broader economy that might otherwise arise from the disruptions in financial markets and to promote moderate growth over time.
>
> Readings on core inflation have improved modestly this year. However, the Committee judges that some inflation risks remain, and it will continue to monitor inflation developments carefully.
>
> Developments in financial markets since the Committee's last regular meeting have increased the uncertainty surrounding the economic outlook. The Committee will continue to assess the effects of these and other developments on economic prospects and will act as needed to foster price stability and sustainable economic growth.

[12]Bernanke (2007b)

[13]If the amounts borrowed by the four banks identified in an earlier footnote continued to be $500 million apiece, in the week ending September 19 borrowing by other banks was close to the levels shown in earlier odd numbered tables and the Federal Reserve would seem to have been unsuccessful in injecting funds through this channel. The amount was $306 million in the week ended September 26 and lower still in each of the following four weeks, so the Federal Reserve's gambit didn't actually work.

The action and concluding statement initially led to a sharp rise in equity prices, sharp rises in commodity prices, a continuation of the falling international value of the dollar, and rising interest rates on longer maturity U.S. government securities. The increased slope of the yield curve was widely interpreted as predicting future inflation.

In October the dollar continued to weaken and oil prices exceeded $93 per barrel for the first time on October 29. During the month the three largest U.S. banks, Citigroup, JPMorgan Chase, and Bank of America proposed a controversial initiative, with reported encouragement from the U.S. Treasury. The proposal was to establish a $75 billion Master Liquidity Enhancement Conduit (M-LEC) or "super fund" that would buy mortgage-backed and other securities from structured investment vehicles (SIVs), which are remote financing units that are administered by banks. Apparently the idea was that the super fund would itself issue commercial paper that would be more acceptable to investors than paper issued by SIVs and might avoid forced sales of asset-backed securities by SIVs that could result in very low values being established in their markets. If it were to succeed, it might allow banks to avoid having to activate their commitments to fund commercial paper that could not be rolled over. Several financial gurus, including Alan Greenspan, criticized the proposal.[14] However, plans for establishing M-LEC were continuing in late November.

A tentative interpretation of this complicated situation is that banks were responding with innovations to competition from nonbank lenders and, possibly, attempting to evade enhanced minimum capital requirements that were established by the Basel I agreements in 1988. The innovations were (1) to increase income by issuing high yielding subprime mortgages and other high yielding credit either directly or indirectly through subsidiaries of financial holding companies and (2) to place such debt in remote dispersing units such as SIVs and other asset-backed security issuers that were not subject to the Basel capital requirements. Initially the SIVs and other issuers were able to fund themselves inexpensively by borrowing in global markets, where a glut of dollars existed because of large continuing U.S. balance of payment deficits. By evading the capital requirements banks were effectively increasing their leverage. The extent to which banks were assuming more risk is still unclear, because details of whether or not lenders in global markets have recourse are unknown. However, when doubts about the quality of the assets underlying collateralized loan and debt obligations and asset-backed commercial paper arose, global lenders refused to refinance SIVs and other issuers. This led to the seizing

[14]See Wighton and Guha (2007) and Dash and Morgenson (2007).

up of short-term debt markets and potentially to the forced sale of the underlying assets. Common stock prices of commercial banks and other financial firms involved in securitization fell sharply in November. Additional fragmentary evidence consistent with this interpretation is reported in Chapter 10.

The FOMC's next regularly scheduled meeting was held on October 30 and 31. The FOMC lowered the target nominal federal funds rate to 4.50% at the conclusion of the meeting and the Board lowered the primary borrowing rate at Reserve Bank discount windows to 5.00%. The statement at the end of the meeting began with following paragraphs:

> Economic growth was solid in the third quarter, and strains in financial markets have eased somewhat on balance. However, the pace of economic expansion will likely slow in the near term, partly reflecting the intensification of the housing correction. Today's action, combined with the policy action taken in September, should help forestall some of the adverse effects on the broader economy that might otherwise arise from the disruptions in financial markets and promote moderate growth over time.
>
> Readings on core inflation have improved modestly this year, but recent increases in energy and commodity prices, among other factors, may put renewed upward pressure on inflation. In this context, the Committee judges that some inflation risks remain, and it will continue to monitor inflation developments carefully.

The minutes of this meeting were released on November 20. It includes the first release of the committee's new three-year forecasts. When compared to forecasts from the July 2007 Monetary Report to the Congress, forecasts for 2007 were largely unchanged, although the core PCE inflation forecast was lowered about 0.3%. Forecasts for real GDP for 2008 were lowered about 1/2% from those made in July, and risks to the downside seem to have increased. The forecasts for real GDP growth for 2009 and 2010 were about 2.55% and for core PCE about 1.8%. The committee seemed to have reduced its estimate of the rate of growth of potential GDP slightly. The unemployment rate was predicted to be about 4.8% over the coming three years.

The price of oil closed above $94 after the meeting and reached $99 in late November. These increases seemed attributable to decreases in the value of the dollar, as appears to have occurred in the 1970s.

The July Monetary Report did mention that the broad trade-weighted index of the dollar had fallen during 2007, but it did not analyze the cumulative decline in this exchange rate index since Bernanke became Chairman or explore its implications for inflation in the U.S. The extended pe-

riod of negative real short-term interest rates beginning in 2002:3 during the Greenspan era led to a sizable decrease in the index; it fell from 129.53 (1997 = 100) in February 2002 to 112.46 in January 2004 and then roughly remained constant until November 2005, when its value was 112.25.[15] The index fell from 110.01 in January 2006 (Greenspan's last month in office) to 99.80 in October 2007. The decrease in the major currencies component was especially strong; its value was 111.99 (1973 = 100) in February 2002, 86.41 in November 2005, and 73.93 in October 2007. The component for other important trading partners was 137.77 (1997 = 100) in February 2002, 138.11 in November 2005, and 127.98 in October 2007. The stickiness in the last index during the Greenspan era reflects efforts by several developing countries to peg their exchange rates to the dollar, but that effort was weakening during Bernanke's term.

Ceteris paribus, a decrease in exchange rates should stimulate exports, curb imports, improve the balance of payments, and increase output, employment, and the rate of inflation. It is too early to say whether the observed decrease is large enough to have substantial impacts, which in any event will occur with lags. However, the possibility of such a scenario is one further reason to believe FOMC concerns about inflation. The greater decrease in the major currencies component may foreshadow a further shift away from the dollar as the prime international currency, which would strengthen these consequences.

[15]Exchange rates in this discussion are from the Federal Reserve Bank of St. Louis's FRED data bank.

8 Overview and Summary of Part 1

While recent histories are unavoidably incomplete, it is important to draw lessons from what has transpired. In 1945 there were widespread doubts that controlling interest rates would provide a sound foundation for Federal Reserve policy.[1] While interest rates remained the main indicator until the Volcker 1979 initiatives, the doubts continued. In the next fifteen years many other indicators were tried and found wanting. By 1994, the Federal Reserve was almost exclusively focusing on real interest rates when implementing monetary policy. Nominal rates were the focus in 1945 because the Federal Reserve was pegging the yield curve and, perhaps, because it was unclear how to measure and forecast inflation. Nevertheless, doubts persist about whether changes in interest rates are sufficient to achieve price stability and maximum sustainable economic growth. Are other policy instruments and regulations needed? The next section summarizes the reasons for changes in indicators and instruments over the past sixty years. The second and third sections present arguments for and against believing that controlling real interest rates is likely to suffice. The last section draws conclusions from this analysis.

8.1 Indicators and Instruments

The real federal funds rate had taken center stage as the indicator through which open-market operations were interpreted, because the relation between other indicators and targets such as inflation and sustainable economic growth had broken down. Among the indicators that had been tried and largely discarded were the monetary aggregates M1 and M2, discount window borrowing, net free reserves, unborrowed reserves, and the mone-

[1]However, in 1906 there had been a lucid statement that: ". . . a change in the relation between the natural and the market rate of interest cannot fail to exercise a determining influence on the extent to which credit is used, and thus on the factor by which the value of money, or its purchasing power, is finally regulated." Wicksell (1935, p. 27) The natural rate can be interpreted as the marginal cost of capital and the market rate as a short-term interest rate.

tary base.[2] In part, the immeasurable amount of currency that is in overseas hoards and the introduction of retail sweep accounts had made control of the monetary base and monetary aggregates specious. The usefulness of the monetary aggregates had also been eroded by the proliferation of close substitutes and continuing innovations that have been discussed above. Because of the large increase in access to the discount window mandated by the Depository Institutions Deregulation and Monetary Control Act of 1980 (DIDMCA) and changes in discount window management, the amount of borrowing from the window is no longer very informative. The introduction of required clearing balances and currency in ATMs has made system-wide excess reserves largely an unpredictable variable instead of an informative indicator. Net free reserves are equal to excess reserves minus reserves borrowed at the discount window and, thus, doubly uninformative.

Policy instruments have had a similar high mortality rate. Reserve requirements have not been raised in almost three decades. Before DIDMCA, relatively high reserve requirements led to erosion of reservable deposits because of decreasing bank membership in the Federal Reserve System and increasing offshore banking by member banks. Accordingly, the Federal Reserve was very reluctant to raise reserve requirements and happy to lower them. After 1980, steadily increasing restrictions on daylight overdrafts and the implicit interest paid on required clearing balances induced banks to increase required clearing balances, which reduced the need to maintain contingency excess reserves. Required reserves still represent a tax because banks earn no interest on them, but the burden has greatly diminished because of reductions in the requirements in the early 1990s, the recent rapid growth of ATMs that require inventories of till cash, and the introduction of retail sweep accounts in 1994. As concluded by Bennett and Peristiani (2002, p. 65), ". . . reserve requirements are losing relevance." They will become completely irrelevant in October 2011 because of provisions in the Financial Services Regulatory Relief Act of 2006, as is explained in Chapter 10.

The discount rate was abandoned as a policy instrument between January 2003 and August 2007. Beginning in January 2003, the primary discount window borrowing rate was set 100 basis points above the Federal

[2]An imaginative characterization of the high rate of turnover of indicators is "Goodhart's Law, that any observed statistical regularity will tend to collapse once pressure is placed on it for control purposes . . ." Goodhart (1981, p.116). It can be interpreted to mean that whenever an indicator variable's path begins to bind financial markets, innovations will occur that bypass the constraint. Newly binding constraints increase the rewards for innovators.

Reserve's desired federal funds rate. The instrument was effectively reactivated on August 17, 2007 when the Board reduced the primary discount window borrowing rate spread over the desired federal funds rate to 50 basis points. In the preceding chapter, I interpreted it to be mostly a communication channel in its reincarnation.

A third set of policy instruments, regulations, is very wide-ranging and difficult to interpret concisely. There are thirty-one broad classes of Federal Reserve regulations, many of which are designed to maintain desirable and orderly processes in financial markets and not to effect monetary policy.[3] One regulation that had been important in the transmission of monetary policy was Regulation Q, which specified maximum interest rates that banks could pay on time and savings deposits. In 1986, the Federal Reserve abandoned controls on interest rates paid on time and savings deposits and thus eliminated it as a policy instrument. The Emergency Credit Control Act of 1969 has been repealed, which eliminated a large number of possible discretionary interventions in financial markets whenever it was activated. Dating from 1935, the Federal Reserve has had a number of discretionary controls that apply to security markets. It has not changed conventional margin requirements on buying stocks, selling stocks short, or buying convertible bonds since January 1974, even though there has been considerable instability in securities markets. It has modified margin requirements on writing options from time to time as option variety and trading volume expanded, but the changes are not easily interpreted as responding to instability in securities markets. In general, it is fair to conclude that the Federal Reserve has become increasingly reluctant to adjust regulations in its efforts to influence economic activity, especially while Greenspan was chairman. This may be because binding regulations are likely to lead to financial innovations, but also reflects a growing Federal Reserve preference for *laissez faire* in recent years. On the other hand, the reach of its regulatory arm has increased considerably with the 1970 amendments to the Bank Holding Company Act, the International Banking Act of 1978, the Depository Institutions Deregulation and Monetary Control Act of 1980, and the Financial Services Modernization (Gramm, Leach, Bliley) Act of 1999. The last is discussed in Chapter 10. In my opinion, regulations are likely to become more important in implementing policy in the coming years, as is explained below.

A fourth category of policy instruments is moral suasion, which consists of attempts to manipulate the economy through speeches by Board members and Reserve Bank presidents, FOMC directives and minutes, beige

[3]For a summary of regulations, see
http://www.federalreserve.gov/regulations/default.htm.

books, testimony before and monetary policy reports to the Congress, etc. Moral suasion has been employed extensively with results that are difficult to evaluate. These emanations are often obscure and sometimes contradict one another, but are read carefully by participants in financial markets and highly paid "Fed watchers." In the context of the diminishing relevance of the instruments described in the preceding paragraphs, statements from the Board and the FOMC appear to have taken on greater importance over time, especially since 1994. The 2007 decision to increase the frequency, time span, and detail of FOMC reports supports this interpretation.

The fifth policy instrument, of course, is open-market operations, which since the Accord has been the principal tool used by the FOMC in its efforts to influence the economy. It has evolved over time as the Federal Reserve shifted from its bills only (or "preferably") doctrine from the time of the Accord to operating over much of the range of the yield curve since the time of operation twist. Until recently open-market operations were also conducted in bankers' acceptances. Open-market operations using federal agency securities commenced in December 1966. Today most transactions are conducted using short-term repurchase agreements and matched sale-purchase transactions, but the way open-market operations are conducted has changed over time with the introduction of new technology and instruments.[4] Published data on transactions in the system's open-market account are only available since 1961.[5] In the early years outright purchases and sales of government securities were larger than repurchase agreement transactions and there were no matched sale-purchase transactions until July 1966. By 1968 the annual volume of each of these latter short-term transactions exceeded the volume of outright purchases and sales. As late as 1989 the Federal Reserve of New York had not automated the large volume of work that was needed to conduct system open-market operations.[6]

An especially interesting and technically creative period for open-market operations occurred around the century date change at the end of 1999. The FOMC authorized and the Federal Reserve Bank of New York implemented three major new innovations for coping with possible large shortages of reserves in the event that computers failed to transition prop-

[4]"In a matched sale-purchase transaction the desk sells Treasury bills from the System's Account for immediate delivery and simultaneously buys them back for delivery on the date desired. . . . While MSPs are just the reverse of an RP [repurchase agreement] in their effect on reserves, their form is different. Technically they encompass two separate transactions." Meulendyke (1989, p. 156)

[5]See Board of Governors of the Federal Reserve System (1976b, pp. 40–45).

[6]See Meulendyke (1989, p. 172).

erly into year 2000.[7] First, the maximum maturity of term repurchase agreements was extended from 60 to 90 days so that beginning in October 1999 primary government security (counterparty) dealers and their clients could have assured access to funds over the transition period. Second, eligible collateral for repurchase agreements was temporarily expanded to include mortgage-backed and stripped securities that would be handled by two large clearing banks using triparty settlement arrangements.[8] This innovation was designed to forestall a possible shortage of collateral in the event of an especially large cash shortfall. Finally, three strips of options on Trading Desk repurchase agreements were auctioned off to counterparty dealers so that the dealers were guarantied temporary access to funds. As it happened there was no cash crisis, but the Federal Reserve was prepared!

Finally, the Federal Reserve has from time to time maintained short-term swap arrangements with foreign central banks in order to facilitate international commerce. These interventions are not likely to have more than a transient effect on exchange rates. However, foreign central banks also have portfolios of assets that are denominated in foreign currencies. At the end of June 2003, central banks in China, Hong Kong, Japan, and South Korea collectively held $696 billion of U.S. government securities, which was slightly more than the value of securities held outright in the portfolio of the Federal Reserve System.[9] At the end of 2006, it was likely that the Chinese and Japanese central banks each had more dollar denominated assets than the Federal Reserve. The foreign central banks were clearly acquiring dollar-denominated assets in order to prevent their currencies from appreciating relative to the U.S. dollar. In the unlikely event that they should sell this large amount of securities, their actions would have enormous effects on exchange rates and interest rates. The wisdom of holding their portfolios of U.S. government securities is beyond the scope of this study; however, effective U.S. monetary policy must always take account of what other central banks and investors are doing.

[7]Sources: Federal Reserve Bank of New York (2000) and Federal Open Market Committee (1999).

[8]Stripped securities are created from a U.S. government or agency bond by separating the payment obligations, coupons and principal, which the bond has on different dates. The payment obligations are traded in markets as discount bonds that have no yield until they mature. Mortgage-backed securities are collateralized by mortgage loans; they are issued by government agencies and by private issuers. For a clear early discussion of these assets, see Becketti (1988).

[9]Source: Financial Times (2003, September 11, p. 18).

The probability of a partial liquidation of internationally held dollars seemed to be increasing in 2007, because many countries were establishing "sovereign wealth funds" that are to be invested in higher yielding assets than government securities; they need not be dollar-denominated. With relatively small percentage purchases or sales of dollar-denominated assets, these funds could substantially either amplify or offset FOMC open-market operations.

8.2 What Has Changed That Allows Control of Real Interest Rates to Influence GDP and Inflation in the 21st Century?

First, unlike 1945 the U.S. is operating in an approximation to a floating exchange rate system in the new century. It is only an approximation because it is a "dirty" float where sizable foreign trading partners such as China have been unwilling to allow their currencies to rise much against the U.S. dollar. However, the dollar's value has been fluctuating considerably against the euro and currencies of other trading partners. Relative to the Bretton Woods system, the Federal Reserve's greater ability to vary real interest rates should make U.S. monetary policy more effective in achieving inflation and output targets, as Fleming (1962) and Mundell (1963) argued. In particular, one should observe an increase in the interest elasticity of the balance of trade; *ceteris paribus*, the difference between exports and imports is negatively related to real U.S. interest rates. A reduction in the U.S. real interest rate is likely to expand U.S. economic activity through increased net exports.

Second, as noted in Chapter 3, developments in corporate finance are likely to have increased the sensitivity of project selection decisions to real interest rates over the postwar period. Therefore, the interest elasticity of the demand for gross investment in the GDP accounts is likely to have increased over time; *ceteris paribus*, gross investment is negatively related to real interest rates.

Third, because of growing volumes of home equity lines of credit after the Tax Reform Act of 1986, it is likely also that the interest elasticity of demand for consumer goods and services has increased. In part, home equity loans are used to finance purchases of goods and services and these loans frequently have interest rates that are indexed to market rates. An increase in real interest rates is expected to discourage spending.

Finally, there may be a reduced willingness of commercial banks and other lenders to extend credit to firms with weak credit ratings when mar-

ket interest rates rise, as was argued in the availability of credit doctrine and its associated prediction of credit rationing, that held sway in the 1950s. More recently and in a similar vein, Bernanke, Gertler, and Gilchrist have argued that interest rate increases are likely to diminish a firm's access to credit through a "financial accelerator."[10] However, if marginal borrowing firms are characterized as being small firms, Oliner and Rudebusch have reported that during the 1974–91 period a "bank lending channel does not appear to have been an important part of the monetary transmission mechanism."[11] There is a large empirical literature that claims that monetary policy may still be effective because of capital market imperfections. The problem with this literature is that the question being studied is not well posed, because the demand for and supply of credit are not credibly identified (separated). In these circumstances one cannot test a hypothesis that a credit channel for monetary policy exists.[12]

Chairman Bernanke apparently continues to believe in the efficacy of the financial accelerator and bank-lending channel, even in the presence of widespread securitization and nonbank lending activity that is described in Chapter 10. The following extracts depict his line of reasoning:

> Loan sales and similar activities are, in essence, another form of nondeposit financing, and the effective cost of this form of funding to the bank will generally depend on its perceived financial strength and resources (which may affect recourse and reinsurance arrangements with the loan purchasers, for example).
>
> One might view the idea that banks are somehow "special" in their ability to gather information and to screen and monitor borrowers as rather dated. Banks do continue to play a central role in credit markets; in particular, because of the burgeoning market for loan sales, banks originate considerably more loans than they keep on their books. Nevertheless, nonbank lenders have become increasingly important in many credit markets and relatively few borrowers are restricted to banks as sources of credit. Of course, nonbank lenders do not have access to insured deposits. However, they can fund loans by borrowing on capital markets or by selling loans to securitizers. Does the rise of nonbank lenders make the bank-lending channel irrelevant?
>
> I am not so sure that it does. Like banks, nonbank lenders have to raise funds in order to lend, and the cost at which they raise those funds will depend on their

[10]See Bernanke and Gertler (1989) and Bernanke, Gertler, and Gilchrist (1996).

[11]See Oliner and Rudebusch (1996, p. 308).

[12]See Hubbard (1998) and Federal Reserve Bank of Boston (1995) for references to this literature. For an interesting argument that identification of a credit channel can be achieved, see Peek, Rosengren, and Tootell (2003).

> financial condition—their net worth, their leverage, and their liquidity, for example. Thus, nonbank lenders also face an external finance premium that presumably can be influenced by economic developments or monetary policy. The level of the premium they pay will in turn affect the rates that they can offer borrowers. Thus, the ideas underlying the bank-lending channel might reasonably extend to all private providers of credit. Further investigation of this possibility would be quite worthwhile.[13]

8.3 What Considerations Are Likely to Impede the Effectiveness of Monetary Policy?

First, in a global setting individuals and firms may conduct financial transactions denominated in U.S. dollars in the United States or overseas, using U.S. financial institutions or those of other countries. In order to set a real federal funds rate at some desired level, the Federal Reserve's actions must be sufficient to control the dollar-denominated rate globally. The "law of one price" would seem to make this a simple matter.[14] However, dollar-denominated assets in different countries are subject to different tax laws and arbitrage opportunities are sure to exist whenever the rate changes. This does not mean that the Federal Reserve cannot approximately control the federal funds rate in, say, New York, but the consequences of such control are likely to be uncertain elsewhere. Also, U.S. firms and foreign firms situated in the U.S can borrow in foreign currencies at offshore interest rates. Financial derivatives allow such foreign currency borrowings to be hedged against exchange rate changes.

Second, beginning with the establishment of the Chicago Board Options Exchange in 1973 and financial instrument futures markets in 1975, it has become increasingly easy for potential borrowers to protect themselves against rising interest rates through hedging.[15] These market innovations allow hedges to be established at lower cost than previously. For example, the ability to hedge reduces the risk of financing new projects at times when there is a possibility that interest rates will rise, by shifting risk from

[13]Bernanke (2007a).

[14]The law of one price exists in a world of markets where there are no frictions or restrictions on transactions. In such a world, if there were any differences in local market federal fund rate equivalents, arbitrageurs would borrow in markets where rates were low and lend in markets where they were high.

[15]After the Accord in 1951, it has always been possible for borrowers to hedge against interest rate increases by assuming short positions in U.S. government securities. When interest rates rise, the prices of securities fall and a short position can be closed out with a gain.

potentially vulnerable borrowers to individuals more capable of assuming risk or to individuals that desire to hedge against the possibility that interest rates may fall. If fully hedged, a formerly vulnerable borrower is not directly affected by monetary policy and, thus, the impact of monetary policy is diminished.[16]

Third, over time the number and variety of financial market derivatives have expanded enormously.[17] Their complexity and a continuing high rate of innovation make it very difficult to know who will be impacted when interest rates change. This may not be important for attaining some target, but it suggests that to avoid unintended consequences the Federal Reserve must be alert to signals emanating from financial markets and be ready to intervene, as it did in the case of Long-Term Capital Management in 1998.

Exotic derivative contracts are likely to affect investors, debtors, and interest rates in counterintuitive ways.[18] Interventions to avoid untoward incidents are likely to impede the achievement of the Federal Reserve's price stability and maximum sustainable economic growth goals more often in the future. An example in 2007 of such an incident was collateralized debt obligations that were backed by adjustable rate subprime mortgage loans and then repackaged as securities with different risk exposures. Because details about the underlying mortgage loans were unavailable, transparency was lost and the market for the securities seized up. A similar lack of transparency about other underlying assets caused the market for asset-backed commercial paper to seize up in both the U.S. and Europe.

Finally, monetary policy always has distributional consequences and, as the preceding paragraph suggests, they are likely to become increasingly intricate. As a simple example, unexpected increases (decreases) in interest rates harm (help) borrowers and help (harm) lenders. Sustained unanticipated high or low interest rates result in transfers of wealth among individuals and across generations in ways that may produce political backlashes and limits on acceptable variations in interest rates. This was not a serious problem when the Bretton Woods System was in effect, because real interest rates could not vary greatly relative to those in other countries without threatening the quasi-fixed exchange rate structure, but it has become serious since then and a digression on distributional effects of monetary policy is warranted.

There have been a series of unsustainable price movements or "bubbles" in major asset markets after the Bretton Woods System collapsed in 1971,

[16]For a discussion of hedging against monetary policy, see Hester (1981, pp. 166–167, 193–199) and Mayer (2001, pp. 22–24).

[17]See Minehan and Simons (1995) and Zhang (1997).

[18]For an example, see Malz (1995).

which have raised havoc and redistributed wealth. As will become clear, to some extent the Federal Reserve's actions have contributed to each of them. When real interest rates are very high or low, opportunities develop in markets that lead to distortions. Asset price movements have been precipitated by a combination of institutional changes, accounting practices, tax law changes, and monetary policy, not monetary policy alone. Bubble prevention is not a goal of the FOMC, unless bubbles interfere with achieving the committee's main targets of price stability and maximum sustainable economic growth. The following excerpt from a speech by Chairman Greenspan about the stock market bubble in the 1990s provides a sample of the central bank's spin on bubbles:

> We at the Federal Reserve considered a number of issues related to asset bubbles—that is, surges in prices of assets to unsustainable levels. As events evolved, we recognized that, despite our suspicions, it was very difficult to definitively identify a bubble until after the fact—that is, when its bursting confirmed its existence.
>
> Moreover, it was far from obvious that bubbles, even if identified early, could be preempted short of the central bank inducing a substantial contraction in economic activity—the very outcome we would be seeking to avoid.[19]

A different spin on asset price surges has emerged from a study organized by the International Center for Monetary and Banking Studies and the Centre for Economic Policy Research.[20] In part, it argues that changes in asset prices contain information about inflation expectations, because investors acquire some assets as a hedge against inflation. Also, wealth is arguably a determinant of spending; rising wealth is likely to lead to higher future spending. The asset prices they consider are those on equities, houses, and foreign exchange. The authors suggest that when setting a desired short-term interest rate monetary authorities should increase it when asset prices are rising. The study does not recommend attacking bubbles directly, but argues that the authorities should respond to the information implicit in the movements of asset prices. Indeed, whether asset price increases are part of a bubble or not is immaterial to their story and much of the following summary.

To survey asset price surges in the U.S. briefly, a long period of (possibly unintended) low real interest rates in the 1970s led to dramatic and unsustainably rising prices on farm land, equipment, and houses in some regions of the U.S. There were widespread losses in agriculture and in the

[19]Greenspan (2002).

[20]See Cecchetti et al. (2001).

mortgage-issuing savings and loan and mutual savings bank institutions when prices fell in the 1980s, in response to high real interest rates that were a consequence of Reagan-era tax cuts and restrictive Federal Reserve policies. Also, high real interest rates in the early 1980s led to a considerable and unsustainable appreciation of the dollar, which decimated the values of assets in manufacturing industries in the Midwest "rust belt".

The Tax Reform Act of 1986 contributed to a collapse in commercial real estate that was followed by depressed residential real estate markets when FIRREA was enacted in 1989. Depressed residential markets resulted when agencies established by FIRREA began to liquidate asset holdings of failing and insolvent thrift institutions. The Federal Reserve responded to the ensuing recession by lowering real short-term interest rates essentially to 1970s levels in 1992 and 1993. As is explained in Part 2, its actions transferred wealth from depositors, who lost interest income, to financial institutions and commercial and residential real estate owners, who were able to survive through Federal Reserve largesse.

Housing and equity markets have been especially volatile in the years since 1994. The 1986 Tax Reform Act's impact on housing was strongly expansionary, as noted in Chapter 6. The resulting rise in the desired stock of houses would take many years to be satisfied.[21] Whether a bubble in housing markets occurred in the early 21st Century is not completely clear, but symptoms of rising demand and perhaps a bubble are rapid growth in the number of houses being constructed and strongly rising prices (until 2007).[22] New housing units completed were at all time record levels of over 2.0 million units in 1972 and 1973, when President Nixon made effective political use of provisions in legislation that had recently established the GNMA. The increase in housing prices following years of negative real interest rates in the mid 1970s led to about 1.9 million housing unit completions in 1978 and 1979. There were only 1.1 million units completed in 1991, when institutions created in FIRREA were resolving the savings and loan debacle. Negative real interest rates during the early 2000s surely contributed to 1.93 million units being completed in 2005 and 1.98 million in 2006.[23] The purchase price of new houses has risen much faster than other prices.[24] The average price of a new house in January was

[21]New houses rarely exceed two million per year, and the stock of houses exceeds one hundred million.

[22]For an interesting discussion of bubbles in U.S. housing markets, which focuses on the period between 1988 and 2003, see Case and Shiller (2003).

[23]Source: Council of Economic Advisors (2007, p. 295).

[24]To see this, compare the house prices in the text to the GDP deflator reported in the preceding tables.

$108,600 in 1986, $148,500 in 1990, $179,200 in 1996, $223,700 in 2000, and $278,900 in 2003.[25] The average January price of new houses was $303,000 in 2005, $337,700 in 2006, and $368,200 in 2007.[26] The spurt in numbers of new houses and prices between 2000 and 2007 was surely abetted by the near-zero real federal funds rates reported in Table 12.[27]

Housing data are always difficult to interpret because of changes in house sizes, regional concentrations, land values, legal arrangements (condominiums, for example), and other dimensions. The following data on mean and median existing house sale prices (including land) from the U.S. Department of the Census for Januaries convey a similar profile, with a slightly lower trend. Thus, the mean (median) price of houses sold was $104,100 ($86,600) in 1986, $151,700 ($125,000) in 1990, $155,300 ($131,900) in 1996, $200,300 ($163,500) in 2000, $230,200 ($181,700) in 2003, $283,000 ($223,100) in 2005, $301,000 ($244,900) in 2006 and $311,500 ($249,400) in 2007.[28] The fact that the mean price rose faster than the median until 2005 suggests that the bubble (if any) was concentrated in more expensive houses, which tend to be located in large urban areas and in regions where land is scarce and zoning is restrictive.

It is clearer that a bubble existed in the stock market. Conventional valuation models of common stock depict the value of a firm's stock as a discounted sum of expected future real corporate earnings or dividends. While we do not know how investors form expectations, it is not unreasonable to think that they extrapolate recent trends in real corporate profits.[29] Nominal after-tax corporate profits rose 133% between 1970 and 1980, but real (using the GDP implicit price deflator) after-tax profits only rose about 19% during this period.[30] During the 1980s, nominal after-tax corporate profits rose 157%, from $114 billion in 1980 to $292 billion in

[25]Sources: Board of Governors of the Federal Reserve System (1996, pp. 143–148), Board of Governors of the Federal Reserve System (2002, pp. 136–140) and Federal Reserve Bulletin (2003, August, p. A32).

[26]Sources: Federal Reserve Bulletin and Federal Reserve Bulletin Statistical Supplement, Table 1.53.

[27]See Leonhardt (2007) for a similar view, other references, and for an interesting discussion of disagreements within the Federal Reserve about the housing bubble and terms of mortgage lending.

[28]Source: http://www.economagic.com/cenc25.htm#Price.

[29]"Bubbles appear to emerge when investors either overestimate the sustainable rise in profits or unrealistically lower the rate of discount they apply to expected profits and dividends." Greenspan (2002).

[30]Data on corporate profits are after tax and with inventory valuation adjustment; they are from the Federal Reserve Bank of St. Louis's FRED database, after the 2003 data revisions.

1990, and real after-tax profits rose about 70%. Subsequently, nominal after-tax corporate profits rose from $292 billion in 1990 to a peak of $622 billion in 1997, or about 113% over seven years. Real after-tax corporate profits rose 82% during these seven years, or at almost twice the annual percentage rate of the preceding decade and about six times the annual percentage rate of the 1970s. With naïve extrapolation, is it any wonder that a bubble emerged in equity markets? Nominal (and certainly real) corporate profits didn't exceed the peak reached in 1997 until 2001:4.[31] The Standard and Poor 500 stock price index continued to rise (in nominal terms) until August 2000, before collapsing; its price/earnings ratio roughly doubled between 1995 and 2000. As implied above, the Federal Reserve declined to puncture the bubble, even though Chairman Greenspan spoke of "irrational exuberance" as early as 1996. It is unclear how serious a mistake this reticence will prove to have been.

Part of the rise in corporate earnings was an artifact of laws governing the taxation of contributions to defined-benefit pension plans and loose accounting standards for these plans. With rising stock prices, whether from a bubble or not, the nominal value of firms' pension plans became over funded and corporate tax laws deterred firms from making further contributions. The non-contributed funds showed up in part as corporate profits; as a result, corporate profits were increased artificially.[32] After stock prices fell in the early 2000s, some firms were likely to have needed to increase contributions to pension funds, which amplified the decline in reported corporate profits. The Congress, not the Federal Reserve, was responsible for this amplification of fluctuations in corporate profits.

In addition to faulty accounting for pension plan fund obligations, it has been reported that there was a serious overstatement of corporate earnings in the national income accounts for 1998, 1999, and 2000, which was only corrected by the Bureau of Economic Analysis in 2002.[33] This overstatement was due to the fact that exercises of options by employees are not reported in a timely fashion. When options are exercised, they are properly recognized in the national income accounts as employee compensation that must be deducted from corporate net income. Alert investors may have

[31]Nominal after-tax corporate profits (with inventory adjustment and without capital consumption adjustment) in billions were $552 in calendar 1997, $470 in 1998, $517 in 1999, $508 in 2000, $504 in 2001, $576 in 2002, $665 in 2003, $844 in 2004, $1,119 in 2005 and $1,336 in 2006. Source: Council of Economic Advisors (2007) and U.S. Department of Commerce (June, 2007).

[32]There are many alternatives in how one chooses to report corporate profits. For examples, see Fuerbringer (2003).

[33]See Himmelberg et al. (2004).

recognized this overstatement within a year and begun to sell stocks, which could have accelerated the collapse of stock prices. If option issuance had been sensibly reflected in corporate accounts, the run up in corporate earnings in years before 1998 would not have been as great as it was.

However, the dramatic fall in the real federal funds rate after 2000 was a Federal Reserve initiative, which may have been in part a response to the crash in equity markets. It appeared that the FOMC feared the possibility of a deflationary spiral after the stock bubble burst. As noted above, the large fall in interest rates is likely to have contributed to the possible bubble in the housing market. Although the FOMC raised the nominal federal funds target interest rate in 25 basis increments at every meeting between July 2004 and July 2006, the real federal funds rate continued to be negative through the first half of 2005. Mushrooming federal government deficits, associated trade deficits, and a sustained period of near-zero real federal funds rates did not promise a smooth ride in the subsequent years! Low rates did not lead to increased investment in plant and equipment, because capacity utilization rates rose only slowly through 2005 in the U.S. and were not especially high then.[34] Utilization rates predictably rose more strongly in 2006, after the real federal funds rate turned positive, but seemed to reach a plateau in 2007, with only modest domestic net investment in plant and equipment.

8.4 What Guidelines for the Federal Reserve Emerge from This History?

The first and most important guideline is that the Federal Reserve must avoid adopting inflexible rules when implementing monetary policy. This includes mechanical rules like a constant growth rate of some monetary aggregate or an inflexible real or nominal interest rate, but it also includes inflexible targeting of nominal GDP, the international value of the dollar, or an inflation rate. Innovations and institutional change require flexibility. Unlike many of his critics, Chairman Greenspan accepted this guideline:

> Rules by their nature are simple, and when significant and shifting uncertainties exist in the economic environment, they cannot substitute for risk-management paradigms, which are far better suited to policymaking. Were we to introduce

[34]The Federal Reserve's total index of capacity utilization was at a ten-year low in 2003; at yearend 2005 it was four points below levels achieved in the mid 1990s. See http://www.federalreserve.gov/releases/g17/ipdisk/utl_sa.txt.

> an interest rate rule, how would we judge the meaning of a rule that posits a rate far above or below the current rate? . . . In summary then, monetary policy based on risk management appears to be the most useful regime by which to conduct policy. The increasingly intricate economic and financial linkages in our global economy, in my judgment, compel such a conclusion.[35]

Discretion rather than rules in no way reduces the need to hold the FOMC fully accountable for its decisions. Accountability requires that full disclosure of the reasoning and information underlying it be made public in a timely fashion. Timely does not necessarily imply immediately, but surely within a few weeks. Immediate disclosure might create indefensible opportunities for profit by individuals with low trading costs and relatively rapid access to markets, and might compromise the technical implementation of policy. The timing and disclosure of policy decisions improved considerably during Greenspan's Chairmanship and has improved further under Chairman Bernanke.

Second, while the set of policy instruments available to the FOMC has been depleted in the recent decades, open-market operations, moral suasion, discount rate changes, and timely revisions of regulations are likely to be borderline sufficient to achieve maximal sustainable growth with low inflation. As noted above, there are good reasons to believe the potency of real interest rate changes has increased. Because of large international holdings of dollars, the Federal Reserve should attempt to coordinate policy with foreign central banks to vary real interest rates constructively. Failure to coordinate would not be catastrophic, but it could lead to larger required changes in real interest rates that might have destabilizing side effects. Moral suasion is needed to reinforce policy initiatives and to convey what the FOMC is trying to achieve.

New regulations are likely to be needed and existing regulations continuingly revised in order to preserve the integrity of markets that are being buffeted by innovations. Many innovations are designed to avoid binding bank capital constraints; often they take the form of designer derivatives, asset sales, and remote-financing vehicles, as is explained in Chapters 7 and 10. Because innovations often occur in capital markets, the regulations need to come from the U.S. Securities and Exchange Commission and the U.S. Commodity Futures Trading Board, as well as from the Federal Reserve Board. At present these agencies seem to be more concerned with preserving their turf than with coordinating regulatory policies. Additional information about the composition of assets behind asset-backed securities and tighter covenant specifications on loans and securities are needed to

[35]Greenspan (2003).

avoid instability, such as seemed to be resulting from sub-prime, mortgage-backed securities in 2007.[36]

One proposal I suggest for improving accountability and the functioning of security markets is to reestablish formally a mechanism that worked in the 16th Century. Commercial bills in Amsterdam were often traded among merchants and investors and used to settle accounts. Whenever a bill was traded, the purchaser added his name to the back of the bill and became potentially liable for a default. When the bill matured, the issuer was obligated to pay the holder the principal and interest. If the issuer could not, then the next signer became responsible for paying the holder. This mechanism, "holder in due course", served to make each purchaser carefully evaluate the financial condition of the individual offering to sell a bill.

A modern appearance of this mechanism occurred in May 1982 when the Chase Manhattan Corporation agreed to pay for losses associated with repurchase agreements that it had arranged for a small securities firm, Drysdale Government Securities, Inc. Chase Manhattan agreed to pay $270 million, when Drysdale defaulted on its obligations to creditors, because it was interpreted to have acted as a principal rather than as an agent for Drysdale.[37] Chase never accepted the legal interpretation that it was liable as a holder in due course, but it paid.

To make holder in due course legally effective, legislation is needed that clarifies when securitizers are acting as agents and when they are acting as principals. I propose that any firm issuing asset-backed securities be interpreted to be a principal. If adopted, such a firm would be responsible for defaults on asset-backed securities and would take care to be sure that individuals taking out mortgage loans and other debt were able to repay loans. Investors would not buy asset-backed securities from a firm if they were not convinced that it had adequate capital to make good on defaulting loans. Asset-backed securities could have a haircut, the excess of the value of collateralized loans over the face value of the securities, which a firm pledged to offset losses, but the haircut would not eliminate the firm's obligation to reimburse investors for default losses. If collateral value from the haircut remained after securities were retired, it would revert to the issuer.

This reform would essentially eliminate securities that established tranches of securities, which imply a hierarchy of claimants against default losses on a bundle of loans. Such tranches were a corruption of collateralized mortgage obligations that were created by the FHLMC in the early

[36]For other examples, see Tett (2007).

[37] See Salamon (1982).

1970s, which dealt in insured mortgage loans. There were no default risks for them! These early CMOs established tranches in terms of the timing of interest and amortization flows from a bundle of *insured* mortgage loans. There was uncertainty about the timing of flows because borrowers could prepay loans. Thus, the FHLMC rearranged claims on a bundle so that investors who wanted a quick repayment would receive the first flows and long-term investors like insurance companies and pension funds that wished to obtain income certainty would get the last flows.[38]

My proposal would establish a date after which the issuance of securities with hierarchical risk tranches would be illegal in the U.S. Regulatory change is difficult in the above noted *laissez faire* U.S. political environment, but transparency, disclosure, and rules are the essence of the proposed international Basel II standard.

Third, the Federal Reserve must, on occasion, be willing to intervene in asset markets to deflate bubbles. The high cost to tax payers and the economy of allowing the housing bubble of the 1970s and related losses in financial institutions, manufacturing, and agriculture to develop was unconscionable. The bubbles began in asset markets when real interest rates were negative. Puncturing the bubble led to severe losses in manufacturing and other sectors during the Volcker Chairmanship in the 1980s that were essentially unavoidable.

Similarly, allowing the stock market bubble in the 1990s and related instability to develop was indefensible. The bubble was evident to many economists, including Chairman Greenspan, with his references to irrational exuberance in 1996. It surely takes courage to deflate bubbles before they explode with devastating force, but action is necessary. Determining precisely when a bubble is present is obviously a judgment call, not hard science; that is why discretionary policy is desirable. Free market ideology and grandstanding for the gains from productivity are no defense for inaction. Chairman Greenspan has interpreted the rise in stock prices with Olympian clarity as follows:

> As might be expected, accumulating signs of greater economic stability over the decade of the 1990s fostered an increased willingness on the part of business managers and investors to take risks with both positive and negative consequences. Stock prices rose in response to the greater propensity for risk-taking and to improved prospects for earnings growth that reflected emerging evidence of an increased pace of innovation. The associated decline in the cost of equity capital spurred a pronounced rise in capital investment and productivity growth that broadened impressively in the latter years of the 1990s. Stock

[38]For the concept of income certainty, see Robinson (1951, p. 94). For a description of CMOs, see Van Horne (1990, pp. 243–246).

prices rose further, responding to the growing optimism about greater stability, strengthening investment, and faster productivity growth.[39]

As was suggested above, there are other less felicitous interpretations of what was going on and the costs to the Federal Reserve's non-response to a bubble are likely to be high in the coming decade. Pension funds and individual retirement accounts were savaged. Losses will be amplified if a bubble in the housing market bursts.

The Federal Reserve should intervene when potentially large disruptive bubbles appear. Bubbles adversely affect its attempts to achieve price stability and maximum sustainable economic growth. Further, bubbles are likely to have a cumulative adverse effect on the acceptability of the fairness of efficient market outcomes by citizens. Widespread perceived inequities by the public were one of the reasons for the extensive federal government interventions during the 1930s.

The relation between efficiency and decisions to intervene is complex. The possibility of interventions by the Federal Reserve changes the costs and rewards of decision makers in the private sector, which may impair the efficiency of markets.[40] Individuals can in effect "game" the central bank. On the other hand, failure to intervene may increase the risk exposures of private sector decision makers, which may discourage them from making socially productive investments. Each potential bubble must be viewed with these two consequences in focus, but a general aversion to intervening is not likely to be optimal.

Fourth, the Federal Reserve should respond and commendably often has responded aggressively when short-term events occur that threaten capital market stability. Examples include its response to the failure of the Penn-Central Transportation Company in 1970, a number of large bank failures, the Long-Term Capital Management fiasco in 1998, the century date change at the end of 1999, and a large number of lesser events that did not make the headlines. Crisis management is always a major responsibility of a central bank.[41]

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[39]Greenspan (2002).

[40]"Moral hazard" is a form of inefficiency that occurs when private sector decision makers alter their actions because contracts offered by insurance companies or government agencies make losses less onerous. Why should a firm make large costly investments in fire prevention or information processing, if it can count on being bailed out? Highly detailed prescriptive contracts can forestall such behavior, but their drafting and enforcement is costly and inevitably incomplete. For an interesting further discussion of moral hazard, see Summers (2007).

[41]For an even stronger statement in support of this interpretation, see Telser (2007).

Finally, and perhaps most challenging is the question of how monetary policy should be coordinated with other policies of the federal government and the independence of the Federal Reserve. As noted in Chapter 1, the Federal Reserve is a creation of the Congress and, thus, can never be fully independent. On the other hand, a quasi-independent system was created because there were serious problems resulting from a series of financial crises and the absence of an elastic currency, which the Department of the Treasury and its agencies seemed unable to solve.

The history since the 1935 Banking Act can cynically be interpreted as a continuing struggle by the Federal Reserve to maintain its independence while, at the same time, behaving in ways to achieve goals desired by Congress and successive administrations. The most serious conflicts between administrations and the Federal Reserve occurred between Chairman McCabe and the Truman administration during the period leading up to the Accord in 1951, between Chairman Martin and the Johnson administration during the Vietnam mobilization in the late 1960s, and between Chairman Volcker and the Reagan administration in the mid 1980s. In all three cases the chairmen, in my opinion, had the better arguments. Chairmen Burns and Greenspan seem to have been much more adaptable to administration positions, both Republican and Democratic, but the economy and especially financial markets have been turbulent during their terms. It is too early to draw a conclusion about Chairman Bernanke. As the preceding chapters convey, many other things were happening in the postwar period and there is no claim here that the Federal Reserve was always right.

The guideline I prescribe is that the Federal Reserve makes continuing independent assessments of the economy and undertakes policies that it believes will lead to the best outcomes. It should not attempt to coordinate monetary and fiscal policies with any administration.[42] For this guideline to be successful, monetary policies must be fully explained to the public and defended. Unpopular policies will bring the wrath of Congressional committees, heated hearings, and hostile comments from administrations. Either the Congress or an administration might initiate legislation that overrules the policies, but at least the issues will be properly debated in the open. In most cases administrations and the central bank are likely to come to similar policy recommendations, but they should be reached independ-

[42]I am aware that this recommendation contradicts the spirit and, perhaps, the letter of the law as it was stated in the Full Employment and Balanced Growth (Humphrey-Hawkins) Act of 1978. In my view post-1978 administrations have not been adequately forthcoming about their economic programs. An independent Federal Reserve perspective will force public disclosure and debate about both fiscal and monetary policies that will result in large dividends to all.

ently. That in my view is the meaning of an independent central bank in a democracy.

9 Introduction: The First Twenty-Five Years

In this and the following chapters I describe and interpret the post World War II evolution of commercial banking in the United States. The goal is to understand the changing risks and returns that were being provided to bank clients as banks moved from an extreme depression-era set of regulatory controls toward today's highly competitive and unstructured environment. While my interest is in commercial banks, the distinctions between banks and other providers of financial services have become increasingly blurred over time. Indeed, commercial banks and other depository intermediaries were almost indistinguishable after 1980, when the Depository Institutions Deregulation and Monetary Control Act was passed.[1] Other providers of financial services are discussed when their activities strongly impact commercial banks. My emphasis is on banking practices, portfolio composition, and the changing role of banks as financial intermediaries. In this second part I do not attempt to evaluate the macroeconomic success of monetary policy, but explore in some detail the substantial effects that monetary and fiscal policies have had on banks.

During this period the U.S. banking system has been experiencing profound structural changes that are occurring at an accelerating rate in the most recent decades. It is inaccurate to portray banks as if they were in or are approaching an equilibrium state in which they provide some time-invariant mixture of financial services; continuing institutional change has been a conspicuous feature of U.S. banking since the country was founded. In part, institutional changes are the result of regulatory and fiscal interventions, which often were precipitated by financial or war-related fiscal crises. In part, the acceleration has occurred because of technical progress in information processing. When banks record deposits, make credit evaluations, and transfer funds, they are only processing information.

[1] A financial intermediary is an industry of similar financial institutions. Examples of financial intermediaries are commercial banks, savings and loan associations, and life insurance companies. The usefulness of distinguishing among financial intermediaries was greatly weakened by the enactment of the Financial Services Modernization (Gramm-Leach-Bliley) Act in 1999, which allowed different institutions to be affiliated through a financial holding company.

Banks and potential entrants into financial services industries have been extraordinarily affected by the ongoing information processing revolution. In part, the acceleration also reflects intellectual breakthroughs in the theory of finance, which are steadily being incorporated in a plethora of new financial instruments and derivative securities. Finally, institutional change seems to have increasingly reflected political changes in the balance between (1) the desirability of free-ranging institutions and markets that reflect a *laissez faire* philosophy and (2) the need for government supervision and regulation. The changes in the direction of less regulation may have been due to fading memories of the trauma that resulted from the Great Depression and the consequent perceived need for government intervention. However, there was more than that involved, because some government interventions changed the nature of the services in ways that were difficult to reverse and may not always have been desirable.[2]

The discussion is organized chronologically. In this chapter, successive sections describe and interpret U.S. banking in two periods, 1945–1960 and 1961–1970, when banks recovered from depression-era trauma and were learning how to escape from the regulatory restrictions that were imposed then. The discussion in the next chapter analyzes events in 1971–1983, 1984–1994, and 1995–2007. The final chapter compares the banking system in the 1990s with its counterpart in the 1920s and assesses how the returns and risks of banks and their clients have changed over time.

As background, recall that the seventeen years of the depression and World War II were a period of extraordinary turmoil and struggle for commercial banks. The U.S. banking system had essentially collapsed when Franklin D. Roosevelt assumed the presidency in March 1933. One of his first actions was to declare a national banking holiday so that bank examiners could determine which banks were viable and which must be closed. More than 4,000 banks never reopened. The Federal Deposit Insurance Corporation was created in 1933; it insured the first $2,500 in an account in an insured bank against loss. A large majority of banks would become insured. The Banking Acts of 1933 and 1935 limited the interest rates that banks could pay on demand and time deposits, severed investment banking from commercial banking, restricted the establishment of new branches and banks, increased the minimum capital that was required to open a bank, and in other ways sought to shield banks from competition. The goals of these actions were to restore the credibility of banks, to increase bank profitability, and to rebuild their capital accounts. These inter-

[2]Examples are actuarially poorly designed government insurance programs, government sponsored enterprises, and financial assistance programs that target short-term crises but lack terminating "sunset" provisions.

ventions immediately succeeded in almost eliminating bank failures, but banks were unable to earn great profits in the depression-ridden U.S. economy. After 1933 and especially during the Second World War banking system deposits grew rapidly; deposits tripled between 1935 and 1945, but loans grew very slowly. In 1945 banks were profitable, but had nearly 60% of their portfolios invested in U.S. government securities. Until the post-war period they had little opportunity to take advantage of Congressional largesse from the Banking Acts of 1933 and 1935. Table 16 reports information about all U.S. banks at the end of June between 1929 and 1945.

Table 16. Summary Information on U.S. Commercial Banks: 1929–1945

as of 6/30	number of banks	total assets	loans	US Govt. securities	cash assets	demand deposits	time deposits	all deposits
1929	24,970	62.4	36.1	4.9	9.0	25.2	19.9	45.1
1931	21,654	59.0	29.3	6.0	10.0	22.6	19.1	41.7
1933	14,207	40.5	16.5	7.5	7.4	16.0	11.7	27.7
1935	15,488	48.9	15.0	12.8	11.8	21.7	13.3	35.0
1937	15,094	56.9	17.5	14.6	15.0	27.6	14.8	42.4
1939	14,667	61.4	16.4	15.7	19.9	29.7	15.2	44.9
1941	14,434	75.4	20.3	20.1	25.8	39.9	16.0	55.9
1943	14,197	104.3	17.7	52.5	26.0	59.7	17.6	77.3
1945	14,126	146.2	23.7	84.1	30.2	72.5	27.2	99.7

Source: United States Bureau of the Census, (1975, vol. II, pp. 1021–1022).
Note: Balance sheet variables are in billions of dollars. Deposits are those of households, state and local governments, and firms; they exclude interbank deposits and deposits of the U.S. government.

9.1 Realizing the Boons: 1945–1960

At the end of 1945 commercial banks in the United States were the dominant depository intermediary with $160 billion in assets. Mutual savings banks, savings and loan associations, and credit unions (collectively called "thrift institutions") respectively had assets of $17 billion, $9 billion, and less than $1 billion. In 1945 there were about 14,000 commercial banks, 540 savings banks, 6,100 savings and loan associations, and 20,000 credit unions. By the end of 1960 the numbers of institutions had not changed greatly, but commercial banks had lost considerable market share to their thrift institution rivals. At the end of 1960, commercial banks had about $258 billion, mutual savings banks $41 billion, savings and loan associations $71 billion, and credit unions $5 billion in total assets.[3]

[3]Sources: Board of Governors of the Federal Reserve System (1976a) and United States League of Savings Associations (1975).

During these fifteen years all four intermediaries were very profitable, and the net worth of each kept pace with or increased relative to its liabilities. Commercial banks were especially profitable; the book value of their net worth rose from $9 billion in 1945 to $21 billion at the end of 1960. Until around 1960 banks were apparently content to sacrifice market share in order to realize extraordinary profits.

During this period banks rationally made little effort to compete for consumer deposits by raising the interest rates they paid; other intermediaries paid much higher rates on deposits than banks.[4] Commercial banks would have considerably increased the cost of their own deposits, if they had competed with higher rates for the relatively small amounts of funds being acquired by their rivals. However, as the market shares of rivals rose, a point would be reached in every local market when the expected marginal gains from competing exceeded the marginal cost. This point was reached between 1957 and 1963 in markets for deposits in many U.S. communities. When commercial banks started to compete seriously, depositors were the principal beneficiaries. Profit rates at depository intermediaries fell.[5] The difference between interest rates paid on consumer savings and time deposits at commercial banks and at other depository institutions diminished until 1966, when Congress and the Federal Reserve intervened to halt what they perceived to be destructive competition by imposing ceilings on the interest rates institutions were allowed to pay.

Market interest rates had an upward trend during the decade ending in 1961. As interest rates rose, large corporations began to manage cash assets with greater care; deposit balances at banks were closely monitored and the commercial paper market, which had been essentially moribund since the onset of the depression, began to grow rapidly. During this time, commercial paper was a debt instrument issued by large corporations with good credit ratings, often to corporations with idle funds; it was a good

[4]See Hester (1981, p. 149).

[5]Specifically, net income at all insured commercial banks had risen from $1.5 billion in 1956 to $2.3 billion in 1960. Net income was $2.4 billion in 1961, $2.3 billion in 1962, $2.4 billion in 1963, $2.6 billion in 1964, and $2.9 billion in 1965. The stagnant level of profits in the early 1960s is especially remarkable because insured bank assets rose by nearly 50% during this period, from $256 billion in 1960 to $375 billion in 1965. (Source: Federal Deposit Insurance Corporation web site). Net income at all savings and loan associations had risen from $402 million in 1956 to $577 million in 1960. It continued to rise until it hit $888 million in 1962, a level it would not attain again until 1969. Total assets at savings and loan associations rose from $71 billion in 1960 to $130 billion in 1965. Again, the ratio of net income to total assets fell during the first half of the decade. United States League of Savings Associations (1974, pp. 97, 104).

substitute for short-term bank loans. Until 1961 commercial banks declined to pay competitive interest rates on corporate time deposits.

In 1958 the Eisenhower administration sensed that substantial changes were occurring in banking and financial markets. It and the Congress established the Commission on Money and Credit, which proposed timely reforms for these markets. The proposals were not adopted by the incoming administration of President Kennedy.[6]

9.2 A Decade of Regulatory Disintegration: 1961–1970

In 1961 the competitive struggle for consumer deposits among banks and thrift institutions was intensifying. Banks also were losing commercial lending business with the largest corporations. Nonfinancial corporations resented earning no interest on deposits kept in banks and increasingly recognized that by dealing commercial paper to one another they could largely eliminate the intermediation costs implicit in short-term borrowing from commercial banks. Banks would still have a role to play, however, because issuers of prime commercial paper often needed to have bank lines of credit to assure lenders that funds could be repaid when the paper matured.

In February 1961, the First National City Bank of New York together with a securities dealer, the Discount Corporation of New York, introduced "negotiable certificates of deposit", which paid an interest rate that closely approximated the prime commercial paper rate. These certificates were large denomination time deposits ($100,000 minimum) that had fixed maturities at issuing banks, but they were highly liquid because corporations could convert them into cash at little cost by selling them in a newly established secondary market.[7] This innovation was the first in a long series of developments that allowed banks to use interest rates to manage their liabilities. It broke a long-standing policy of large commercial banks not to pay market interest rates on deposits of corporations. The banks' earlier policy was rationalized by the argument that corporations should have better uses for their funds than investing in bank time deposits.

In the early years of the decade, Comptroller of the Currency James Saxon facilitated the chartering of new national banks and allowed na-

[6]The Kennedy administration examined the major proposals from the Commission on Money and Credit, but did not find them urgent and did not implement them. See Committee on Financial Institutions (1963).

[7]For a useful summary of the evolution of negotiable certificates of deposit, see Summers (1980).

tional banks to use subordinated debt to satisfy capital requirements that were being enforced by bank examiners. This policy eroded the 1930s philosophy of protecting a bank's capital by deterring competition. Further controversy developed between the U.S. Department of Justice's Antitrust Division and various bank regulators about the criteria to be used when evaluating bank mergers during the 1950s. The 1930s strictures that were designed to prevent ruinous competition in banking markets were restraining banks from expansion, a problem that would be addressed repeatedly in the coming decades beginning with the Bank Merger Act of 1960, which mandated that regulatory agencies consider *both* potential community benefits and competitive effects of a proposed merger.

Around 1949 foreign countries began to have balance of payments surpluses with the U.S. and their governments converted some of their accumulating dollar balances into gold. Gold conversions were not initially a threat to the U.S., which had acquired a large gold hoard between the mid 1930s and 1949. Gold conversions accelerated after the Korean War. With a growing drain of gold to foreign governments and foreign investors, in 1961 the incoming Kennedy administration and the Federal Reserve developed a policy of attempting to twist the yield curve to protect the international standing of the dollar and the U.S. gold stock, as was discussed in Chapter 3. In part, the policy was to force short-term interest rates higher in order to induce foreign investors to hold treasury bills, rather than withdraw gold from the Treasury. In the Bretton Woods agreements that established the International Monetary Fund, the United States was obligated to convert dollars into gold at a price of $35 per ounce when foreign investors requested gold. The other part of the policy was to drive long-term rates down by buying bonds in order to encourage investment in plant and equipment. There is controversy about whether the policy actually was effective, but there is no question that short rates rose relative to long rates between 1961 and 1964. Rising short-term rates could also have been a consequence of the intensifying struggle for deposits among intermediaries and/or the recovery from the U.S. recession that ended in early 1961.

The effect of short-term interest rates rising relative to long-term rates was to weaken the profitability of mutual savings banks and savings and loan associations, because they raised funds with short maturity deposits and almost exclusively invested in long maturity, fixed-interest-rate mortgage loans. The fact that most of these institutions were mutually chartered and not monitored by stockholders would result in seemingly perverse behavior, which appeared to reflect differences in incentives for management of stock and mutually chartered firms. Specifically, mutual savings banks increased the share of high yielding mortgages in their portfolios at a time

when mortgage interest rates were *falling* relative to interest rates on other assets.[8]

A much more severe crisis for mutual savings banks and savings and loan associations developed in 1966 when the Federal Reserve undertook restrictive monetary policies to deter inflation, which was developing from the mobilization for the Vietnam War. This policy began with an increase in the discount rate at the end of 1965 and continued with increases in interest rates over the first nine months of 1966, as can be seen in Table 17 in the next chapter. The thrift institutions were locked into a portfolio of low interest rate mortgage loans, when their funding costs were steadily rising. This together with the continuing struggle for market shares meant that both intermediaries were becoming unprofitable and, perhaps, were not viable without government intervention.[9]

In September 1966 Congress ordered the Federal Reserve to put an inflexible ceiling on the interest rates that banks could pay on time and savings deposits. The Federal Home Loan Bank Board (FHLBB) was similarly required to put a ceiling on the interest rates that savings and loan associations could pay.[10] Thus, interest rate competition between depository intermediaries was effectively banned. Interest rates on U.S. government securities were higher than these ceilings and, as a result, a process of "disintermediation" began in which depositors would withdraw funds from banks and thrift institutions and invest them in higher yielding government securities. Suspending competition among intermediaries was harmful to all depositors and many borrowers, although it temporarily protected government agencies that insured deposits. Individuals attempting to get mortgage loans from thrift institutions were often unable to obtain financing because thrifts continued to lose deposits to higher yielding government

[8]See Hester and Pierce (1975, Chaps. 1 and 7).

[9]Institutions with such a configuration, more fixed interest rate assets than fixed interest rate liabilities at some future date s when measured from date t, are said to have a negative "gap". When interest rates rise, institutions with negative gaps experience losses because they must borrow at the newly higher interest rates before they can lend at them over some time interval.

[10]The Federal Home Loan Bank System was established in 1932 to provide assistance to member savings and loan associations. It consisted of a controlling Federal Home Loan Bank Board and twelve satellite Federal Home Loan Banks that were designed to be analogous to the twelve Federal Reserve Banks. In 1934, a part of the National Housing Act established the Federal Savings and Loan Insurance Corporation (FSLIC) as an agency that was supervised by the Federal Home Loan Bank Board. Both the Board and the FSLIC were eliminated by the Financial Institutions Reform, Recovery, and Enforcement Act of 1989 (FIRREA).

securities. In response to intense lobbying from thrift institutions, the Treasury increased minimum denominations of government securities in 1970 to make them less convenient as substitutes for thrift institution deposits. Specifically, the minimum denomination of Treasury bills was increased from $1,000 to $10,000 and the minimum denomination for longer maturity securities was increased from $100 to $1,000.

The interest rate ceilings applied to all bank time deposits, including large denomination negotiable certificates of deposits. This presented a new challenge to commercial banks that were trying to serve their corporate clients. They could not attract funds with high interest rates in order to accommodate loan requests. Banks responded to this challenge and protected their large corporate customers in very creative ways. First, around 1963, they took advantage of a legal loophole in the Bank Holding Company Act of 1956.[11] In that act the Federal Reserve was empowered to regulate any organization that controlled 25% of the stock of *two* or more commercial banks. The Congress had believed that small communities would not have adequate banking services if a small local bank was required to stand alone; therefore, a local holding company was allowed to operate both a bank and some other businesses without being subject to the Bank Holding Company Act. Activities of multi-bank holding companies were severely circumscribed by the Federal Reserve, so that they could not gain competitive advantages over individual banks.

Large banks undertook "congeneric" transformations through which they reorganized themselves into one-bank holding companies. This was achieved at a meeting of stockholders in which a bank's outstanding common stock shares were called in and replaced by an equivalent number of shares in a new one-bank holding company. In principle, the new corporation could raise funds at competitive market rates by issuing commercial paper that was not subject to interest rate ceilings or reserve requirements. The Federal Reserve would respond with lags to this and similar creative initiatives and eventually in 1970 was able temporarily to close down the

[11]Data on one-bank holding companies are fragmentary and incomplete. An anonymously authored article, Board of Governors of the Federal Reserve System (1972), reported that as of December 31, 1970, with the exception of 34 holding companies that submitted late information, 83 one-bank holding companies had been formed before 1956, 53 in the interval January 1956–December 1959, 291 in the interval January 1960–December 1965, 201 in the interval January 1966–June 1968, and 690 in the interval June 1968–December 1970. Although supporting evidence is unavailable, it is likely that all companies formed before 1960 were very small. Between 1965 and 1968 deposits at unregistered (one) bank holding companies rose about 600%, from $15.8 billion to $108.2 billion. Source: United States House of Representatives (1969, p. 1).

whole class of games, by getting Congress to amend the Bank Holding Company Act to eliminate the blanket exemption for one-bank holding companies. The Federal Reserve continued to be the sole regulator of bank holding companies.

Second, banks began to expand the number of their overseas branches and subsidiaries. As late as 1965 U.S. banks only had 211 overseas branches, 177 of which were offices of the First National City Bank of New York. Overseas assets of U.S. banks at the end of 1965 were $12 billion. The number of overseas offices would quadruple, the number of banks with overseas offices would grow to more than 150, and overseas assets would soar to about $150 billion by 1975. Large banks saw that U.S. corporations would be able to obtain banking services in offshore centers where there were no interest rate ceilings or reserve requirements on deposits. They followed their customers abroad and were able to avoid restrictive U.S. monetary policies and regulations. Many overseas branches were "shell" branches; they sometimes consisted only of a mailbox in some Caribbean island country and memory in a computer in one of a U.S. bank's domestic offices. The shell branch operated under the laws of the "host" country.

Third, banks probed and took advantage of vagueness in Federal Reserve rules and definitions, especially those involving federal funds, commercial paper, bankers' acceptances, and repurchase agreements.[12] The Federal Reserve responded to these initiatives by tightening the rules, but again with a lag. Other activities to avoid regulations were collaborative games with large clients that continued into the 1970s; examples were weekend eurodollar transactions and manipulation of Federal Reserve float.[13]

With binding interest rate ceilings on deposits, competition between financial institutions for consumer deposits was similarly creative. Prizes were offered whenever a new account was opened or if a substantial deposit was made in an existing time deposit account. Regulators did not regard such supplements as interest. Prizes offered by savings banks and

[12]A repurchase agreement is a transaction in which a bank sells some of its securities to a firm or a state government and commits to buy them back in the near future. In many cases the repurchase occurred the next business day. Funds acquired through repurchase agreements were not subject to reserve requirements. For a discussion of the evolution of regulation of repurchase agreements, see Smith (1978).

[13]See Coats (1981) for a discussion of the weekend game and "Making millions by stretching the float," Business Week, (November 23, 1974, pp. 88, 90) for a description of float games.

savings and loan associations were not very effective in raising new funds for financing residential mortgage loans. Depositors and loan applicants were still suffering from the continuing ceilings on interest rates that banks and thrifts could pay.

As political pressure from the housing industry increased, the departing Johnson administration searched for new mechanisms to finance housing. Existing government mortgage programs could not be conveniently expanded, because they were in the federal budget that already had a sizable deficit from the Vietnam War effort. The administration creatively adopted a practice used in the private sector, namely, establishing an unconsolidated subsidiary. In 1968 the government spun off the Federal National Mortgage Association (FNMA), so that its deficit would no longer be part of the federal deficit.[14] This "privatization" was more form than substance, because all financing actions by the reorganized FNMA required approval by the U.S. Secretaries of the Treasury and Housing and Urban Development. Because some FNMA lending included subsidies for low-income borrowers, a second federally owned agency, the Government National Mortgage Association (GNMA), was created in 1968 to finance subsidized mortgage programs. Private investors would not buy shares of a firm that was intended to incur losses by providing subsidies. In 1970 the government created a third housing finance organization, the Federal Home Loan Mortgage Corporation (FHLMC), in response to lobbying from savings and loan associations, which feared that they would be unsuccessful competitors with FNMA. These government sponsored enterprises (GSEs) would become important players and very controversial in the coming years, as will be seen in the next chapters. They were pioneers in developing and marketing "pass-through" securitized assets and collateralized mortgage obligations.

A further complication in 1968 resulted from the continuing demands from foreign investors, who sought to exchange dollars for gold. The United States was legally required to maintain a 25% gold backing for its currency and bank reserves. Continuing withdrawals threatened the ability of the U.S. to satisfy this requirement. A law was passed that eliminated the requirement and suspended sales of gold to anyone but foreign governments. This law, the continuing withdrawals, and a 1971 decision by the Nixon administration to suspend sales of gold to foreign governments would serve to complete the destruction of the postwar quasi-fixed exchange rate system that was established at the 1944 Bretton Woods Conference.

[14]The Federal National Mortgage Administration had been established in 1938 to provide mortgage financing to low- and middle-income households.

Insured commercial bank net operating income and net income after taxes, expressed as a percentage of yearend total assets, peaked in 1960 at 1.38% and 0.88%, respectively. The aggregate ratio of the book value of insured bank net worth to total assets would peak in 1963 at 8.08% and then decline irregularly for the next quarter century, as the competitive struggle to get around regulations continued and expanded.[15]

In 1969 the incoming Nixon administration recognized that financial markets were becoming severely distorted by the uneven erosion of the regulations that were adopted in the 1930s. The administration created the Commission on Financial Structure and Regulation and asked it for a set of proposals that could be used to create a "level playing field." The Commission was mostly composed of executives from the financial sector. Its final report repeated many of the proposals of the earlier Commission on Money and Credit, but was distinctive in urging removal of deposit interest rate ceilings.[16] Congress would enact none of the proposals for another decade.

However, events were beginning to overtake policy proposals. In June 1970 the Penn-Central Transportation Corporation with seven billion dollars in assets filed for bankruptcy, defaulting on $200 million of commercial paper. This failure threatened the stability of the $40 billion commercial paper market. To prevent a collapse, the Federal Reserve under its new Chairman, Arthur F. Burns, allowed the money stock to expand rapidly and removed interest rate ceilings from large denomination ($100,000 or more) time deposits, including negotiable certificates of deposit. These actions would spur a new round of financial market innovations.

[15]Source: Federal Deposit Insurance Corporation web site.

[16]For details on the Commission's members and proposals, see Commission on Financial Structure and Regulation (1971).

10 Resolution: 1971–2007

10.1 Innovations, Turbulence, and Restructuring: 1971–1983

At the outset of this period there was a new serious threat to the exchange rate system that had been established at the Bretton Woods Conference of 1944. Large corporations recognized that the Bretton Woods quasi-fixed exchange rate system was no longer viable; they shifted very large amounts of funds into hard European currencies and the Japanese yen in the correct anticipation that the value of the U.S. dollar would fall relative to them when the system collapsed.[1] In a desperate attempt to stem the dollar outflow, the Federal Reserve dramatically forced interest rates up in the spring of 1971. Yields on government securities and large denomination certificates of deposit were threatening to rise above ceilings that banks and thrifts could pay on deposits. This situation together with the first recession since 1961 induced President Nixon to make a draconian speech on August 15, 1971, that suspended convertibility of dollars into gold by foreign governments. In the speech he also imposed a 90-day freeze on prices and wages, imposed tariffs on imported vehicles, lowered excise taxes on vehicles, and expanded the investment tax credit.

In the new exchange rate environment, it seemed plausible that interest rates would be more volatile.[2] Arthur Burns attempted to defuse this suspicion by simultaneously wearing two more hats; in addition to being chairman of the Federal Reserve Board he was an advisor to the Cost of Living Council that was promised in the Nixon speech and chairman of its Committee on Interest and Dividends, which was intended to moderate fluctuations in interest rates and dividends in a loosely structured incomes policy. These two chairmanships proved to be incompatible. By 1973 market interest rates were considerably higher than the rates that banks could pay on

[1]For a sense of the crisis, see Mullaney (1971).

[2]There were attempts to retain a fixed exchange rate system when the dollar was revalued so that the implied price of gold rose to $38 per ounce in December 1971 and $42.22 in February 1973. Both prices were far below the free market gold price and, therefore, these efforts came to naught.

small time and savings deposits. Table 17 shows the extraordinary volatility of interest rates, which began with the Federal Reserve's decision to raise the discount rate in December 1965. The table reports end-of-quarter monthly-average interest rates on 3-month treasury bills, 5-year government securities, and 20-year government securities, and quarterly first differences in each for 39 quarters.

As can be seen the three interest rates roughly doubled between 1965 and 1974. The amplitudes of their quarterly changes increased markedly over this period, especially in the longer maturities, as the Federal Reserve sought variously to fight inflation, respond to different political pressures, protect the commercial paper market, and defend the dollar. As argued in the first part of this volume, it had too few instruments for the number of goals it was pursuing. The Nixon economic speech of August 15, 1971, took some of the burden off the Federal Reserve's shoulders and interest volatility decreased for a few quarters. However, the central bank became active again in 1973 as it sought to combat inflation that resulted from rising import prices, which were partly a consequence of the collapse of the Bretton Woods system. As explained in the first part of this volume, the battle against inflation was at best marginally successful.

In 1972 some investment bankers anticipated the possibility that market rates might rise above the rates banks were allowed to pay and created a new financial institution, the money market mutual fund (MMMF).[3] They reasoned that a MMMF would be able to attract many small investors by offering accounts that paid interest rates that were slightly less than the rates paid on large denomination certificates of deposit, commercial paper, and government securities. The inspiration for this innovation may have been the ill-considered 1970 decision by the Treasury to increase the minimum denomination of t-bills.[4] In part the Treasury was attempting to discourage small savers from withdrawing funds from low yielding savings and loan accounts so that they could earn the higher rates being paid on bills. MMMFs were exempt from interest rate ceilings and reserve requirements. Investors could write checks with a minimum denomination of, say, $500 against their balances. The MMMFs had no deposit insurance and were rather slow in gaining broad public acceptance. The funds' game

[3]For a discussion of the early history of money market mutual funds, see Dunham (1980).

[4]The minimum size of a t-bill order was raised from $1,000 to $10,000 at the beginning of March 1970. The Treasury claimed it was both an effort to reduce costs of issuing small denomination securities and to protect savings institutions and the flow of mortgage loans. For a discussion see Dale (1970).

Table 17. End-of-Quarter Monthly Averages of and First Differences in US Government Security Interest Rates: 1965–1975

	Annual percentage yields			Quarterly first differences		
year and quarter	3-month treasury bill market rate	5-year constant maturity	20-year constant maturity	3-month treasury bills	5-year constant maturity	20-year constant maturity
1965:4	4.38	4.72	4.50	0.46	0.47	0.20
1966:1	4.59	4.92	4.72	0.21	0.20	0.22
1966:2	4.50	4.97	4.73	- 0.09	0.05	0.01
1966:3	5.37	5.50	4.94	0.87	0.53	0.21
1966:4	4.96	5.00	4.76	- 0.41	- 0.50	- 0.18
1967:1	4.26	4.54	4.56	- 0.70	- 0.46	- 0.20
1967:2	3.54	5.01	4.99	- 0.72	0.47	0.43
1967:3	4.42	5.40	5.16	0.88	0.39	0.17
1967:4	4.97	5.75	5.59	0.55	0.35	0.43
1968:1	5.17	5.76	5.59	0.20	0.01	0.00
1968:2	5.52	5.85	5.40	0.35	0.09	- 0.19
1968:3	5.19	5.48	5.28	- 0.33	- 0.37	- 0.12
1968:4	5.96	6.12	5.88	0.77	0.64	0.60
1969:1	6.02	6.41	6.22	0.06	0.29	0.34
1969:2	6.44	6.75	6.28	0.42	0.34	0.06
1969:3	7.09	7.57	6.55	0.65	0.82	0.27
1969:4	7.82	7.96	6.91	0.73	0.39	0.36
1970:1	6.63	7.21	6.72	- 0.19	- 0.75	- 0.19
1970:2	6.68	7.85	7.34	0.05	0.64	0.62
1970:3	6.12	7.29	6.88	- 0.56	- 0.56	- 0.46
1970:4	4.87	5.95	6.28	- 1.25	- 0.34	- 0.60
1971:1	3.38	5.00	5.94	-1.49	- 0.95	- 0.34
1971:2	4.75	6.53	6.38	1.37	1.53	0.44
1971:3	4.69	6.14	6.05	- 0.06	- 0.39	- 0.33
1971:4	4.01	5.69	6.00	- 0.68	- 0.45	- 0.05
1972:1	3.73	5.87	6.06	- 0.28	0.18	0.06
1972:2	3.91	5.91	6.01	0.18	0.04	- 0.05
1972:3	4.66	6.25	6.05	0.75	0.34	0.04
1972:4	5.07	6.16	5.96	0.31	- 0.09	- 0.09
1973:1	6.09	6.80	6.91	1.02	0.64	0.95
1973:2	7.19	6.69	7.06	1.10	- 0.11	0.15
1973:3	8.29	7.05	7.25	1.10	0.36	0.19
1973:4	7.45	6.80	7.29	- 0.75	- 0.25	0.04
1974:1	7.96	7.31	7.73	0.51	0.51	0.44
1974:2	7.90	8.60	8.10	- 0.06	1.29	0.37
1974:3	8.06	8.37	8.59	0.16	- 0.23	0.49
1974:4	7.15	7.31	7.91	- 0.91	- 1.06	- 0.68
1975:1	5.49	7.30	7.99	- 1.66	- 0.01	0.08
1975:2	5.34	7.51	8.04	- 0.15	0.21	0.05

Source: Federal Reserve Bank of St. Louis, FRED data file.

was to get around the interest rate ceilings on depository institution accounts by offering accounts that in effect increased the divisibility of large denomination, short-maturity securities. By 1974 they were paying several

percentage points more in interest than banks and thrifts could, but had attracted only about four billion dollars. The MMMFs would wreak havoc with banks and thrift institutions that accepted time and savings deposits by the end of the decade.

A second major innovation occurred in 1972 when a small Massachusetts mutual savings bank, the Consumer Savings Bank of Worcester, contrived to offer checking accounts. According to the law of that time, only commercial banks could offer demand deposit accounts. The innovation was to offer an interest bearing account that would permit third-party transfers. An account holder could request a bank to transfer funds to a third party by writing an order, which was indistinguishable in all but name from the check that individuals wrote against demand deposit accounts. This negotiable order of withdrawal (NOW) account had an important advantage over demand deposit accounts, because individuals could receive interest on deposit balances. Commercial banks are not allowed to pay interest on demand deposits. Balances in NOW accounts were typically insured. Authorization to offer NOW accounts gradually spread to other states and became universal in 1981. NOW accounts strengthened the hand of thrift institutions when competing with commercial banks, which responded by offering them as well. Consumers gained access to interest income from this innovation, but most interest rates on time and savings accounts were subject to the aforementioned ceilings, which often prevented depositors from receiving a rate of return that matched those offered by MMMFs.

In 1973 a third important innovation occurred when the Chicago Board Options Exchange (CBOE) was established. Although not generally appreciated at the time, it was the progenitor of financial market "derivatives" that would emerge in many varieties in the subsequent decades. A derivative is a contract with a value that is defined by the probabilistic value of another asset or event. The CBOE's establishment coincided with the publication of a path-breaking article by Fischer Black and Myron Scholes (1973) that showed how simple options could be priced. This and a related literature too large to be summarized here provided the intellectual foundations for designing new financial instruments and contracts that largely define modern financial markets.[5] The designing revolution continued at least through the end of 2006, when the notional value of outstanding derivative contracts was well in excess of $400 trillion.

In 1975 a fourth major innovation occurred when the Chicago Board of Trade created a financial instrument futures market for collateralized depository receipts of GNMA securities. This market allowed individuals

[5]See Zhang (1997) and references therein.

and institutions like mortgage bankers to hedge against the increasing volatility of interest rates that is apparent in Table 17. Its existence meant that agile dealers in a rapidly expanding market for mortgage-backed securities, bonds that are secured by a portfolio of mortgage loans, could operate with less risk exposure. The market strengthened potential competitors of thrift institutions as providers of mortgage loans. This initial specialization of futures contracts in collateralized depository receipts was soon dwarfed by futures contracts in U.S. government securities and eurodollars. Contracts in depository receipts eventually disappeared because of a lack of trading volume. Other financial futures contracts and options contracts were more liquid and convenient to use to achieve cross hedges, which are risk-reducing positions in asset markets.[6]

So long as interest rates on deposits were kept down by effective ceilings, the rising trend in interest rates was not damaging to the net worth of savings and loan associations and other mortgage lenders, provided that they were able to retain deposits. They were earning more on their assets and paying no more on their liabilities. To be sure, it would become increasingly difficult to attract deposits in the face of higher interest rates paid on government securities and by MMMFs. As their ability to retain deposits diminished, banks and thrift institutions sought and obtained permission to pay higher rates on a variety of new types of deposits; an especially important innovation was the high yielding money market certificate. However, it was very dangerous for savings institutions to attempt to match interest rates paid by MMMFs in an environment of rising interest rates, because their portfolios typically had large negative gaps. When interest rates rise, firms with a negative gap are required to increase the interest rates they pay on liabilities before they are able to increase interest rates they earn on assets. Money market mutual funds by construction are valued at the market values of their assets and thus have no gap.

Financial instrument futures and options markets could have reduced the vulnerability of savings and loan associations to rising interest rates, but the severity of their condition was not recognized and managers were not trained, encouraged, or inclined to hedge.

Pressures were rising in financial markets for a variety of reasons. First, the real interest rate on federal funds, defined as the nominal interest rate on federal funds minus the contemporaneous rate of change in the GNP

[6]An early and illuminating discussion of the relation between futures and option prices appears in Cox, Ingersoll, and Ross (1981). A cross hedge exists when a position in one asset is partly or completely offset with a position in another asset. Generally speaking, the interest rates on the two assets must be correlated for such a matching to succeed in reducing risk.

implicit price deflator, had been negative on average from 1971 through 1978 and in every year except 1973.[7] Because other real interest rates were similarly signed and because nominal interest payments were deductible from taxable income, individuals and firms had a strong incentive to borrow. Prices of houses and other assets rose considerably faster than the consumer price index. Why real interest rates were so low is a question that has never been satisfactorily answered, but with the benefit of hindsight it appears to have been a major failure of monetary policy. The Federal Reserve was effectively sponsoring inflation! Monetary authorities were increasingly emphasizing monetary aggregates as indicators of monetary policy during this period. This stance was inconsistent with their claim to be limiting fluctuations in interest rates, which was reported in Chapter 5. Eliminating this inconsistency was a major contribution of the FOMC in 1979, shortly after Paul A. Volcker became Chairman of the Federal Reserve Board.

Second, technical improvements in funds transfers both domestically through the Federal Reserve's computers and internationally through the New York Clearing House Interbank Payments System (CHIPS) allowed a considerable increase in repurchase agreement (RP) and eurodollar transactions. This increase manifested itself in a rapidly rising demand deposit turnover rate, the annualized ratio of demand deposit debits to average demand deposit balances. This occurred because both RP and eurodollar transactions raised the volume of debits to demand deposit accounts without raising measured demand deposits. Demand deposits were only measured at the end of a business day, after funds had disappeared into their RP or eurodollar nests. Thus, a given amount of measured demand deposits was financing a steadily growing volume of transactions.

Demand deposit turnover for all insured commercial banks was 63.3 times per year in 1970, 105.3 in 1975, 201.8 in 1980, and 500.3 in 1985. The large percentage jump between 1980 and 1985 was partly the result of a change in the rules for when transfers from overseas offices could be viewed as "collected" or "good" funds, which is discussed below. The turnover rate was 874.1 in 1995, the last full year that these data were reported in the Federal Reserve Bulletin. Such innovations impaired monetary policy that was based on controlling monetary aggregates, because the volume of transactions from a given monetary base was underestimated and increasingly unpredictable.

[7]See Hester (1981, pp.172–173). With the 2003 revisions of the GDP accounts, the statement in the text should be modified to read that the real federal funds rate was negative on average during the years 1971 through 1977, where the rate was constructed using the GDP price deflator.

Third, the resignation of President Nixon and the need to appoint two Vice Presidents, Gerald Ford and then Nelson Rockefeller, created a difficult political environment in which to conduct monetary policy. Financial instability resulting from the failures of several large banks in 1974 and 1976, the first significant failures since the Great Depression, also complicated the implementation of monetary policy. This instability induced the House of Representatives Committee on Banking, Currency and Housing to initiate another large study of financial markets in 1975, Financial Institutions and the Nation's Economy (FINE). Like its two predecessors, no significant legislation emerged directly from this study, but momentum for major reforms was increasing. After the election of Jimmy Carter as president, there was also leadership instability at the Federal Reserve where power is concentrated in the office of the Chairman. Arthur M. Burns was not reappointed as Chairman in January 1978. He was succeeded by G. William Miller in March 1978, who in August 1979 was succeeded by Paul A. Volcker.

Fourth, there was rapidly expanding internationalization of banking. Banks in the U.S. had about $400 billion in assets booked in overseas branches in 1980. Foreign banks operating in the U.S. had about $175 billion in U.S. assets, of which only a small fraction was financed with deposits booked in the U.S. Both foreign banks and overseas U.S. bank branches were avoiding interest rate ceilings, reserve requirements, and other U.S. regulations. About 20% of U.S. banking assets was off shore; foreign banks were making approximately 40% of all commercial and industrial loans in the two largest states, California and New York.[8] In 1978 the International Banking Act was passed in an attempt to regulate foreign banks operating in the United States and to create an environment where they and domestic banks were operating under similar rules. However, nothing was done to control the activities of shell branches or overseas banks that were lending directly to firms in the U.S. Indeed, as suggested above, the Federal Reserve weakened its control of economic activity in the U.S. when in 1980 it ruled that transfers from shell branches to banks in the United States were "immediately available" rather than "next day" funds.[9] It apparently feared that without this change more financial activity

[8]For a valuable discussion of foreign bank credit to U.S. corporations, see McCauley and Seth (1992).

[9]As reported in Chapter 5, the Board announced that transfers could be treated as collected funds on the day they were transferred. Before then, transfers in a day were not "good funds" (interpreted as being collected) until the following day. The change greatly increased the convenience of borrowing funds from Caribbean shell and other overseas branches.

would relocate from the U.S. to foreign locations where surveillance would be difficult at best.

In 1978 the Federal Reserve began to push nominal and real interest rates higher. Assets of money market mutual funds began to rise rapidly as money market interest rates soared above deposit interest rate ceilings. On October 6, 1979, against the backdrop of a plunging U.S. dollar and a second round of OPEC price increases, Chairman Volcker announced a series of actions to battle renewed inflation. The most important of these was that the Federal Reserve would then focus on bank reserves (quantities) and not intervene to stabilize interest rates (prices). Nominal and real interest rates increased rapidly to new 20th Century highs. This increase would severely penalize individuals such as farmers who had borrowed heavily at floating interest rates from the Federal Farm Credit System. It also would threaten the viability of savings and loan associations that were attempting to compete with MMMFs. The latter had assets that rose at an accelerating rate, from less than $4 billion in 1977 to $232 billion in September 1982.

The political consequences of the cumulating pressures and the Volcker initiatives would be, first, the activation of the existing Emergency Credit Control Act of 1969 by President Carter on March 14, 1980 and, second, landmark reform legislation on March 31, 1980, the Depository Institutions Deregulation and Monetary Control Act of 1980 (DIDMCA). The Emergency Credit Control Act gave the Federal Reserve virtually unlimited powers to alter the nature of financial services available in the economy during an emergency period. It was only in force for a few months, but its restrictions on borrowing appeared to precipitate a sharp recession and a fall in interest rates that lasted for about two quarters. Access to consumer credit was severely limited, so potential borrowers joined depositors in being savaged by government restrictions in financial markets.

DIDMCA had nine titles (sections); it was the first of several legislative steps to replace the regulatory structure that had been introduced in the 1930s. It established that after an eight-year phase-in period there would be a set of uniform reserve requirements on demand and other checkable deposits (NOW accounts) and another set of requirements on time and savings deposits, irrespective of the type of institution holding the account. All depository intermediaries would have access to the discount window and could avail themselves of Federal Reserve services at cost. Further, over a six-year period all interest rate ceilings on time and savings deposits were to be phased out. Deposit insurance was increased from $40,000 to $100,000 per account. Lending powers of thrift institutions were expanded and all state usury ceilings on mortgage loans were preempted. Finally, depository institutions anywhere in the United States could offer NOW ac-

counts after January 1, 1981. These and other changes were intended to put all depository institutions on a level playing field.

As the legislation came into force, the FOMC again began to push nominal and real interest rates to new 20th Century highs. Assets of MMMFs continued to grow, because deposit interest rate ceilings were not being removed quickly. Thrift institutions were sustaining large operating losses; estimates of the market value of savings and loan association mortgage portfolios suggested that the industry had a net worth of negative $100 to $150 billion instead of the positive $30 billion shown on its books.[10]

Net operating income of commercial banks as a percentage of total assets was higher between 1978 and 1981 than in earlier years of the decade, but lower than in the 1950s and 1960s. Rates of return on bank assets soared, but costs of liabilities only increased modestly until September 1982. Large U.S. banks were recycling large deposit inflows from OPEC countries to developing countries in the form of sovereign loans. As is explained below, some of these profits were illusory, because future interest on many loans to developing countries would prove to be uncollectable. There were no official estimates of the market value of commercial bank mortgage loans, but a substantial deterioration in their values also occurred during these years.[11] This loss was not revealed because bank accountants, like accountants at thrift institutions, carried mortgage loans and securities at cost or par, rather than at market values.

The condition of savings and loan associations continued to deteriorate because of their large holdings of low fixed interest rate mortgage loans. By early 1982 it was becoming obvious that a wave of failures was in progress. Further legislative action and an easing of interest rates were needed to avoid an impending collapse of the industry. In the third quarter of 1982 both would occur. The Federal Reserve sharply increased the rate of growth of M1 and short-term interest rates fell about five percentage points. In September President Reagan signed the Garn-St Germain Depository Institutions Act of 1982, a second landmark reform bill.

The Garn-St Germain Act provided a number of emergency mechanisms for coping with the savings and loan industry crisis for a period of three years. These included involuntary mergers, a number of unconventional accounting procedures that concealed the severity of an association's condition, loans, transfers of cash, and “net worth certificates”. The last was conditional synthetic capital; it was a promise by the government to

[10]See White (1991, p. 76 and endnote 13).

[11]See Mondschean (1989, p. 114).

provide a specified amount of funds to creditors, if an association failed.[12] The act considerably expanded the lending and investing powers of savings and loan associations. Lower interest rates and these emergency mechanisms allowed the industry to postpone its day of reckoning, but did not solve the industry's problems.[13]

The Garn-St Germain Act also addressed the rapid growth of MMMFs by allowing banks and thrifts to issue two new liabilities, money market deposit accounts and super NOW accounts. Each account had a minimum balance of $2,500, but would pay close to money market interest rates. The super NOW account allowed individuals to write an unlimited number of checks, but was subject to a 12% reserve requirement. It paid a lower interest rate than money market deposit accounts, which allowed six checks to be written per month and initially had no reserve requirement on personal accounts, and only a 3% reserve requirement on nonpersonal accounts. After six months these accounts held more than $300 billion, which was more than was in MMMFs. MMMFs would lose about $70 billion in this six-month span, but then resume growing.

Another event occurred in 1981 that would have profound consequences. The incoming Reagan administration and Congress enacted a series of three income tax rate cuts, the first in 1981 and the third in 1983. The tax cuts together with restrictive monetary policy resulted in massive continuing government deficits, rising real interest rates, and a substantial appreciation in the dollar, which would peak in February 1985. The dollar would rise more than 40% relative to the currencies of Japan and western European countries.

By 1982 the dollar had already appreciated enough relative to the peso so that Mexico was not able to service its dollar-denominated debts to U.S. and other multinational banks. Other Latin American and African countries would soon encounter the same difficulty. Banks had been accepting large deposits from OPEC countries and lending them to developing countries, apparently in the belief that there could be no defaults on such sovereign debt. The U.S. economy experienced two severe recessions in the period from November 1979 through December 1982. Pastures must have

[12]The cumulative value of net worth certificates issued was $1,710 million at the end of 1986. Source: Strunk and Case (1988, pp. 5–6).

[13]After-tax net income at all insured savings institutions was $784 million in 1980, - $4,632 million in 1981, - $4,272 million in 1982, $1,968 million in 1983, $1,101 million in 1984, $3,839 million in 1985, and $1,115 million in 1986. The number of insured savings and loan associations fell from 4,002 at the end of 1980 to 2,648 at the end of 1987. Of this decrease, 400 were failures that held about $130 billion in assets. Source: Strunk and Case (1988).

looked greener elsewhere, but as Martin Mayer reported, there was also federal government encouragement to recycle OPEC dollars.[14] In part, such encouragement took the form of authorizing the establishment of International Banking Facilities (IBFs) in 1981, which permitted U.S. and foreign banks to make loans from subsidiaries located in the U.S.; the net income from IBFs was not taxed until it was "repatriated" to its organizing bank.

Finally, in response to political pressures, the FHLBB reduced the minimum required ratio of book net worth to total assets from 5% to 3% between 1980 and 1982. While all such requirements were specious because assets were not being marked to market values, this action signaled that the Home Loan Bank Board leaned toward regulatory forbearance. More ominously, the Board's examination and supervisory staff shrank between 1981 and 1984. This reduction in examiners was a consequence of budgetary cuts that were mandated by the Reagan administration and Congress in a poorly timed attempt to get the government "off the backs" of entrepreneurs. This is an early instance of implementing an evolving *laissez faire* philosophy that had been conspicuously gaining political momentum, beginning with the Goldwater presidential campaign of 1964.[15]

10.2 Further Waffling and Finally Absorbing the Losses: 1984–1994

In the last quarter of 1983, the Federal Reserve returned to a restrictive monetary policy. The real money supply, M1 in constant dollars, was essentially unchanged for four quarters and real and nominal interest rates rose. As interest rates rose, the condition of savings and loan associations again worsened. Now thrift institutions had to pay market interest rates on their liabilities, but the bulk of their assets were still in low yielding mortgage loans.[16]

[14]See Mayer (2001, p. 230)

[15]See White (1991, pp. 82–92) and Romer and Weingast (1992, pp. 167–202).

[16]Between 1978 and 1982 savings and loan associations were increasingly allowed to make mortgage loans with floating interest rates. For example, the interest rate on a loan might change every six months so that its rate would be, say, 3% above the rate on a 7-year U.S. Treasury note. By 1983 between 40% and 60% of new mortgage loans had floating rates. The rates still were not fully flexible, because contracts often specified a maximum rate or "cap" which could not be exceeded. An association's gap would be an increasing function of the fraction of its mortgages

The government responded to the continuing crisis with a new series of patchwork actions that again had the effect of postponing the inevitable day of reckoning. First, it authorized regulatory agencies to continue the set of emergency actions that had been specified in the Garn-St Germain Act beyond the original three-year time span.

Second, the FHLBB under its Chairman, Edwin Gray, attempted to protect the Federal Savings and Loan Insurance Corporation (FSLIC) from growing losses by banning "brokered deposits," an arrangement in which savings and loan associations acquired funds in the form of insured certificates of deposit through investment advisors and stock brokers from investors in amounts that did not exceed the maximum amount of $100,000 that the FSLIC would insure. Gray recognized that such deposits provided operators of associations with extraordinary access to riskless funds that would seriously impair the understaffed FSLIC's ability to regulate rapidly growing associations. His ban was successfully challenged in court.

Third, in 1985 the FHLBB found a way to bypass Reagan administration resistance to expanding the number of examiners, but much time would pass before the new examiners could intervene effectively. The number of examiners more than doubled between 1984 and 1988 and their budget more than tripled.[17]

Fourth, a government capital injection to the FSLIC became necessary because it was insolvent. After M. Danny Wall replaced Gray as Chairman of the FHLBB, Congress passed the Competitive Equality Banking Act of 1987 (CEBA) that President Reagan signed in August. It authorized the FSLIC to borrow $10.8 billion and established the Financing Corporation (FICO), a new government agency that was authorized to borrow an additional $15 billion for restructuring savings and loan associations. The Congress exacted a high price for this assistance when it insisted that the FSLIC exercise extreme regulatory forbearance in the Southwest (especially Texas and Oklahoma) where savings and loan associations had been severely impacted by falling oil prices.

CEBA also attempted to close a newly emerging effort by nonfinancial corporations to avoid bank holding company regulations. A commercial bank was defined to be an institution that both accepts demand deposits and makes commercial and industrial loans. A number of nonfinancial corporations had created "nonbank banks," which were institutions that either accepted demand deposits or made commercial and industrial loans, but not both. Such nonbanks were not subject to the bank holding company

that had floating rates. If enough were floating the average association's gap could be positive.

[17]See White (1991, pp. 130–131).

laws because there was no bank, but they could gain access to services provided by the Federal Reserve and the Federal Deposit Insurance Corporation (FDIC). CEBA defined a bank to be any organization that either both accepted demand deposits and made commercial and industrial loans or was insured by the FDIC.[18]

In addition to high costs of deposit liabilities, savings and loan associations encountered two other obstacles in their struggle for survival. First, federal housing credit programs offered by FNMA, GNMA, and FHLMC were capturing a steadily increasing share of mortgage markets. By 1988 nearly 40% of all mortgages on houses for 1–4 families benefited directly from these programs; as a result interest rates on mortgage loans fell relative to those on highly rated industrial bonds with comparable maturities.[19] Mortgage loans were more than fifty percent of savings and loan association portfolios and the rates of return on new loans were being driven down. Second, expanded lending powers provided by DIDMCA and the Garn-St Germain Act allowed savings and loan associations to acquire diverse other assets in markets where their expertise was very limited. Losses from incompetence, corruption, and dubious investments were high.[20]

The number of associations steadily dwindled, from 6,320 in 1960 to 3,825 in 1982. More ominously, if assets were being marked to market, the number of continuing associations with negative net worth was rising. By yearend 1989 more than one-third of the 2,878 surviving saving and loan associations with nearly forty percent of industry assets were unprofitable. Collectively their tangible net worth was negative $23.7 billion and their after-tax 1989 net income was negative $24.4 billion. The entire industry

[18]See Alvarez (2006).

[19]The percentage exceeded 50% in 1994 and was 53% at the end of 2003, but then fell sharply as competition from the private sector soared and the government-sponsored enterprises, FNMA and FHLMC, were found to have engaged in misleading accounting. Most of their mortgages were securitized in mortgage pools, which is not where the dubious accounting occurred. See Poole (2007) for a good discussion of problems associated with government-sponsored enterprises.

[20]It was sometimes argued that the debacle of the 1980s was a rational response by owners of savings and loan associations to their precarious condition in a regime where deposit insurance was universal. See Kane (1989) and references therein. The argument was that "zombie" thrifts had nothing to lose if risky investments failed, because they already typically had negative net worth, if assets were marked to market. If risky investments yielded high payoffs, an association might become viable; if they failed, insured depositors were protected against losses. A discussion of corrupt practices in the savings and loan industry is available in Pizzo, Fricker, and Muolo (1989).

had a miniscule tangible net worth of $10.1 billion to back up $946 billion in deposits and it had after-tax net income of negative $19.2 billion in 1989.[21]

The ratio of profits to assets at commercial banks also declined after 1982. Large realized and unrealized losses on third-world loans by money center banks were the major problem. In addition, growing competition in financial markets from nonfinancial corporations and overseas banks, together with relaxation of barriers to intrastate banking eroded long-standing monopoly rents of banks. Money market mutual funds continued to pay high interest rates, which had the effect of increasing the cost of deposits to banks. Savings and loan associations also continued to contest consumer markets by paying high interest rates on brokered time deposits.

Falling profits were unevenly distributed across commercial banks; bank failures reached levels in the United States not seen since the early years of the Great Depression. The number of insured commercial banks that ceased operations in a year rose from 8 in 1981 to a peak of 220 in 1988. The number of insured banks fell from 14,496 at the end of 1984 to 10,452 at the end of 1994. At the end of 2006, there were 7,402 commercial banks.[22] Disappearing banks were being bought by other banks and converted into branches, voluntarily closed, or closed by bank regulators. It should be noted that the number of surviving banks includes a number of newly chartered commercial banks and institutions that had converted from mutual savings bank or savings and loan association charters to commercial banking charters.

Quite apart from changes in the number of banks, Amel and Jacowski (1989) reported that between 1976 and 1987 there was a major change in the market structure of U.S. commercial banking. In 1976 there were 10,608 independent banks that controlled 30% of domestic banking assets. By the end of 1987 there were 4,375 independent banks that controlled 9% of domestic assets. In 1976 there were 301 multibank holding companies that controlled 36% of domestic banking assets; by the end of 1987 there were 985 that controlled 70% of domestic assets. The remaining category, one-bank holding companies, saw their share of domestic banking assets shrink from 34% to 21% between these two dates. The new or rapidly expanding multibank holding companies tended to be intrastate regional organizations with little third-world loan exposure. An interpretation is that banks were responding to increasing competition from nonbank institutions by merging to reduce intra-industry competition.

[21]See White (1991, p.18).

[22]Source: Federal Deposit Insurance Corporation web site, http://www2.fdic.gov/SDI/main4.asp

Between 1984 and 1994 commercial banks were greatly increasing the amount of mortgage loans in their portfolios. There are several explanations for this shift. First, banks were facing aggressive competitors in all loan markets, but the weakest competitors were the crippled and disappearing mutual savings banks and savings and loan associations. Commercial banks were not as heavily burdened with low fixed interest rate mortgage loans as mutual savings banks and savings and loan associations, so they could undercut these rivals. Second, regulators and the public were increasingly accepting adjustable-rate mortgages (ARMs). This meant that banks could now make mortgage loans and not have the large negative gaps that the savings institutions had experienced. Third, the growing secondary markets in mortgage-backed securities that had been developed by GNMA and FHLMC had made mortgage loans very liquid. Banks could reasonably expect to be able to securitize and sell them if conditions changed.

Further, the Tax Reform Act of 1986 profoundly changed the extent to which households could deduct loan interest from taxable income. Before the change essentially all interest payments could be deducted from taxable income. After the act's five-year phase-in period interest payments could only be deducted if the proceeds were used to finance medical or educational expenses or a residential property, i.e., was a mortgage loan secured by residential property. Banks and other lenders rapidly expanded mortgage loans to exploit this tax law revision. A major innovation to achieve this goal was the home equity line of credit. A home equity line of credit allows house owners to borrow funds flexibly against the equity in their houses. The funds are fungible in that they can be used for almost any purpose and the interest continues to be deductible. Table 18 shows mortgage loans and mortgage-backed securities as a percentage of total commercial banking net consolidated assets. The table understates bank financing of real estate because most, but not all, government agency paper in bank portfolios is used to finance government-sponsored mortgage programs. Home equity lines of credit are shown only if a line has been activated and then only the amount borrowed against the line is included in real estate loans.

The data are unavoidably incomplete, because the Federal Reserve did not publish information for collateralized obligations and private securities in early years. The missing series are undoubtedly small and the overall positive trend between 1985 and 1991 is clear; there was no meaningful trend between 1991 and 1999, but the trend again turned positive beginning in 2000.

Table 18. Percentages of Real Estate Loans and Securitized Mortgage Debt in Commercial Bank Portfolios

year	real estate loans	mortgage pass-through securities	collateralized mortgage obligations	mortgage-backed securities	total
1985	15.88	0.96	n.a.	n.a.	n.a.
1986	16.90	1.13	n.a.	n.a.	n.a.
1987	19.00	2.10	n.a.	n.a.	n.a.
1988	20.86	2.59	n.a.	n.a.	n.a.
1989	22.50	3.27	n.a.	n.a.	n.a.
1990	23.86	4.08	1.28	n.a.	n.a.
1991	24.86	4.51	2.07	0.94	32.38
1992	24.87	4.52	3.12	0.82	33.33
1993	24.80	4.74	3.72	0.73	33.99
1994	24.43	4.67	3.24	0.64	32.98
1995	25.01	4.47	2.67	0.62	32.77
1996	25.06	4.80	2.11	0.61	32.58
1997	25.02	4.94	1.94	0.50	32.40
1998	24.87	5.17	2.13	0.67	32.84
1999	25.44	5.24	2.15	0.88	33.71
2000	27.04	4.75	1.92	0.95	34.66
2001	27.10	5.13	1.96	1.08	35.28
2002	28.39	6.09	2.35	1.25	38.08
2003	29.91	6.75	2.34	1.30	40.30
2004	30.78	7.13	2.01	1.41	41.33
2005	32.40	6.78	1.80	1.76	42.74
2006	33.19	6.43	1.58	1.87	43.07

Source: Annual articles entitled "Profits and Balance Sheet Developments at U.S. Commercial Banks" that appeared in June, July, or Spring issues of the Federal Reserve Bulletin. The percentages are of average consolidated net assets

The bad experience of the savings and loan industry was the result of the associations' large negative gaps. Banks and other investors learned from that experience and may have controlled their gaps, positive or negative, with adjustable rate mortgages and instruments available on financial futures and options exchanges. Additional instruments for controlling exposure to gaps included swaps and stripped securities.[23] These instruments and their elaborate variations are priced using mathematical models from the theory of finance, which often are based on the option-pricing model of Black and Scholes (1973).

On August 9, 1989, the government finally took actions to clean up the savings and loan industry when President George H. W. Bush signed the Financial Institutions, Reform, Recovery, and Enforcement Act of 1989 (FIRREA). This very complex bill eliminated the Federal Home Loan Bank Board and the Federal Savings and Loan Insurance Corporation and

[23]For a discussion of stripped securities, see Becketti (1988). A good summary discussion of swaps and other derivatives appears in Curcuru (2007).

replaced them respectively with the Office of Thrift Supervision (OTS) and the Savings Association Insurance Fund (SAIF). The Federal Deposit Insurance Corporation (FDIC) was assigned the responsibility for managing SAIF and another fund, the Bank Insurance Fund (BIF). The two funds established different insurance premiums, which were based on loss experiences and were less onerous for commercial banks than for savings and loan associations. Supervision of the twelve Federal Home Loan Banks was transferred to a new organization, the Federal Home Finance Board (FHFB). Responsibility for liquidating insolvent savings and loan associations was assigned to another new agency, the Resolution Trust Corporation (RTC), which was also managed by the FDIC. The cost of this clean up would be very large, although the exact amount is not known; its present value in 1989 was estimated to be about $150 billion. Responsibility for managing this bailout was assigned to another new agency, the Resolution Financing Corporation (RFC), which was authorized to borrow $50 billion. Other RFC funds came from securities that were claims on future net income of and reserves of Federal Home Loan Banks.

In 1991 a growing concern about the solvency of the FDIC arose from the continuing wave of commercial bank failures and led to the Federal Deposit Insurance Corporation Improvement Act of 1991 (FDICIA). This act authorized the FDIC to borrow to meet its obligations. It also incorporated reforms that gave the FDIC the goal of attempting to minimize its potential losses when fulfilling its responsibilities of insuring depositors. In particular, it put pressure on the Corporation to avoid resorting to a doctrine of "too big to fail" which had been invoked when large banks got into difficulty. An example is when the Continental Illinois National Bank and Trust Company failed in 1984. In terms of total assets it was the largest bank failure in U.S. history and was estimated in 1997 to have cost the FDIC $1.1 billion. While large, it was greatly exceeded by costs the FDIC experienced when resolving failures in 1988 and 1989 of the large Texas banks, First Republicbank Corp. ($3.77 billion) and Mcorp-Dallas ($2.85 billion).[24] The reason for these large payments was that the FDIC reimbursed all depositors' losses rather than the $100,000 per account that it was legally required to insure, because the Corporation apparently feared that systemic failures would occur if uninsured clients at such large entities were not fully protected. The Corporation had shown no similar concern for uninsured depositors at small banks, as in the case of the 1990 failure of the minority-owned Freedom National Bank in Harlem.

FDICIA modified the structure of premiums that the FDIC could charge banks in order to better reflect its risk exposure. This and the nearly con-

[24]See Federal Deposit Insurance Corporation (1998, p. 245).

temporaneous Basel international agreements of 1988 for determining a bank's minimum required capital would strongly affect banking practices in the years to come, as will be seen in the next section.

Another major legislative reform, the Riegle-Neal Interstate Banking and Branching Efficiency Act of 1994, attempted to simplify the very complex regulatory structure of U.S. banks. A few multi-state bank holding companies had come into existence in the 1920s and continued to exist, because they were "grandfathered" by the 1927 McFadden Act that banned interstate banking. Otherwise, banks and savings and loan associations could only have branches in a single state. The Garn-St Germain Act of 1982 authorized regulatory agencies to approve emergency mergers between failing savings and loan associations and other financial institutions that sometimes were in different states, if suitable merger partners were not available in a state. Further, mergers between a commercial bank and a savings and loan association within a state were approved if no suitable savings and loan partner was available. Finally, states had widely varying regulations about branching within their borders. Some states would not approve branching within their borders or would approve branching only in limited areas, while others allowed statewide branching. In the 1980s restrictions on branching within states were slowly being removed and some states were negotiating bilateral interstate branching arrangements. Nevertheless, banking markets continued to be subject to many artificial barriers at the end of that decade. The Riegle-Neal Act re-established the chartering of multi-state bank holding companies. Further, unless states opted out within a certain time interval the act authorized full interstate branching. Only Texas and Montana opted out.

Table 19, extracted from a table in Rhoades (2000), summarizes changes in U.S. commercial banking market structure from 1980 through 1998. During the first six years of this period, the number of commercial banks was essentially constant. However, the number of banking organizations, often holding companies, fell by ten percent because of mergers. After 1985 both the number of banks and banking organizations fell dramatically, but the ratio of the two measures was roughly unchanging. The number of bank mergers peaked in 1987 at 649, but was more than 340 in every year after 1980. The number of new bank charters peaked in 1984 and then dropped during the recession of the early 1990s. As noted earlier, bank failures peaked in the late 1980s and then dropped to almost negligible numbers at the end of the period. The number of bank offices rose 40% and the number of ATMs rose 1000% over this eighteen-year span.

In principle, the Riegle-Neal Act should have helped bank clients by eliminating a large number of indefensible barriers to entering markets. However, the effects of its enactment on banking market structure are not

Table 19. Bank Market Structure: 1980–1998

year	banks	bank organizations	offices	ATMs	bank mergers	new charters	failures
1980	14,407	12,342	52,710	18,500	190	206	10
1981	14,389	12,177	54,734	25,790	359	199	7
1982	14,406	11,922	53,826	35,721	420	316	32
1983	14,405	11,672	55,109	48,118	428	366	45
1984	14,381	11,354	56,050	58,470	441	400	78
1985	14,268	11,021	57,417	61,117	475	318	116
1986	14,051	10,512	58,180	64,000	573	248	141
1987	13,541	10,100	58,820	68,000	649	212	186
1988	12,966	9,718	59,568	72,492	468	228	209
1989	12,555	9,455	61,218	75,632	350	201	206
1990	12,194	9,221	63,392	80,156	365	175	158
1991	11,790	9,007	64,681	83,545	345	107	105
1992	11,349	8,730	65,122	87,330	401	73	98
1993	10,867	8,318	63,658	94,822	436	59	40
1994	10,359	7,896	65,097	109,080	446	48	11
1995	9,855	7,571	68,073	122,706	345	110	6
1996	9,446	7,313	68,694	139,034	392	148	5
1997	9,064	7,122	70,698	165,000	384	207	1
1998	8,697	6,839	71,231	187,000	518	193	3

Source: (Rhoades 2000, pp. 23−24). Rhoades reports "only on 'meaningful' bank mergers, that is, mergers that consolidate under common ownership operating banks formerly independent of one another" (p. 2). He does not report data on conversions of thrifts to commercial banks, which averaged slightly over 20 per year during this period and excludes mergers involving failing banks.

evident in Table 19, because it was only a continuation of an ongoing relaxation of barriers to intrastate branching and merging that had occurred since the early 1980s. At least one study, Jayaratne and Strahan (1996), has reported that the relaxation of barriers to intrastate branching had positive effects on economic growth. The continuing wave of mergers greatly increased the share of banking system assets in the largest banks. Between 1985 and 2000, the share of banking system assets held by the 100 largest banks "rose from about 50 percent to more than 70%."[25] There is evidence that mergers among large banks have been harmful to borrowers.[26] The share of banking system assets understates the share of bank lending made by large banks, because large banks securitize relatively more of their loans. Securitization moves loans off bank balance sheets. Securitized loans tend to be homogeneous, which may reduce the access to bank credit by promising but idiosyncratic borrowers.[27] Large banks also raise rela-

[25]Bassett and Brady (2001, p. 719).
[26]See Carow, Kane, and Narayanan (2006).
[27]Cf. Cole, Goldberg, and White (2001).

tively more of their funds from foreign offices and in nondeposit forms than other banks, which suggests that deposits are likely to have declined relative to other financial assets held by households and firms.

10.3 The Aftermath: 1995–2007

Debt in the United States had been rising steadily as the economy grew. The Federal Reserve's Flow of Funds Accounts indicate that between 1965 and 1980, total credit market debt outstanding owed by domestic nonfinancial sectors was approximately 150% of nominal Gross Domestic Product (GDP). Between 1980 and 1989 domestic nonfinancial credit market debt rose much faster than GDP, so that by 1989 it was almost 200% of nominal GDP. It fell to 180% at the end of 1994 and then rose steadily to 213% at the end of 2006. Debt growth by domestic nonfinancial sectors after 1980 was quite broadly based, but differed considerably across sectors in subperiods. Between 1980 and 1989, debt of the U.S. government grew 206%, debt of all business grew 145%, debt of corporations grew 162%, debt of households grew 139%, and debt of state and local governments grew 174%. Between 1989 and 1994, debt of the U.S. government grew 55%, debt of all business grew 6%, debt of corporations grew 12%, debt of households grew 36%, and debt of state and local governments grew 19%. Between 1994 and the end of 2006, U.S. government debt grew 40%, debt of all business 129%, debt of corporations 112%, debt of households 188%, and debt of state and local governments 79%. (U.S. government debt outstanding does not include debt it owes to government trust funds.)

Debt growth between 1980 and 1989 reflects a high rate of inflation and, in the case of the federal government, the deep recessions of 1980 and 1982 and the large income tax cuts in the years 1981–83. Federal government debt was also growing most rapidly between 1989 and 1994, as the economy suffered another recession and the effects of the tax cuts continued. In part because of tax rate increases during the first Bush and Clinton administrations and the absence of a recession, federal government debt actually shrank between 1994 and 2001. It grew rapidly between 2001 and 2006 because of new tax rate cuts and increased defense spending by the second Bush administration. Business and especially household debt expanded rapidly and perhaps at unsustainable rates between 1994 and 2006.

The manner in which post 1993 sector deficits were financed partly reflects the extraordinary changes in the banking regulatory environment and other developments in financial markets. Changes in total credit market as

sets and liabilities were large relative to changes in GDP. The ratio of total credit market assets to GDP rose from 2.38:1 in 1994 to 3.31:1 in the fourth quarter of 2006. In part this rise reflects the fact that there was growing "roundaboutness" in financial markets as intermediaries were increasingly acquiring credit market assets that were issued by other intermediaries. Such increasing asset interlocks of firms in financial markets suggest gains through greater spreading of risks, but also may have led to diminishing transparency and higher systemic risk. Regulatory and other safeguards were not keeping pace with risks from increasing interdependence among intermediaries.[28] Over time credit market debt owed by nonfinancial sectors was decreasing as a fraction of total credit market assets.

Table 20 reports end-of-year positions in credit market assets for selected classes of large investors from 1994 through 2006. Holdings of the domestic nonfederal nonfinancial and federal government sectors rose about 60% and 50% respectively over this period. Holdings of the rest of the world grew nearly 442%; the U.S. partly financed its huge trade deficits by transferring credit market assets to foreign investors. Credit market assets of all financial institutions rose 157% between 1994 and 2006. Commercial banks' credit market assets rose 142% during this interval – more than savings institutions and life insurance companies, but less than the other financial institutions shown in the table.

The highest rate of growth, 600%, was by asset-backed security issuers, which are special purpose vehicles that issue commercial paper and other debt that is secured by financial and other assets. Commercial banks, savings institutions, finance companies, and other institutions such as leasing companies originated many of the assets that are financed by these security issuers. The high growth rate of issuers of asset-backed securities reflects efforts by commercial banks and other intermediaries to get assets off their balance sheets. By moving assets off balance sheets, banks were able to earn income from servicing assets they originated without violating minimum capital requirements that were established in the 1988 Basel agreements and by regulatory agencies.[29] Further, banks could avoid deposit in-

[28]For a skeptical view of the progress of regulators in safeguarding financial markets, see Mayer (2001, chaps. 13, 15). Other safeguards include a plethora of exotic new derivatives such as credit default swaps, synthetic collateralized options, non-deliverable swaptions, and property derivatives. They have not been tested in a general market crisis or collapse, although such a testing may have begun in the fall of 2007.

[29]A new set of agreements, Basel II, is expected to come into effect in the years after 2006, but the incentives for banks to move assets off their books are not likely to weaken under them. Basel II recognizes that the capital requirements based on presumed risk of different categories of assets in Basel I were too crude.

Table 20. Total Credit Market Assets Held by Selected Large Investor Classes: 1994–2006 (end of year in trillions of dollars)

investor class	1994	1996	1998	2000	2002	2004	2006
Total	17.2	19.8	23.4	27.2	31.7	37.7	44.5
Domestic nonfederal nonfinancial	3.0	3.1	3.3	3.5	3.6	4.3	4.8
households	2.0	2.1	2.3	2.3	2.2	2.7	3.0
Federal government	0.2	0.2	0.2	0.3	0.3	0.3	0.3
Rest of world	1.2	1.8	2.3	2.6	3.7	5.0	6.5
All financial	12.8	14.7	17.6	20.9	24.1	28.1	32.9
commercial banks	3.3	3.7	4.3	5.0	5.6	6.5	8.0
savings institutions	0.9	0.9	1.0	1.1	1.2	1.5	1.5
life insurance companies	1.5	1.7	1.8	1.9	2.3	2.7	2.9
MMMFs	0.5	0.6	1.0	1.3	1.6	1.3	1.6
other mutual funds	0.7	0.8	1.0	1.1	1.4	1.6	1.9
government-sponsored enterprises	0.7	0.8	1.3	1.8	2.3	2.6	2.6
federally related mortgage pools	1.5	1.7	2.0	2.5	3.2	3.5	4.0
ABS issuers	0.5	0.8	1.2	1.5	1.8	2.3	3.5
finance companies	0.5	0.5	0.6	0.9	1.1	1.4	1.6

Sources: Federal Reserve statistical release Z.1, Flow of Funds Accounts of the United States, March 12, 1999, March 4, 2004, and March 8, 2007.
Notes: The table excludes corporate equities. The row "Total" is equal to the sum of the underlined investment classes.

surance premiums and taxes implicit in reserve requirements, if assets were not financed by deposits. In principle, acquirers of asset-backed commercial paper and other debt have little recourse to originating institutions or asset-backed security issuers if defaults occur; so asset-backed se-

The new agreements put more weight on a bank's own analysis of its risk exposure. Examiners are to ascertain that a bank's procedures for evaluating risk and protecting against losses are adequate, especially at large international banks. Other banks must satisfy standards that a country's examiners specify. The new system is sufficiently complex that it will not be phased in for a U.S. chartered international bank until after it has operated one year in which standards set under both Basel I and Basel II are simultaneously satisfied. Smaller U.S. banks are not expected to operate under Basel II before 2008 and no U.S. bank will be allowed to operate fully under Basel II until at least 2012. Banks in some other countries were expected to begin operating under Basel II as early as 2006. For a more complete interpretation of Basel II, see Bernanke (2006a).

curity issuers are effectively redistributing risk to a broader group of investors.[30]

Two potential problems for issuers of asset-backed securities may result if there are maturity imbalances between the securities they issue and assets they finance. First, if long-term assets have fixed rates and liabilities are short-term or have adjustable rates, a gap problem like that experienced by savings and loan associations may arise. Second, securities may need to be reissued, if assets have longer maturities than liabilities. This "rollover" risk is often controlled by requiring that an issuer have a stand-by line of credit from a commercial bank. If, as in late 2007, owners of asset-backed securities doubt the quality of underlying assets, they may refuse to roll over maturing paper, which must then be financed by activating the lines of credit.

Other issuers of securitized debt in Table 20 also have been growing rapidly. Federally related mortgage pools issue securities that are backed by mortgage loans. They compete with private asset-backed security issuers. Because of their association with the federal government, securities issued by the pools are perceived to be somewhat safer, pay a lower interest rate than comparable private sector issuers, and trade in a highly liquid market. As is evident in Table 18, about twenty-five percent of bank credit to real estate markets takes the indirect form of mortgage-backed securities.

Government-sponsored enterprises (GSEs) own loans made or guaranteed by agencies established by the United States government, as well as loans originating in the private sector. As noted above, some of these agencies were created during the Vietnam War period, because the government did not want agency loans to be financed by its full faith and credit debt. The loans that are on their books are financed with securities that are analogous to debt that is issued by a subsidiary of a private corporation. The securities bear yields that imply that investors view them as having little default risk. In 2003, the accounting practices of two of the largest GSEs, the Federal National Mortgage Association and the Federal Home Loan Mortgage Corporation, were challenged; subsequently their chairmen were dismissed and the growth of their lending slackened, as can be seen in Table 20.

Securitization often requires the help of investment bankers. Beginning in 1987, some large bank holding companies were authorized by the Fed-

[30]When securities are being issued acquirers often require that the value of the assets being financed exceeds the par value of securities by some percentage, a "haircut", to compensate for expected losses. If the haircut is large, securitization may not be an efficient method for avoiding capital requirements.

eral Reserve to establish subsidiaries that could underwrite state and local government revenue bonds; they were called Section 20 subsidiaries because they were allowable under Section 20 of the 1933 Glass-Steagall Act. Initially, the amount they could underwrite was limited by a condition that the revenue from underwriting could not exceed five percent of the subsidiary's total revenue. This action by the Federal Reserve Board was the first crack in the separation of commercial and investment banking, which had been mandated by the Glass-Steagall Banking Act.[31] The crack widened in 1989 when the Federal Reserve relaxed the restriction on revenue from five to ten percent of a subsidiary's revenues and again in 1996 when the restriction was eased from ten to twenty-five percent. In 1997 the Federal Reserve eliminated all such firewalls for Section 20 subsidiaries.[32]

On April 6, 1998 the largest U.S. bank holding company, Citicorp, and the Travelers Insurance Group announced a merger, which effectively threw a gauntlet down at the feet of the federal government. There was no legislation at the time that allowed such a merger to be sustained. Because the Travelers Group owned an investment-banking firm, Solomon Smith Barney, the proposed merger was in violation of the Glass-Steagall Act. The transaction was effected by having the Travelers Group buy Citicorp and then apply to the Federal Reserve to become a bank holding company, Citigroup. Under the Bank Holding Company Act, the Federal Reserve was authorized to grant new holding companies a two-year window in which to dispose of activities that were not allowed under the Bank Holding Company Act. Two years were not required because a 1999 law eliminated the problem.

On November 12, 1999 President Clinton signed the Financial Services Modernization (Gramm-Leach-Bliley) Act. This act repealed restrictions on banks affiliating with securities firms that appeared in Sections 20 and 32 of the Glass-Steagall Act, thereby obviating the need for the two-year window. The act introduced a new construct, a "financial holding company", which could engage in a statutorily approved list of activities that included insurance, securities underwriting, merchant banking, and complementary financial undertakings. The Federal Reserve is responsible for overseeing the regulation of financial holding companies; various state and other federal agencies are charged with continuing to regulate activities (functions) provided by affiliates of a financial holding company. At the end of 2004, there were 639 financial holding companies, of which 474

[31]See Wirtz (2000, p. 9).

[32]See Federal Reserve Bank of Minneapolis (2000, p. 54).

were domestic financial holding companies that had $7.46 trillion in assets.[33] At the end of 2006 there were 643 financial holding companies.

The Financial Services Modernization Act is extremely intricate and incorporated much political compromise. For all intents and purposes, this act permitted U.S. banks to become "universal banks," such as have long existed in Western Europe. A thorough exposition of the act is beyond the scope of this discussion. It is important to note, however, that it preempted state laws that had limited affiliations among financial firms and that it radically restructured Federal Home Loan Banks. The Federal Housing Finance Board continued to regulate Federal Home Loan Banks. In addition to financing housing, FHLBs were empowered to issue securities that are backed by loans to small business, loans for community development, and loans to support agriculture. Further, commercial banks with less than $500 million in assets could use long-term FHLB loans to finance loans to small firms.

The Financial Services Modernization Act was not the end of the story, because of the recent rapid growth of state-chartered industrial loan companies that were, in part, an offshoot of CEBA. These institutions are quasi banks; they are often controlled by nonfinancial firms that offer banking services that are not regulated by the Federal Reserve through either the Bank Holding Company or the Financial Services Modernization Acts. As can be seen in Alvarez (2006) and Kohn (2007a), the Federal Reserve has been seeking legal redress to have them brought under Federal Reserve regulation.

Press reports at the time of the signing of the Financial Services Modernization Act had predicted a sweeping restructuring of financial markets. It is difficult to confirm that such revolutionary restructuring is occurring because of the act, but dramatic changes are continuing. There have been a number of large post 1999 lawsuits about the financing of Enron, Global Crossing, Parmalat, Tyco International, etc. that have resulted in significant fines being imposed on large financial holding companies for some of their investment banking activities. Before the Financial Services Modernization Act, many of these suits could not have impacted "old fashioned" bank holding companies.

The Financial Services Regulatory Relief Act of 2006 has initiated a process that will eventually result in many important reforms that the Federal Reserve has long sought. As explained in Bernanke (2006b), in October 2011 the Federal Reserve will be allowed to pay interest on required reserves, excess reserves, and contractual clearing balances. According to Bernanke, the long time until implementation was imposed in the law for

[33]See Federal Reserve Bulletin (Spring 2005, p. 240).

"reasons related to congressional budget scoring." The relief act also allows the Federal Reserve to lower reserve requirements to zero on both transactions and other deposit accounts beginning in October 2011 at all depository institutions.

Table 21. Numbers of FDIC Insured Commercial Banks and Savings Institutions and Offices 1994–2006

	Commercial banks		Savings institutions	
mid-year	firms	offices	firms	offices
1994	10,717	64,367	2,233	16,878
1995	10,166	65,321	2,082	15,637
1996	9,689	66,040	1,972	15,302
1997	9,307	67,020	1,852	15,059
1998	8,982	68,974	1,729	14,313
1999	8,674	70,205	1,650	14,085
2000	8,477	71,337	1,623	14,136
2001	8,178	72,164	1,561	13,887
2002	7,967	72,940	1,489	13,620
2003	7,831	73,893	1,410	13,882
2004	7,692	75,772	1,361	14,000
2005	7,549	78,030	1,294	14,003
2006	7,479	80,473	1,276	14,267

Source: Federal Deposit Insurance Corporation website, March 20, 2007.

Table 21 reports data on the numbers of firms and offices of FDIC insured commercial banks and savings institutions between 1994 and 2006. The numbers of commercial banks and their offices are similar but not strictly comparable to those presented by Rhoades and reproduced in Table 19, as is explained in notes to that table. Table 21 does not suggest that the Financial Services Modernization Act has had much of an effect on trends in the number of firms and offices in these intermediaries. The number of offices per firm continues to increase, especially for commercial banks, which suggests growing concentration in both industries.

11 Overview and Summary of Part 2

To a considerable extent the financial system has reverted to a mixture of the system of the 1920s and a new system where there is massive government intrusion into capital markets. The consequences of this intrusion are poorly understood and difficult to analyze. For example, what happens when the FNMA or some Federal Home Loan Banks get into difficulty?[1] A vast and rapidly expanding set of and variety of derivative and synthetic derivative assets exist with a notional value in excess of $400 trillion at the end of 2006. The transition to the new system has been fumbling and costly, in part because of a lack of transparency. Transparency will improve and innovations will continue, but large costs in present value terms are also likely to continue to be absorbed by unwitting investors. Depositors and borrowers at commercial banks can anticipate receiving a new and different set of services, which in some respects are better and in others worse than they received eighty years ago.

11.1 Comparing the 1920s and the 1990s

Consider the system of the 1920s. Banks could pay interest on demand and time deposits and were able to conduct both commercial and investment banking. Before 1927 interstate bank holding companies existed and banks had branches in different states. Banking instability was widespread; between 1921 and 1929 more than 5,400 banks suspended operations. There was no federal deposit insurance.

Between June 1920 and June 1929, total commercial banking system deposits rose 36%, from $36 to $49 billion.[2] Deposits of banks that were members of the Federal Reserve System rose from $25 billion to $36 bil-

[1]The question is not frivolous. By mid 2005 the chief executive officers of both the Federal Home Loan Mortgage Corporation and the Federal National Mortgage Association had been forced to resign because of accounting problems and their results for recent years have had to be substantially restated.

[2]Board of Governors of the Federal Reserve System (1943, p.17).

lion in the same period.[3] In real terms, percentage changes in deposits should be adjusted upward because major price indexes fell about ten percent in the 1920s.[4] Business loans fell as a percentage of all bank loans and investments from 47% to 33% between 1922 and 1929. Nonfarm residential mortgage loans on commercial bank balance sheets doubled as a percentage of banking system assets during the 1920s, although they were only 8% in 1929. For banks that were members of the Federal Reserve System, all securities (loans) expressed as a fraction of total assets were 18% (59%) at the end of 1920 and 20% (55%) at the end of 1929. For member banks, U.S. government securities were 8% of total assets on both dates.[5] For all U.S. banks, portfolio holdings of corporate bonds rose from 8% of banking system assets in 1920 to 11% in 1930. There were significant amounts of overnight call loans, which were short-term loans collateralized by securities. In 1925 loans on security collateral were 29% of all loans at national banks. As in the case of repurchase agreements in the 1990s, many overnight lenders in the call loan market were nonfinancial corporations; 70% of the $9.2 billion of loans to brokers and dealers came from such corporations in October 1929.[6] Federal funds were traded among members of a clearinghouse, but a national market did not exist until the Federal Reserve's fed wire was established in 1928.

There are marked similarities between the 1920s and the late 1990s. In the latter period, banks paid interest on NOW account balances, time and savings account balances, and deposits they booked at overseas branches. Only demand deposit balances in domestic offices paid no interest. As a percentage of average net consolidated assets in all banks, demand balances in domestic offices had fallen from 13% in 1991 to 5% in 2006.[7] After 1999, financial holding companies could do both commercial and investment banking. Bank failures occurred at a high rate in the 1980s and early 1990s, but there were few losses sustained by depositors because of deposit insurance. There were 1442 bank failures in the United States between 1982 and 1993, which was about half the percentage incidence of the 1920s. The failure rate has been falling since 1988; the FDIC has re-

[3]Ibid. p. 73.

[4]See Goldsmith and Lipsey (1963, pp. 170–171).

[5]Board of Governors of the Federal Reserve System (1943, p. 72).

[6]Unless otherwise noted, statistics in this paragraph are from Klebaner (1974, pp. 112–129).

[7]This and other percentages of net consolidated assets in all banks are from Bassett and Zakrajsek (2001, p. 384) for the years 1991 through 2000, from Carlson and Perli (2004, p. 182) for 2001 through 2003, and from Carlson and Weinbach (2007, p. A61) for 2004 through 2006.

ported that fewer than twelve banks failed in each year from 1994 through 2006.[8]

Between December 1990 and December 2005 seasonally adjusted total assets of domestically chartered commercial banks deposits rose 167%, from $2.95 trillion to $7.88 trillion, and all deposits rose 126%, from $2.26 trillion to $5.10 trillion.[9] After adjusting for differences in the rate of inflation (the consumer price index rose 47% in this time interval), in real terms these growth rates were similar to those in the 1920s. Outstanding commercial and industrial loans at domestically chartered commercial banks, rose from $514.7 billion in December 1990 to $878.9 in December 2005 but, as in the 1920s, fell as a percentage of total bank assets from 18% to 12%. Unlike the 1920s when outstanding commercial paper fell, commercial paper was an increasingly important source of funds for nonfinancial corporations in the 1990s. Outstanding commercial paper of nonfinancial corporations (all issuers) rose fairly steadily from $148 ($562) billion in December 1990 to $343 ($1,615) billion in December 2000, but then fell (rose) to $132 ($1,631) billion in December 2005. Thus, over the whole fifteen-year period the nominal (and certainly the real) value of outstanding commercial paper of nonfinancial corporations fell as it did during the 1920s. The growth in paper of all issuers reflects the growing volumes of intra-financial sector paper discussed in the preceding chapter. Nonfinancial corporations borrowed heavily in the bond market in both periods and especially from overseas investors in the 1990s. Unlike the 1920s, relatively small amounts of funds were raised through new equity issues in the 1990s. Indeed, over the ten-year span 1992–2001 the Federal Reserve's Flow of Funds accounts indicate that the net issuance of equities by U.S. nonfinancial corporate business was slightly negative, while their net issuance of bonds was about $147 billion per year. From 1998 through 2004 net issuance of corporate equities was modestly positive in every year, but turned sharply negative in 2005 and 2006. Negative net issuance occurs because of mergers, privatizations, and stock buy backs.

All real estate loans, as a percentage of average net consolidated assets on U.S. commercial bank balance sheets, rose from 25% in 1991 to 32% in 2005. Either figure is substantially more than banks had held seventy-five years ago. However, it is difficult to make quantitative comparisons of real estate loans between the 1920s and the 1990s because their characteristics have changed so much. Mortgage loan maturities in the 1920s typically were five years or less and contracts often specified that a large "balloon"

[8]http://www2.fdic.gov/hsob/hsobRpt.asp

[9]Board of Governors of the Federal Reserve System (1996, p. 71) and Federal Reserve Bulletin Statistical Supplement (2007, March, pp. 58–59).

payment was due at maturity; in recent years many residential mortgage loan contracts have thirty-year maturities. The effective life of mortgage loans in the 1920s was, of course, longer than five years, because loans would often be renewed, and shorter than thirty years in the 1990s because people move on average about once every five years. In terms of maturity, the differences between the two periods is that in the 1920s a bank (1) effectively had an option to call the loan at maturity and (2) had only a limited gap exposure, because interest rates on loans could be set to current market rates when loans matured. The value of the option may not have been high if the underlying asset's value was below the amount of the loan, but a bank could protect the option's value by requiring that a loan be small relative to a property's value. Unlike the 1920s, mortgage contracts in the 1990s could be (1) written with adjustable loan rates, (2) insured against default, and (3) securitized or traded on a secondary market.

Banks held few private sector corporate bonds in the 1990s, but they had large quantities of securitized debt that had been issued by government agencies and other issuers. As a percentage of average net consolidated assets on all commercial bank balance sheets, securities were 21% in 1991 and 22% in 2005. The percentage of consolidated assets that was U.S. Treasury securities fell from 5.1% to 0.6% over these years, as compared to being a flat 8% in the 1920s. Thus, agency debt and securitized debt represented a much larger share of bank assets in the 1990s than corporate bonds did in the 1920s. Further, much of this debt was securitized by mortgage loans. While only U.S. Treasury securities are full faith and credit obligations of the U.S. government, agency and securitized debt are generally perceived to be less likely to default than corporate debt held by banks in the 1920s. However, a collapse in real estate markets could greatly strain U.S. banking markets.

An area of growing risk exposure, similar to that of the 1920s, was in short-term borrowing by banks. The sum of net federal funds purchased and net funds acquired through repurchase agreements, as a percentage of net consolidated assets, was roughly constant between 1991 and 2004; it fell from 2.5% to 2.3% over this period. They were mostly repurchase agreements that were often secured by agency debt, primarily backed by real estate loans. A remarkable trend in the 1990s was the sharp increase in "other liabilities" as a percentage of net consolidated banking system assets, from 5.0% in 1991 to 10.5% in 2004. Such liabilities are not covered by deposit insurance, and thus represent risk that is being assumed by others in the economy. In the 1920s, the sum of borrowings, outstanding acceptances, and other liabilities of all banks that belonged to the Federal Reserve System fluctuated widely; in December 1929 it was 7.1% of total

member bank assets.[10] Because "borrowings" in 1929 included federal funds and repurchase agreements, the combined 2004 percentages of total assets that were net federal funds purchased, net funds acquired through repurchase agreements, and other liabilities were about 186% of their 1929 counterpart. In 2005, the Federal Reserve revised the way data on other borrowings were reported; Klee and Weinbach reported that uninsured "managed liabilities" (including time deposit accounts with more than $100,000 in balances) were 36.2% of net consolidated banking system assets at the end of 2005, up from 32.8% in 1996.[11] They were 38.3% at the end of 2006. In 1929, of course, all bank liabilities were uninsured.

11.2 Evaluating the Changing Returns and Risk Exposures of Clients of Banks

How have returns, services, and risk exposures changed over the postwar period? Who were the winners and losers in different periods? The distortions arising from the Great Depression and World War II severely affected banks, as is evident in Table 16. At the end of 1945, 58% of insured banking system assets were U.S. government securities and 17% loans. It is important, but not easy, to allow for this severe initial distortion of bank balance sheets. Bankers as well as balance sheets had been through a wringer; bankers remembered all too well how vulnerable they were to economic shocks. As a first approximation, it seems reasonable to argue that the traumatizing effects of the depression and war largely defined bank portfolios until perhaps 1955. Banks were taking few risks and provided few new services. To be sure, there were relatively more loans and smaller holdings of U.S. securities as time passed; at the end of 1955 loans were 39% and U.S. government securities were 29% of insured banking system assets. But, as noted in Chapter 9, banks were not paying competitive interest rates on time and savings deposits and, relative to the 1920s, still had large amounts of liquid government securities. They were not stretching themselves to help either depositors or borrowers.

[10]See Board of Governors of the Federal Reserve System (1943, pp. 70–73). Borrowings included funds "borrowed by the reporting banks on their own promissory notes, on certificates of deposit, on notes and bills rediscounted, and on any other instruments given for the purpose of borrowing money, and includes federal funds purchased and loans and securities sold under repurchase agreement." (p. 70).

[11]See Klee and Weinbach (2006, p. A98).

This relaxed period disappeared roughly between 1955 and 1957 as the Federal Reserve took actions that sharply raised interest rates in an effort to fight inflation. The "prime" loan interest rate rose from 3% to 4.5% in these years.[12] Firms began to seek longer "term" loans from banks and both the federal funds and commercial paper markets revived.[13] Bank interest rates on consumer time and savings deposits began to rise rapidly between 1957 and 1963, closing the spread between what commercial banks and savings and loan associations paid. Bank net income as a percentage of all member bank assets reached a maximum value in 1960, 0.84%, which was not surpassed until 1992. In the next years this bank profit measure began a prolonged decline as interest rates on deposits continued to rise and large banks introduced negotiable certificates of deposit. At the end of December 1960, total loans were 46% and U.S. government securities were 24% of insured banking system assets.

This golden age for bank depositors came to an end in 1966, when Congress and regulators intervened by imposing ceilings on interest rates that could be paid on deposits, in order to prevent a prospective wave of failures among mutual savings banks and savings and loan associations. The intervention was initially especially damaging to borrowers, as the foregoing narrative suggests, because depositors were able to avoid the ceilings by acquiring assets that did not have them. Mutual savings banks and savings and loan associations were largely limited to making mortgage loans. Disintermediation savaged borrowers in real estate markets until FNMA was privatized and GNMA and FHLMC were respectively established in 1968 and 1970. However, depositors were also penalized when inflation rates began to exceed the interest rates banks and others were allowed to pay, especially if one takes into account that income taxes were paid on interest income.

The events of this period pose an interesting question. Was the crisis in 1966 a consequence of uninformed myopic market behavior by banks and savings and loan associations or a serious flaw in system design? While it is true that government insurance funds would suffer losses if banks and

[12]The prime rate during the 1950s was the minimum interest rate that banks charged to their most creditworthy customers. Its meaning changed in the 1960s when banks increasingly began to lend to their most creditworthy customers at LIBOR, the London Interbank Offer Rate, plus some increment; the resulting loan rate was often less than the prime rate. For roughly the last twenty years, the prime rate has been set to be the Federal Reserve's target percentage federal funds rate plus three percent.

[13]A term loan is a commercial or industrial loan with an initial maturity longer than one year. Initially they tended to have fixed interest rates, but as interest rate volatility increased their rates often floated with market rates.

savings and loan associations failed, few failed because of the imposition of interest rate ceilings. In 1965 and 1966 both mutual savings banks and savings and loan associations were paying higher rates on deposits than were sustainable, because they lacked the ability to raise interest rates sufficiently on the assets they held. As a short-run struggle for market shares, it was a classic example of myopic greed and overshooting that often accompanies market clearing, which has been described by Phillips as "integral stabilization."[14] However, the competitors were not fairly matched because savings and loan associations and mutual savings banks were required to be mostly invested in long-term real estate loans and had a much larger negative gap than commercial banks. This systemic risk is attributable to Congress and government regulators who required this specialization and thus implicitly a negative gap. Congress stopped the competition in 1966.

The system was also flawed because there were too few private sector stakeholders in savings and loan associations and mutual savings banks, who might have had an interest in the survival of these financial institutions. Most savings and loan funds were lodged in mutually chartered institutions. In mutual institutions there are no stockholders with an investment that could be lost. Managers had a stake, but apart from temporary unemployment they were unlikely to suffer penalties if an institution failed. Many managers and members of boards of directors had conflicts of interest because they often were affiliated with other firms that transacted with an institution. In stock chartered savings and loan associations, owners were frequently similarly conflicted. Further, the true value of the stakes of their stockholders had been seriously eroded by rising interest rates, because of negative gaps. These were also system design flaws. Congress and regulators were unwilling to let the system collapse. By imposing deposit interest rate ceilings the government intervened to prevent disorder, but failed to address the underlying systemic deficiencies. This failure would lead to chaos in the subsequent two decades.

At the end of December 1970, total loans were 55% and U.S. government securities were 11% of insured commercial banking system assets. The period between 1970 and the passage of DIDMCA on March 31, 1980 is best viewed as an unseemly contest among (1) depositors who were struggling (mostly unsuccessfully) to earn a positive real rate of return on their savings, (2) borrowers who were struggling (mostly successfully) to earn a high rate of return on their leveraged tangible investments, and (3) the Federal Reserve which was struggling (destructively and mostly unsuccessfully) to fight inflation. Congress and three ineffective presidents

[14]See Phillips (1954, pp. 297–299).

largely watched from the sidelines. The events, outcomes, and victims are described in Chapter 10.

Because real interest rates were borderline negative during much of the decade, the trade-weighted value of the dollar fell about twenty-five percent and the U.S. current account balance was positive on average. A falling value of the dollar meant that U.S. firms could compete in global markets without substantively restructuring themselves. Borrowers who were exporters were richly rewarded during these years. European and Japanese firms were forced to improve their technology, which paid them large dividends in the following decade. Speculators responded to the falling value of the international exchange standard, the dollar, by making large profits in foreign exchange markets and bidding up the price of gold and silver to absurdly high levels. European countries began serious efforts to construct a substitute for the dollar by limiting bilateral fluctuations in the values of their currencies. The "snake" was an early informal arrangement where many continental European countries attempted to limit variations in the value of their currencies relative to the West German mark.

After money market mutual funds began to expand rapidly in 1978 and the Garn-St Germain Act of 1982, which created new high-yielding deposit accounts, savers began to gain at the expense of borrowers, insurers of deposits, and, eventually, average taxpayers. The Federal Reserve's restrictive monetary policy, beginning in late 1978, and the series of large Reagan administration tax cuts, beginning in 1981, caused both nominal and real interest rates and the trade-weighted value of the dollar to rise sharply; the trade-weighted index (1973 = 100) nearly doubled from 85.5 in January 1980 to 158.4 in February 1985. The Federal Reserve won the battle against inflation, but its efforts inflicted heavy losses on several sectors of the economy. Farmers and farm equipment manufacturers were devastated. The real cost of funds to borrowers soared and newly cheap imports from Japan and Europe severely impacted U.S. manufacturers. Much of the Midwest became a rust belt as manufacturing firms bore the brunt of the fight against inflation. The surviving firms that could borrow and afford the high cost of funds restructured their enterprises, often relocated, and received high returns in the 1990s, like those realized by firms in Japan and Europe in the 1980s. Large U.S. banks experienced losses when they had to renegotiate loans to developing countries that were dollar denominated and/or indexed to short-term interest rates.

Beginning with the Plaza Hotel agreement of September 1985, an international campaign was undertaken to reduce the value of the dollar. This campaign contributed to a decrease in the U.S. trade deficit after 1987 and a sharp fall in the trade-weighted index of the dollar to 89.0 in April 1988. The merchandise trade deficit fell from $160 in 1987 to $74 billion in

1991. The falling exchange rate together with the restructuring of industries helped to improve the rate of return to firms—especially those with an export specialization. Because the real interest rate was falling, most borrowers gained relative to depositors, but real interest rates remained high until the early 1990s.[15]

The Tax Reform Act of 1986 changed rules on the deductibility of interest by households, which strongly favored individuals who could arrange a loan secured by residential real estate. Homeowners gained at the expense of renters. The principal effect of the reform act was a surge in demand for real estate loans, which is partly evident in Table 18, and a disproportionately higher rate of inflation of housing prices. Existing homeowners had large capital gains and the distribution of housing wealth became more unequal over time because the ratio of median to mean housing prices fell.[16] The yearend percentage of homeowners' equity in household real estate relative to its market value decreased almost monotonically from 65.8% in 1989 to 54.8% in 2003. The ratio was 51.7% in the second quarter of 2007.[17] Thus, leverage and the risk exposure of homeowners rose as they sought to take advantage of the return from the almost unique tax shield afforded by mortgage loans. Greenspan and Kennedy (2005) have reported estimates of sizable net equity extractions from housing markets by homeowners between 1991 and 2005.

The Tax Reform Act also limited the deductibility of losses that investors could take on passive investments in commercial properties, which reduced the effective demand for these properties. The passage of the act in 1986 coincided with a construction boom in commercial building. As a consequence, an excess supply of such buildings developed, which was evidenced by very high vacancy rates and falling prices and rents.[18] Commercial real estate loan losses coincided with and contributed to the high rate of bank failures during this period and the recession of the early 1990s.

The Federal Reserve responded to the recession tardily, but aggressively, by driving the real federal funds rate down to near zero in late 1992

[15]The real interest rate in this discussion is the nominal federal funds rate minus the contemporaneous annualized percentage rate of change of the GDP implicit price deflator.

[16]From data reported in Part 1, it can be verified that the ratio of median to mean house prices in transactions fell from 83% in January 1986 to 79% in January 2005 as prices rose.

[17]Source: Board of Governors of the Federal Reserve System, Flow of Funds Accounts of the United States (March 10, 2000 and September 17, 2007, Table B.100).

[18]See Hester (1992, p. 127).

and 1993. The major consequence of this intervention was to allow banks to reduce the nominal interest rates that they were paying on deposits, because federal funds and funds acquired through repurchase agreements were good and increasingly inexpensive substitutes for a bank's core deposits. For example, in January 1990 NOW accounts were paying 4.97%; they were only paying 1.84% in January 1994 and 1.98% in November 1996, when the Federal Reserve stopped reporting these rates.[19] Real interest rates paid on NOW accounts fell from about plus 0.50% to minus 0.25% between 1990 and 1994. Similarly, on time deposits with a maturity of more than two and one-half years, the nominal interest rate banks paid was 7.86% in January 1990; they were paying 4.30% in January 1994 and 5.65% in September 1997 when, again, the Federal Reserve stopped reporting these series. Banks gained and depositors suffered from the Federal Reserve's policies in the early 1990s.

Beginning in early 1994 the Federal Reserve reversed course and drove the nominal federal funds rate sharply higher, from 2.96% in December 1993 to 5.92% in March 1995. The real federal funds rate also increased about 300 basis points between these two dates. The nominal federal funds rate was reduced slightly in 1995, but the target rate varied between 5.25% and 5.50% between December 1995 and the Long-Term Capital Management crisis of September 1998. The real federal funds rate drifted up over this 34-month span, but was insufficient to arrest an expanding bubble that had developed in the stock market. A torrent of funds from overseas resulted from the growing U.S. trade deficit and expectations of an appreciating U.S. dollar; much of this foreign inflow was invested in securities markets. Negative net issues of corporate equities between 1995 and 1998, which were reported in the Federal Reserve's Flow of Funds Accounts, accentuated the bubble.

[19]There had been serious erosion in the amount and quality of information being reported to the public by the Federal Reserve Board in the monthly Federal Reserve Bulletin. Time series were dropped or changed, which impaired their value for analysis. In some, but not all cases, changes were forced on the Federal Reserve by financial market innovations. Beginning in January 2004, the Bulletin was converted from a monthly to a quarterly publication, but a new monthly statistical supplement was issued. The number of analytical articles that facilitate interpretation of monetary statistics was sharply reduced as a result. The Federal Reserve stopped printing the bulletin in 2006; articles in the successor electronic version of the Bulletin are available from the Federal Reserve web site, and a printed annual compendium for 2006 appeared in early 2007. The number of analytical articles in the compendium is no larger than in the quarterly version of the Bulletin.

Although households were large net sellers of equities between 1994 and 1998, the value of corporate equities directly held by them more than doubled in the Flow of Funds Accounts where equities are marked to market, because stock prices were rising. Life insurance companies, mutual funds, defined-benefit and defined-contribution pension funds, state and local government retirement funds, and bank personal trusts and estates hold equities on behalf of households; these "indirect holders" were large net buyers of equities. A balance sheet of households and nonprofit organizations shows the percentage of their net worth that was directly and indirectly held as equities rose from 23% at yearend 1994 to 37% at the end of 1998, but was 29% at yearend 2006, largely because of the collapse of the stock market bubble and a possibly expanding bubble in residential house prices.[20] The percentage of net worth held by households and nonprofit organizations as deposits and credit market assets fell from 21% to 16% between 1994 and 1998; at the end of 2006 this percentage was 17%. The same balance sheet shows that deposits and credit market assets as a percentage of the value of tangible assets fell from 50% at yearend 1994 to 47% in 1998 and to 36% at yearend 2006, in large part because of rapidly rising house values. Deposits as a percentage of the value of tangible assets were 31% in both 1994 and 1998, but were only 24% at the end of 2006. The ratio of household and nonprofit organization deposits to liabilities fell from 66% in 1994 to 62% in 1998 and to 49% at the end of 2006. Clearly liquidity decreased and leverage and the risk exposure of households and nonprofit organizations to defaults rose sharply over these years.

Interest rates paid on NOW deposits and on savings and small denomination money market deposit accounts at domestic offices of all U.S. banks rose slightly between 1993 and 1998, by 30 and 29 basis points respectively, which was far less than the increase in the federal funds rate.[21] Small depositors did not benefit from the Federal Reserve's attempt to be restrictive. Interest rates on large time deposits did more or less keep pace with movements in the federal funds rate as did interest rates on money market mutual funds. Interest rates on loans are much more difficult to assess from the Federal Reserve's analysis of bank profitability, because so many loans are securitized and thus not on bank balance sheets and income statements. Using information from aggregate bank balance sheets and income statements, it appears that loan interest rates, net of loss provisions,

[20]See Board of Governors of the Federal Reserve System, Flow of Funds Accounts of the United States, (June 7, 2007, p. 116).

[21]Data are from Bassett and Carlson (2002, p. 279). One plausible explanation for the small increase in interest rates on time and savings accounts is the introduction of retail sweep accounts in 1994, as is explained in Chapter 6.

were also sticky; they rose by 28 basis points between 1993 and 1998. Independently reported interest rates on consumer loans were high and relatively unchanging over these years, but independently reported interest rates on mortgage loans secured by new and secondary market houses were falling.[22] On balance it appears that household borrowers gained at the expense of household lenders, as in the 1970s.

Most business loan interest rates are indexed to money market "base" rates, such as the federal funds rate, the prime rate, and the London Interbank Offer Rate (LIBOR). They are strongly positively correlated, but the spread between a base rate and the rate charged a firm and other terms of lending are not time invariant. Trends in the fraction of loans that originate in the commercial paper market and from asset-backed issuers undoubtedly affect the cost of funds to firms, but their rates also tend to move in lock step with the federal funds rate, as does the cost of the rising share of nondeposit funds that banks raise to fund loans.

National income statistics on nominal after-tax corporate profits and proprietor's nonfarm income suggest that interest rates on business loans were not especially onerous; between 1993 and 1998 the former rose 37% and the latter rose 40%. Nominal GDP rose 32% over the same five-year span. Both measures also outperformed nominal GDP in the next seven years, even with the recession of 2001. Between 1998 and 2005 nominal after-tax corporate profits and proprietor's nonfarm income rose 63% and 50% respectively, while nominal GDP rose 43%. Low real interest rates were an important contributor to these latter increases in business income.

11.3 An Interpretation of Recent History

Events from the collapse of Long-Term Capital Management (LTCM) in October 1998 to the completion of writing for this volume, November 2007, have been extremely complex and are challenging to interpret. The collapse of the stock market bubble beginning in August 2000 and terrorist attacks on September 11, 2001 precipitated a set of extraordinary policy responses that continue to the present day. The following discussion is somewhat conjectural, because it is too early to draw firm conclusions.

The monthly average nominal federal funds rate fell from 5.51% in September 1998 to 5.07% in October to a low of 4.63% in January 1999, as the Federal Reserve responded to the LTCM debacle. It averaged about 4.75% in the first half of 1999 and then began a rise of about 175 basis

[22]Source: Federal Reserve Bulletin, various issues, (Tables 1.53 and 1.56).

points until a peak of 6.54% was reached in July 2000. The Federal Reserve maintained its target rate of 6.50% until January 2001. Signs of an economic slowdown were evident, including falling stock prices. The National Bureau of Economic Research declared that a recession had begun in March 2001. In July 2003, it reported that the recession had ended in November 2001, although the unemployment rate was still rising in mid 2003. It is likely that the combination of the Federal Reserve's restrictive monetary policy and restrictive fiscal policy, evidenced by growing federal government surpluses, precipitated the recession and finally pricked the long-running and widely recognized stock market bubble.[23]

Beginning in January 2001, the Federal Reserve reduced its target level of the nominal federal funds rate by a record thirteen times to 1.00%. As can be seen in Table 12 in Chapter 6, the real federal funds rate turned sharply negative as the nominal rate fell. Between 2001 and 2003 the federal budget shifted from a large surplus to a substantial deficit, because of large cuts in tax rates and large increases in spending associated with the U.S. invasions of Iraq and Afghanistan. As anyone trained in Keynesian economics would predict these extraordinarily expansionary policies led to a recovery, albeit unbalanced.

From the end of June 2004, the target nominal federal funds rate was raised at each FOMC meeting by 0.25%; in June 2006 it reached 5.25%, where it remained through August 2007. Despite these nominal interest rate increases, the real federal funds rate (calculated using the contemporaneous GDP deflator rate of inflation) continued to be negative through the second quarter of 2005. The long period of negative real short-term interest rates has been colorfully, if inaccurately, described in the financial press as the "Greenspan put", because it seemed designed to provide a floor under equity prices.[24]

The Standard and Poor stock price index (1941–1943 = 10) fell precipitously from its monthly average peak of 1,485 in August 2000 to 838 in February 2003; it rallied unevenly to 1,199 in December 2004, 1,262 in December 2005, and 1,514 in June 2007. The Flow of Funds Accounts indicate that households and nonprofit organizations continued to be net sellers of corporate equities through the end of 2006. The value of equities directly held in the portfolios of these groups fell 41% between yearend 1999 and yearend 2006, from $9.2 trillion to $5.4 trillion. The value of in-

[23]See Shiller (2000, Chapter 1).

[24]A put is an option that allows its owner to sell an asset at a fixed "strike" price. Negative real short-term interest rates do not establish a fixed strike price, but they bolster the price and attractiveness of equities by making substitute short-term assets less inviting to investors.

directly held equities rose from $8.1 trillion to $11.4 trillion in this time span. The estimated net worth of households and nonprofit organizations in the accounts rose from $42.4 trillion at the end of 1999 to $55.6 trillion at the end of 2006, mostly because the estimated market value of their real estate holdings rose from $11.5 trillion to $22.6 trillion over this period. Negative real short-term interest rates had surely contributed to the rising value of household real estate.

The post June 2004 stream of steady increases in nominal interest rates would eventually prick any bubble that developed in the housing market and have a large negative impact on individuals who were borrowing with adjustable rate mortgage loans, new subprime home buyers, and consumers. The Greenspan put effectively mitigated the collapse in equities, at the high cost of worsening the likely bubble in housing markets. The subsequent series of nominal and real interest rate increases was probably necessary to contain inflationary pressures. Monetary policy was effectively shifting the set of individuals who were experiencing financial losses from stock market investors to others who have yet to be fully identified. One clear set of losers over the period since 1998 is labor. The share of labor income in national income has fallen steadily over the past decade and is at a post World War II low in 2007. Decreasing labor income is the counterpart of the above noted increasing share of profits in the national income accounts.

During the long period of negative real interest rates, borrowers had gained enormously from Federal Reserve largesse. Low interest rates led to extraordinary increases in house prices; so homeowners had also experienced large capital gains. Some of these gains were realized through the aforementioned net equity extraction reported by Greenspan and Kennedy (2005). Depositors and many fixed income investors suffered because interest rates were so low. The irony of the situation is that the gainers may also be eventual losers, because the retirement funds of many home owners are likely to be partially invested in mortgage-backed securities, which are likely to have low rates of return, especially if default losses are sustained. The position of homeowners who have yet to retire may be further jeopardized by the massive deficits of President George W. Bush, which are being financed to a considerable extent by Social Security Administration surpluses. If Social Security and Medicare commitments of the federal government are to be honored, large future bond issues appear unavoidable. Such large bond issues are likely to cause steep rises in interest rates that will depress real estate markets just as aging home owners try to sell their properties. It will take some time to sort out these distributional effects. Real estate markets are quite challenging to analyze because many mortgage loans have adjustable interest rates and initial “teaser” rates that

are expected to reset in the coming years, and because many mortgage loans have been securitized. Foreclosure rates in 2007:3 were already at record levels and expected to rise further over the next several years. As this picture clears, market transfers of wealth are not likely to be kind to the young and middle aged.

11.4 The Changing Nature of Banks

Table 22 provides information about bank income and expenses, which supports the interpretation of the changing role of banks as intermediaries in recent years that was suggested in the preceding chapter. As a percentage of average consolidated assets, variations in bank net income were largely matched by accounting decisions to make provisions for losses between 1985 and 1991. During this period net interest income and net noninterest expense percentages were essentially invariant. When the Federal Reserve drove the federal funds interest rate down in 1992 and 1993, the net interest income percentage rose markedly because banks reduced the interest rates they paid on deposits more than interest rates earned on their loans, as noted above. As in the 1950s, they managed to keep net interest income abnormally high through 1997 by not competing with deposit interest rates and by allowing the share of their funds raised through deposits to decrease. Sweeping funds from transactions accounts, against which banks are required to hold idle reserves, into other accounts allowed banks to earn interest on a larger fraction of their funds, without increasing the cost of their deposits.[25] More important for changes in bank net income were two post-1993 changes, shown in the fifth and sixth columns of the table. First, the percentage average provision banks made for losses between 1994 and 2000 fell by about 50% from the average in the preceding eight years. This change is partly explained by the recovery from the 1991 recession, but also reflects increased securitization of loans by banks. When loans are securitized without recourse, banks are not exposed to default losses. Second, net noninterest expenses as a percentage of average consolidated assets began to fall steeply. While technological improvements allowed decreased expenditures on major factors of production, most of the change in net noninterest expenses occurred because of a steep

[25]The Federal Reserve does not collect detailed information on the volume of funds that are swept daily from transactions accounts; banks only report the volume of funds swept when the first introduce a sweep program. For evidence that banks, but not their clients, benefit from sweep accounts; see Board of Governors of the Federal Reserve System (1998, p. 599).

Table 22. Net Income and Selected Components as Percentages of Average Net Consolidated Assets and Average Federal Funds Interest Rate

year	net income	net interest income	net noninterest expense	loss provisioning	average federal funds rate
1985	0.69	3.53	1.99	0.69	8.10
1986	0.62	3.42	1.96	0.80	6.80
1987	0.09	3.42	1.91	1.29	6.66
1988	0.80	3.52	1.85	0.57	7.57
1989	0.48	3.51	1.79	0.97	9.21
1990	0.47	3.45	1.82	0.97	8.10
1991	0.53	3.60	1.93	1.02	5.69
1992	0.91	3.89	1.91	0.78	3.52
1993	1.20	3.90	1.81	0.47	3.02
1994	1.15	3.78	1.75	0.28	4.21
1995	1.18	3.72	1.62	0.30	5.83
1996	1.20	3.73	1.53	0.37	5.30
1997	1.25	3.68	1.38	0.41	5.46
1998	1.20	3.52	1.36	0.42	5.35
1999	1.31	3.52	1.11	0.39	4.97
2000	1.18	3.41	1.07	0.50	6.24
2001	1.17	3.40	1.03	0.68	3.88
2002	1.31	3.48	0.93	0.68	1.67
2003	1.39	3.24	0.82	0.45	1.13
2004	1.33	3.19	0.96	0.30	1.35
2005	1.31	3.09	0.86	0.30	3.21
2006	1.39	3.05	0.76	0.27	4.96

Sources: English and Reid (1995, p. 561), Carlson and Perli (2004, p.182), Carlson and Weinbach (2007, p. A62), Board of Governors of the Federal Reserve System (1991, 1996, 2002), and Federal Reserve Bank of St. Louis FRED data bank.

rise in "other" noninterest income—primarily income from securitization and fees for providing a variety of services, including credit cards and ATMs. Finally, while bank net income may have had a one-time gain when interest rates fell in the 1990s, there appears to be no long-term relation between net income, as a percentage of average consolidated assets, and the federal funds rate shown in the last column.

A main conclusion about the most recent ten years is that banks were partially transforming themselves from intermediaries that had deposits, loans, and securities on their balance sheets into brokers who originate loans and then distribute them to others as securitized assets. In principle, the risks of holding such assets were not borne by banks, which act as agents that provide services by collecting and distributing payments to the holders of securitized assets for fees. Banks were believed to be potentially liable for misrepresentations about borrowers and for errors or deficiencies in providing services, but not otherwise. Data about the extent to which banks have shifted from being intermediaries to being brokers are not available, but as noted in the discussion of Table 20, banks' share of out-

standing credit market assets has been decreasing since 1994. A different measure, the ratio of commercial banking system credit to total debt of domestic nonfinancial sectors, was about 33% from 1965 through 1980; after 1980 this ratio declined almost monotonically to 25% in the early 1990s, after which it has drifted up to about 28% in 2006. Changes in either balance sheet ratio do not imply that the share of credit being originated by banks has fallen.

The consequences of banks becoming brokers rather than acting as traditional intermediaries are potentially large. Additional risk is being shifted to the private sector because, while agencies of the federal government insure deposits, the government does not insure many institutional or individual holders of securitized assets.[26] The effects of a lack of government insurance are amplified by the continuing shift of retirement funds from defined-benefit to defined-contribution pension plans, because the Pension Benefit Guaranty Corporation that was established in the Employee Retirement Insurance Security Act of 1974 provides insurance only for defined-benefit plans. Credit derivatives may allow risk to be redistributed in the private sector, but not eliminated. Most individuals will not be able to assess the extent to which their funds are protected with derivatives. Many mortgage-backed securities are repackaged into collateralized debt obligations that are then sold in tranches, which vary in terms of their vulnerability to default losses. The lowest (highest) tranches are the first (last) to absorb losses when mortgage loan defaults occur, but transparency about actual risk exposure is limited.

In the fall of 2007, it became apparent that risk had not always been shifted away from banks. Bank holding companies themselves had acquired some asset-backed securities in the market, apparently because yields on these securities were high. Further, they had not actually distributed some other asset-backed securities. Instead they had lodged them in structured investment vehicles (SIVs), which were not at arm's length, because the holding companies continued to manage them. The game is not completely clear as this is being written, but it seems that the SIVs and related remote subsidiaries of holding companies were attempting to profit by retaining the securities and financing them with low cost funds that had been made available by the Federal Reserve's negative real federal funds rate policy and a glut of dollars in portfolios of foreign central banks. The financing sometimes took the form of commercial paper and similar borrowing that required bank lines of credit, in the event that the securities could not be refinanced. As suggested in Chapter 7, this seems to have been an attempt by holding companies to get around minimum capital re-

[26]For a similar interpretation, see Norris (2007).

quirements that were imposed in the Basel I and, presumably, in the Basel II agreements.

The quantity and quality of information that was heretofore collected and used by banks to allocate funds and to keep informed about clients after a loan was made are also likely to diminish with securitization. When loans are off a bank's books, the bank is less likely to maintain a costly information file about a borrower. Banks traditionally knew their clients well enough to incorporate some specific terms in loan contracts that sometimes were crucial to the success of a borrower. Other nonbank lenders may replace banks as sources of funds for such clients, but lending terms are not likely to be as accommodating. Indeed, lenders may not care whether a borrower can reasonably be expected to repay a loan, so long as the loan can be sold to others.

Finally, as debt is increasingly shifted from banks to other financial institutions through securitization, changes in regulation have become necessary.[27] Existing truth-in-lending, anti-redlining, and similar legislation envisioned a depository institution making loans to individuals and keeping them in their portfolios. When a loan made by a bank is sold to another institution, it is unclear whether the originator or the subsequent holder is responsible for treating borrowers fairly.[28] Securities backed by consumer or mortgage loans can change hands many times. When someone other than a depository institution originates loans, a lender typically is subject to laws of a state. In many cases the originator is a subsidiary owned by a bank or financial holding company, but until recently the activity of the originator was not subject to regulations that apply to depository institutions.[29] When loans are securitized, it surely needs to be clarified who is responsible for treating borrowers fairly and which regulatory agency ensures that they are.

[27]In the concluding chapter of his last book, the late Edward M. Gramlich forcefully made this same point. See Gramlich (2007).

[28]See also Morgenson (2007).

[29]Regulators apparently agree because on July 17, 2007 the Federal Reserve web site somewhat belatedly stated: "Federal and State Agencies Announce Pilot Project to Improve Supervision of Subprime Mortgage Lenders."

Postscript

The drafting of this book was completed on November 30, 2007, when financial markets were in considerable turmoil. In the subsequent months conditions in financial markets continued to deteriorate. Substantive measures of economic activity were reasonably strong in the third quarter, but then weakened. (Data about GDP in 2007:3 were only provisional at the end of November.) This brief continuation describes and interprets recent events in the U.S. economy and in financial markets. It should be viewed as an extension of Chapters 7 and 10.

Monetary Policy

The unemployment rate rose from 4.5% in 2007:2 to 4.7% and 4.8% in the next two quarters; it was 4.9% in January 2008. The labor force participation rate was 66.0% in 2007:4 and 66.1% in January 2008. In part because of a jump in inventory investment and rising net exports, nominal GDP in 2007:3 rose to $13,971 billion, which implied an annualized growth rate of 5.9% over 2007:2. Inflation as measured by the GDP price deflator continued to be low, about 1%, and real GDP rose 4.9%.

At its scheduled meeting on December 11, 2007, the FOMC again reduced its target federal funds rate. The new rate was 4.25% and the Board reduced the primary borrowing (discount) rate to 4.75%. The accompanying statement included the following paragraphs:

> Incoming information suggests that economic growth is slowing, reflecting the intensification of the housing correction and some softening in business and consumer spending. Moreover, strains in financial markets have increased in recent weeks. Today's action, combined with the policy actions taken earlier, should help promote moderate growth over time.
>
> Readings on core inflation have improved modestly this year, but elevated energy and commodity prices, among other factors, may put upward pressure on inflation. In this context, the Committee judges that some inflation risks remain, and it will continue to monitor inflation developments carefully.

On December 12, the Board together with the Bank of Canada, the European Central Bank, and the Swiss National Bank announced "measures designed to address elevated pressures in short-term funding markets." Specifically the Board announced the establishment of a temporary Term Auction Facility (TAF) and a set of swap agreements among the central banks. Four auctions of 28-day or 35-day funds were announced for the months of December and January, to provide funds that would be secured by collateral that included mortgage-backed securities. The first two auctions were for $20 billion. The swap agreements were designed to address a shortage of dollars in Europe. The goal of these actions was to drive down the interest rate differential between those on short-term funds in the interbank market and target rates that the central banks were setting. Partly as a result of the auctions, major U.S. banks abandoned their efforts to establish the proposed $75 billion Master Liquidity Enhancement Conduit. Two additional term auctions of $30 billion were held in January and two more of $30 billion were announced for February. The initiatives appear to have been successful and substantially diminished the differential.

Because of the auctions, reported borrowing from the Federal Reserve rose sharply in 2007:4 and net free reserves turned negative. Discount window borrowing by all depository intermediaries averaged $0.3 billion in October, $0.4 billion in November, and $3.8 billion in December. Total borrowing (including TAF borrowing) from the Federal Reserve averaged $15.4 billion in December.

The Federal Reserve's Flow of Funds Accounts for 2007:3, which were released on December 6, revealed that Federal Home Loan Banks had advanced about $175 billion to banks and thrift institutions in the third quarter, vastly more than had been advanced in earlier year intervals. This was likely related to funding problems experienced by these intermediaries, but an official explanation and interpretation have not been provided.

Stock markets in economically advanced countries began 2008 with substantial declines. In Asia and Europe the fall in values accelerated on January 21, when the U.S. markets were closed for a holiday. Before the market opened on January 22, the FOMC announced that at an unscheduled meeting it had lowered the target federal funds rate by 0.75 to a level of 3.50%. The Board simultaneously lowered the primary borrowing (discount) rate to 4.00%. The accompanying statement included the following:

> The Committee took this action in view of a weakening of the economic outlook and increasing downside risks to growth. While strains in short-term funding markets have eased somewhat, broader financial market conditions have continued to deteriorate and credit has tightened further for some businesses

> and households. Moreover, incoming information indicates a deepening of the housing contraction as well as some softening in labor markets.
>
> The Committee expects inflation to moderate in coming quarters, but it will be necessary to continue to monitor inflation developments carefully.
>
> Appreciable downside risks to growth remain. The Committee will continue to assess the effects of financial and other developments on economic prospects and will act in a timely manner as needed to address those risks.

The U.S. stock market continued its decline on January 22, but then rose strongly on January 23. On January 24, a large French bank, Societe Generale, announced that it had been the victim of a rogue trader and it was selling equities in Europe on January 21 and 22, with resulting cumulative losses of $7.2 billion. It is unclear whether the FOMC was informed about this debacle at the time of its decision to lower the rate by 75 basis points and it remains to be seen if its actions signal a reincarnation of the "Greenspan put", where the target rate tended to be cut when equity prices fell. Futures markets were predicting additional federal funds rate target cuts at the FOMC's next scheduled meeting on January 29 and 30. It was surprising that the FOMC made such an aggressive move one week before a regularly scheduled meeting.

On January 24 executive branch and Congressional leaders announced an agreement on a one-time tax rebate initiative of up to $600 for tax filers earning less than $75,000 (up to $1200 for joint filers earning less than $150,000) in an effort to provide fiscal stimulus to the economy. The proposed program included a number of temporary changes in regulations applying to real estate markets, tax subsidies for investments by small enterprises, and additional provisions for other workers who contribute to the Social Security program, but pay no income taxes. Initial estimates for this program, which must get approval from the U.S. Senate, are that about 116 million individuals will receive between $150 and $200 billion in tax rebates that are unlikely to be distributed before June 2008.

On January 30 preliminary estimates of fourth quarter GDP were released. Real GDP rose at an annual rate of 0.6% and the GDP price deflator rose at annual rate of 2.6%. In part the low real growth rate was due to a steep fall in inventory investment. Core PCE inflation rose at an annual rate of 2.7% in 2007:4, far above the FOMC's desired rate. In the afternoon of that day the FOMC lowered its target for the federal funds rate to 3% and the Board lowered its primary lending rate to 3.5%. In part the FOMC accompanying statement said:

> Financial markets remain under considerable stress, and credit has tightened further for some businesses and households. Moreover, recent information indicates a deepening of the housing contraction as well as some softening in labor markets.
>
> The Committee expects inflation to moderate in coming quarters, but it will be necessary to continue to monitor inflation developments carefully.
>
> Today's policy action, combined with those taken earlier, should help to promote moderate growth over time and to mitigate the risks to economic activity. However, downside risks to growth remain. The Committee will continue to assess the effects of financial and other developments on economic prospects and will act in a timely manner as needed to address those risks.

On February 5, 2008, the Institute for Supply Management announced that its index of growth of business activity in the service sector plunged into negative territory for the first time in five years. The service sector had been providing a large share of new jobs for the past 25 years, so this announcement suggested a rising rate of unemployment in the next few months. Simultaneously rising prices and rising unemployment imply "stagflation", such as occurred in the 1970s. To be sure, the rates of increase of both measures were very modest in 2007 and early 2008, relative to the earlier period. Nevertheless, FOMC statements and actions were tracing a treacherous path.

Financial Innovation and Regulation

In January 2008 it was widely reported that major financial institutions had experienced aggregate losses on subprime mortgages, asset-backed commercial paper, and other assets (some of which had been returned to bank balance sheets from SIVs and other remote financing vehicles) of at least $100 billion. The chairmen and/or chief executive officers of Citigroup, Merrill Lynch, and Bear Stearns, among others, have been forced to resign. Because of these spectacular losses banks have been compelled to raise large amounts of new capital from sovereign wealth funds and other large investors on terms that were likely to have been quite disadvantageous to existing stockholders and with conditions that have not yet been fully disclosed. There is no law or regulation forbidding incompetence, but perhaps investors should have been protected with far more transparency and disclosure about what these institutions were doing.

It is sometimes argued that bank regulators are superfluous because knowledgeable investors would cause prices of equities of companies led

by inept management to fall in value before great losses were sustained. Rarely has the idiocy of such an argument been more conspicuously demonstrated. To the contrary, examinations of financial holding companies by the Federal Reserve need to be greatly strengthened. To the extent that the argument has validity, much more detailed disclosure of activities by financial institutions is evidently necessary. The Securities and Exchange Commission, the Commodity Futures Trading Board, and other regulators of security markets need to play a more active role.

A further crisis developed when it was reported that monoline insurance companies that insure state and local government and other securities against default were experiencing large losses and in danger of losing their top credit ratings. These companies are regulated by state government insurance agencies. If their ratings fall, then the ratings of securities that they guaranty would also necessarily fall. Pension funds and other financial institutions are prohibited from holding securities with low credit ratings. An uncontrolled liquidation of many billions of dollars of securities with reduced ratings would be extraordinarily disruptive. As this postscript is being written efforts are being reported in the press to provide the insurers with additional capital.

Monoline insurance company instability can be attributed to the fact that such companies had very little experience with losses that might result from new varieties of securities, which were backed by subprime mortgage loans or collateralized with other debt obligations. Actuaries should not be expected to write contracts with much accuracy when distributions of losses are unknown. A similar lack of experience handicapped institutions that provided ratings for such securities. Regulators of financial holding companies, banks, and pension funds need to impose stringent limits on the holdings of novel securities, when distributions of their losses cannot be reliably estimated. Indeed, unknowable risks associated with such securities are best viewed as uninsurable!

References

Alvarez SG (2006) Testimony on industrial loan companies before Subcommittee on Financial Institutions and Consumer Credit, Committee on Financial Services, U.S. House of Representatives, July 12

Amel DF, Jacowski MJ (1989) Trends in banking structure since the mid-1970s. Fed Res Bull 75:120−133

Andrews PWS (1951) A further inquiry into the effects of rates of interest. In Wilson T and Andrews PWS (eds) Oxford studies in the price mechanism, Oxford, Oxford, 51−67

Axilrod SH (1985) U.S. monetary policy in recent years: an overview. Fed Res Bull 71:14–24

Bassett WF, Brady TF (2001) The economic performance of small banks, 1985–2000. Fed Res Bull 87:719−728

Bassett WF, Carlson M (2002) Profits and balance sheet developments at U.S. commercial banks in 2001. Fed Res Bull 88:259−288

Bassett WF, Zakrajsek E (2001) Profits and balance sheet developments at U.S. commercial banks in 2000. Fed Res Bull 87:367−393

Baumol WJ (1952) The transactions demand for cash: an inventory theoretic approach. Quart Journ of Econ 66:545−556

Becketti S (1988) The role of stripped securities in portfolio management. Fed Res Bank of Kansas City Econ Rev 73, 5:20−38

Belton TM, Gelfand MD, Humphrey DB, Marquardt JC (1987) Daylight overdrafts and payments system risk. Fed Res Bull 73:839−852

Bennett P, Peristiani S (2002) Are U.S. reserve requirements still binding? Fed Res Bank of NY Econ Pol Rev 8:53−68

Bennett RA (1983) Money funds: rate war over. NY Times, March 16, D1, D21

Bernanke BS (2003) An unwelcome fall in inflation? Speech given at University of California-San Diego, July 23. Text available at http://www.federalreserve.gov/boarddocs/speeches/2003/20030723/default.htm

_____, (2006a) Modern risk management and banking supervision. Remarks before Stonier Graduate School of Banking, June 12. Text available at: http://www.federalreserve.gov/boarddocs/speeches/2006/200606123/default.htm

_____, (2006b) Bank regulation and supervision: balancing benefits and costs. Remarks before the annual convention of Amer Bankers Assoc, October 16. Text available at: http://www.federalreserve.gov/newsevents/speech/bernanke20061016a.htm

_____, (2007a) The financial accelerator and the credit channel. Remarks at conference on the credit channel of monetary policy in the twenty-first cen-

tury at Fed Res Bank of Atlanta, June 15. Text available at: http://www.federalreserve.gov/boarddocs/speeches/2007/20070615/default.htm
_____, (2007b) Opening remarks at Fed Res Bank of Kansas City symposium on housing, housing finance, and monetary policy, August 31. Text available at: http://www.federalreserve.gov/boarddocs/speeches/2007/20070831/default.htm
Bernanke BS, Gertler M (1989) Agency costs, net worth, and business fluctuations. Amer Econ Rev 79:14−31
Bernanke BS, Gertler M, Gilchrist S (1996) The financial accelerator and the flight to quality. Rev of Econ and Stat 78:1−15
Black F, Scholes M (1973) The pricing of options and corporate liabilities. Journ of Pol Econ 81:637−654
Blinder AS (1998) Central banking in theory and practice. MIT, Cambridge
Board of Governors of the Federal Reserve System (1943) Banking and monetary statistics: 1914–1941. Washington
_____, (1971a) Balance of payments program: revised guidelines for banks and nonbank financial institutions. Fed Res Bull 57:9−20
_____, (1971b) Balance of payments program: revised guidelines for banks and nonbank financial institutions. Fed Res Bull 57:905−916
_____, (1972) One-bank holding companies before the 1970 amendments. Fed Res Bull 58:999−1008
_____, (1974) Numerical specifications of financial variables and their role in monetary policy. Fed Res Bull 60:333−337
_____, (1976a) Banking and monetary statistics: 1941–1970
_____, (1976b) Annual statistical digest: 1971–1975
_____, (1979) Flow of funds accounts 1949–1978: annual total flows & year-end assets and liabilities
_____, (1981) Annual statistical digest: 1970–1979
_____, (1987) Monetary policy objectives for 1987: summary report of the Federal Reserve Board. February 19
_____, (1989) Flow of fund accounts financial assets and liabilities: year-end 1965−1988
_____, (1991) Annual statistical digest: 1980–1989
_____, (1993) 1993 monetary policy objectives: midyear review of the Federal Reserve Board, July 20
_____, (1994) The Federal Reserve System – purposes and functions
_____, (1996) Annual statistical digest: 1990–1995
_____, (1998) Monetary report to the Congress. Fed Res Bull 84:585−603
_____, (2000) Guide to the flow of funds accounts
_____, (2002) Statistical digest: 1996–2000
_____, (2005) The federal reserve system − purposes and functions
_____, Flow of funds accounts of the United States, report z.1, various quarters
Bradsher K (1994) The Federal Reserve is signaling a new increase in interest rates. NY Times, April 15, A1, C5

Brayton F, Mauskopf E, Reifschneider D, Tinsley P, Williams J (1997) The role of expectations in the FRB/US macroeconomic model. Fed Res Bull 83:227−245

Browne LE (1999) U.S. economic performance: good fortune, bubble or new era? New England Econ Rev, May/June, 3−20

Burns AF (1973) The structure of reserve requirements. Fed Res Bull 59:339−343

_____, (1977) Statement before the Senate Committee on Banking, Housing and Urban Affairs. Fed Res Bull 63:986−993

Carlson M, Perli R (2003) Profits and balance sheet developments at U.S. commercial banks in 2002. Fed Res Bull 89:243−270

_____, (2004) Profits and balance sheet developments at U.S. commercial banks in 2003. Fed Res Bull 90:162−191

Carlson M, Weinbach GC (2007) Profits and balance sheet developments at U.S. commercial banks in 2006. Fed Res Bull 93. Text available at: http://www.federalreserve.gov/pubs/bulletin/2007/pdf/bankprofit07.pdf

Carow KA, Kane EJ, Narayanan RP (2006) How have borrowers fared in banking megamergers? Journ of Money, Credit, and Banking 38:823−836

Case KE, Shiller RJ (2003) Is there a bubble in the housing market? Brookings Papers on Econ Activity 2:299−362

Cecchetti SG, Genberg H, Lipsky J, Wadhwani S (2001) Asset prices and central bank policy. Information Press, Oxford

Clause J, Henderson D, Orphanides A, Small D, Tinsley P (2000) Monetary policy when the nominal short-term interest rate is zero. Fed Res Board Fin and Econ Series Paper No. 2051

Coats WL (1981) The weekend eurodollar game. Journ of Fin 36:649−659

Cole RA, Goldberg LG, White LJ (2001) Cookie-cutter versus character: the micro structure of small business lending by large and small banks. processed, August 21

Commission on Financial Structure and Regulation (1971) Report of the president's commission on financial structure and regulation. U.S. Govt Printing Office, Washington

Commission on Money and Credit (1963) Stabilization policies. Prentice-Hall, Englewood Cliffs, NJ

Committee on Financial Institutions (1963) Report of the committee on financial institutions to the President of the United States. U.S. Govt Printing Office, Washington

Conderacci G, Janssen RF (1979) Balm for business: selection of Volcker as Chairman of the Federal Reserve Board is being widely hailed. Wall Street Journ, July 26, 1, 23

Copeland TE, Weston JF (1988) Financial theory and corporate Policy. Addison-Wesley, Reading, MA

Council of Economic Advisers, various years, Economic report of the president together with the annual report of the council of economic advisers. U.S. Govt Printing Office, Washington

Council on International Economic Policy (1975) International economic report of the president. U.S. Govt Printing Office, Washington

Cox JC, Ingersoll JE, Ross SA (1981) The relation between forward prices and futures prices. Journ of Fin Econ 9:321−346
Crabbe L (1989) The international gold standard and U.S. monetary policy from world war I to the new deal. Fed Res Bull 75:423−440
Curcuru SE (2007) U.S. cross-border derivatives data: a user's guide. Fed Res Bull, May, A1−A16. Text available at: http://www.federalreserve.gov/pubs/bulletin/2007/crossborder.pdf
Dale EL (1970) Treasury puts minimum on bills. NY Times, February 26, 51−52
Dash E (2007) Four major banks tap Federal Reserve for funding. NY Times, August 23, C10
Dash E, Morgenson G (2007) Banks' plan for relief may itself need help. NY Times, October 19, C1−C2
Degen RA (1987) The American monetary system: a concise survey of its evolution since 1896. DC Heath, Lexington, MA
Dunham C (1980) The growth of money market funds. New England Econ Rev, September/October, 20−34
Dykes SE, Whitehouse MA (1989) The establishment and evolution of the Federal Reserve Board:1913-23. Fed Res Bull 75:227−243
Ebersole JF (1938) The influence of interest rates upon entrepreneurial decisions in business – a case study. Harvard Bus Rev 17:35−39
Edwards CL (1997) Open market operations in the 1990s. Fed Res Bull 83:859−874
Eggertsson G, Woodford M (2003) The zero bound on interest rates and optimal monetary policy. Brookings Papers on Econ Activity, 1:139−233
English WB, Reid BK (1995) Profits and balance sheet developments at U.S. commercial banks in 1994. Fed Res Bull 71:545−569
Evans DS, Schmalensee R (1999) Paying with plastic: the digital revolution in buying and borrowing. MIT, Cambridge
Faust J, Svensson LEO (2001) Transparency and credibility: monetary policy with unobservable goals. Int Econ Rev 42:369−397
Federal Deposit Insurance Corporation (1998) History of the Eighties – Lessons for the Future, Vol. 1
Federal Open Market Committee (1999) Minutes of the August 24, 1999 FOMC meeting. Fed Res Bull 85:820−821
Federal Reserve Bank of Boston (1995) Is bank lending important for the transmission of monetary policy? Peek J, Rosengren ES (eds)
Federal Reserve Bank of Chicago (1983) Leveling the playing field
Federal Reserve Bank of Minneapolis (2000) The Region, March
Federal Reserve Bank of New York (2000) Domestic open-market operations during 1999. Text available at: http://www.newyorkfed.org/pihome/annual.html
Feinman JN (1993) Reserve requirements: history, current practice, and potential reform. Fed Res Bull 79:369−389
Fleming M (1962) Domestic financial policies under fixed and under floating exchange rates. IMF Staff Papers 9:369−379
Friedman M (1948) A monetary and fiscal framework for economic stability. Amer Econ Rev 38:245−264

_____, (1968) The role of monetary policy. Amer Econ Rev 58:1−17
_____, (1971) The euro-dollar market: some first principles. Fed Res Bank of St. Louis Monthly Rev 53, 7:16−24
Friedman M, Schwartz AJ (1963) A monetary history of the United States. Princeton, Princeton
_____, (1970) Monetary statistics of the United States: estimates, sources, methods. Nat Bur of Econ Res, New York
Fuerbringer J (2003) Counting the ways to count corporate earnings. NY Times, September 21, B6
Gilbert RA, Lovati JM (1978) Bank reserve requirements and their enforcement: a comparison across states. Fed Res Bank of St. Louis Rev 60, 3:22−32
Goldenweiser EA (1951) American monetary policy, A research study for committee for econ develop. McGraw-Hill, New York
Goldsmith RW, Lipsey RE (1963) Studies in the National Balance Sheet of the United States, Vol I. Princeton, Princeton
Goodhart C (1981) Problems of monetary management: the U.K. experience. In Courakis AS (ed) Inflation, depression and economic policy in the west, Mansell, London, 111−144
Gramlich EM (2007) Subprime mortgages: America's latest boom and bust. Urban Institute, Washington
Greenberger M, Crenson MA, Crissey BL (1976) Models in the policy process: public decision making in the computer era. Russell Sage Foundation, New York, Chapter 6
Greenhouse S (1993a) Clinton goes head to head with the Fed. NY Times, January 18, C1, C5
_____, (1993b) Fed chief sways to Clinton's new economic tune. NY Times, February 27, C1, C26
_____, (1993c) Fed fears a market bubble if it lowers interest rates. NY Times, September 16, C1, C2
Greenspan A (2002) Economic volatility. Remarks at Kansas City Fed Res Bank symposium, August 30. Text available at: http://www.federalreserve.gov/boardocs/speeches/2002/20020830/default.htm
_____, (2003) Monetary policy under uncertainty. Remarks at Kansas City Fed Res Bank symposium, August 29. Available at: http://www.federalreserve.gov/boardocs/speeches/2003/20030829/default.htm
_____, (2007) The age of turbulence: adventures in a new world. Penguin, New York
Greenspan A, Kennedy J (2005) Estimates of home mortgage originations, repayments, and debt on one-to-four-family residences. Fed Res Fin and Econ Disc Series, 2005-41
_____, (2007) Sources and uses of equity extracted from homes. Fed Res Fin and Econ Disc Series, 2007-20
Greider W (1987) Secrets of the temple: how the Federal Reserve runs the country. Simon and Schuster, New York
Hester DD (1962) An empirical examination of a commercial bank loan offer function. Yale Economic Essays 2:3−57

_____, (1969) Financial disintermediation and policy. Journ of Money, Credit and Banking 1:600−617
_____, (1981) Innovations and monetary control. Brookings Papers on Econ Activity, 1:141−189
_____, (1982) The effects of eurodollar and domestic money market innovations on the interpretation and control of monetary aggregates. In Lombra RE, Witte WE (eds) The political economy of domestic and international monetary relations, Iowa State, Ames, 303−338
_____, (1993) Financial institutions and the collapse of real estate markets. In Browne LE, Rosengren ES (eds) Real estate and the credit crunch, Federal Reserve Bank of Boston Conference Series No. 36:114−135
_____, (2002) U.S. banking in the last fifty years: growth and adaptation. Univ of Wis SSRI Working Paper 2002-19
_____, (2006) U.S. monetary policy in the Greenspan era: 1987– 2003. In Di Giorgio G, Neri F (eds) Monetary policy and institutions: essays in memory of Mario Arcelli, LUISS, Rome, 15−48
Hester DD, Calcagnini, G (2002) Banking changes in the European Monetary Union: an Italian perspective. Carocci, Rome
Hester DD, Pierce JL (1975) Bank management and portfolio behavior. Yale, New Haven
Hicks JR (1937) Mr. Keynes and the 'classics'; a suggested interpretation. Econometrica 5:147−159
Himmelberg CP, Mahoney JM, Bang A, Chernoff B (2004) Recent revisions to corporate profits: what we know and when we knew it. Fed Res Bank of NY Cur Issues in Econ and Fin, 10, March
Hubbard RG (1998) Capital-market imperfections and investment. Journ of Econ Lit 36:193−225
Issing O (2001) Monetary theory as a basis for monetary policy: reflections of a central banker. In Leijonhufvud A (ed) Monetary theory and policy experienced, Palgrave, New York, 13−24
Jayaratne J, Strahan PE (1996) The finance-growth nexus: evidence from bank branch deregulation. Quart Journ of Econ 111:639−670
Judd JP, Rudebusch GD (1999) Federal Reserve Bank of San Francisco Economic Letter, January 29
Kahn R (1984) The making of Keynes general theory. Cambridge, Cambridge
Kane EJ (1982) External pressures and the operations of the Fed. In Lombra RE, Witte WE (eds) The political economy of domestic and international monetary relations, Iowa State, Ames, 211−232
_____, (1989) The unending deposit insurance mess. Science 246:451−456
Kareken J (1957) Lenders' preferences, credit rationing, and the effectiveness of monetary policy. Rev of Econ and Stat 39:292−302
Keynes JM (1937) The general theory of employment. Quart Journ of Econ 51:209−223
Kilborn PT (1985) The new clash with Volcker. NY Times, December 26, D4
Klebaner BJ (1974) Commercial banking in the United States: a history. Dryden, Hinsdale, IL

Klee EC, Weinbach GC (2006) Profits and balance sheet developments at U.S. commercial banks in 2005. Fed Res Bull. Text available at: federalreserve.gov/pubs/bulletin/2006/pdf/bankprofit06.pdf

Kohn DL (1990) Policy targets and operating procedures in the 1990s. Fed Res Bull 76:1−7

_____, (2007a) Testimony on industrial loan companies before the Committee on Financial Services. U.S. House of Representatives, April 25, Text available at: http://www.federalreserve.gov/newsevents/testimony/kohn20070425a.htm

_____, (2007b) John Taylor rules. Speech given at conference on John Taylor's contributions to monetary theory and policy, Federal Reserve Bank of Dallas, October 12

Kydland FE, Prescott ES (1977) Rules rather than discretion: the inconsistency of optimal plans. Journ of Pol Econ 85:473−492

Lambert MJ, Stanton KD (2001) Opportunities and challenges of the U.S. dollar as an increasingly global currency: a Federal Reserve perspective. Fed Res Bull 87:567−575

Leonhardt D (2007) Pushing the Fed to act early if not often. NY Times, August 22, B1, B9

Lucas RE (1976) Econometric policy evaluation: a critique. Carnegie Rochester Conf Series on Public Policy 1:19−46

Madigan BF, Nelson WR (2002) Proposed revision to the Federal Reserve's discount lending programs. Fed Res Bull 88:313−319

Maisel SJ (1973) Managing the dollar. WW Norton, New York

Malz AM (1995) Currency option markets and exchange rates: a case study of the U.S. dollar in March 1995. Fed Res Bank of NY Cur Issues in Econ and Fin, July

Mayer M (1990) The greatest-ever bank robbery: the collapse of the savings and loan industry. Charles Scribner's & Sons, New York

_____, (2001) The Fed: the inside story of how the world's most powerful financial institution drives the markets. Free Press, New York

Mayer T (1990) Monetarism and macroeconomic policy. Edward Elgar, Aldershot, England

_____, (1999) Monetary policy and the great inflation in the United States. Edward Elgar, Aldershot, England

McCauley RN, Seth R (1992) Foreign bank credit to U.S. corporations: the implications of offshore loans. Fed Res Bank of NY Quarterly Review, Spring, 52−65

Meigs AJ (1962) Free reserves and the money supply. Chicago, Chicago

Meltzer AH (2003) A history of the Federal Reserve, 1913-1951. Chicago, Chicago

Metzler LA (1948) Three lags in the circular flow of income. In Metzler LA (ed) Income, employment, and public policy: essays in honor of Alvin H. Hansen, WW Norton, New York, 11−32

Meulendyke AM (1989) U.S. monetary and financial markets. Fed Res Bank of NY

Meyer LH (2004) A term at the Fed. HarperCollins, New York
Minehan CE, Simons K (1995) Managing risk in the '90s: what should you be asking about derivatives? New England Econ Rev, September/October, 4−25
Modigliani F, Sutch R (1966) Innovations in interest rate policy. Amer Econ Rev 56: (May) 178−197
Mondschean TH (1989) Three essays on financial market innovation. Ph.D. thesis, University of Wisconsin-Madison
Morgenson G (2007) More home foreclosures loom as owners face mortgage maze. NY Times, August 6, A1, A17
Mullaney TE (1971) Speculative tide of dollars abroad brings new crisis. NY Times, May 9, F1, F16
Mundell R (1963) Capital mobility and stabilization policy under fixed and flexible exchange rates. Canadian Journ of Econ and Political Sci 29:475−485
Nerlove M (1966) A tabular survey of macro-econometric models. Internat Econ Rev 7:127−175
Norris F (2007) Modern finance suffers its version of run on the bank. NY Times, August 10, C1, C6
Okun AM (1963) Potential GNP: its measurement and significance. Proceedings of the business and economic statistics section of the Amer Stat Assoc, 98−104
Oliner SD, Rudebusch GD (1996) Monetary policy and credit conditions: evidence from the composition of external finance, comment. Amer Econ Rev 86:300−309
Orphanides A (2004) Monetary policy rules, macroeconomic stability, and inflation: a view from the trenches. Journ of Money, Credit, and Banking 36:151−176
Pauls BD (1990) U.S. exchange rate policy: Bretton Woods to present. Fed Res Bull 76:891−908
Peek J, Rosengren ES, Tootell GMB (2003) Identifying the macroeconomic effect of loan supply shocks. Journ of Money, Credit, and Banking 35:931−946
Phelps ES (1967) Phillips curves, expectations of inflation, and optimal unemployment over time. Economica 34:254−281
Phillips AW (1954) Stabilization in a closed economy. Econ Journ 64:290−323
_____, (1958) The relation between unemployment and the rate of change of money wage rates in the United Kingdom, 1861-1957. Economica 25:283−299
Pierce JL, Enzler JJ (1974) The effects of external inflationary shocks. Brookings Papers on Econ Activity, 1:13−61
Pizzo S, Fricker M, and Muolo P (1989) Inside job: the looting of America's savings and loans. McGraw-Hill, New York
Poole W (1970) Optimal choice of monetary policy instruments in a simple stochastic macro model. Quart Journ of Econ 84:197−216
_____, (2007) The GSEs: where do we stand? Fed Res Bank of St. Louis Review 89:143−51
Porter E, Bajaj V (2007) Rising trouble with mortgages clouds dream of owning home. NY Times, March 17, B4

Porter RD, Judson RA (1996) The location of U.S. currency: how much is abroad? Fed Res Bull 82:883−903
Rattner S (1979) Volcker's rate policy: 6 weeks of sharp rises. NY Times, September 24, D1, D2
Reich C (1984) Inside the Fed. Institut Investor, May, 137−162
Rhoades SA (2000) Bank mergers and banking structure in the United States, 1980-98. Board of Governors of the Fed Res System Staff Study No. 174
Richards HW (1995) Daylight overdraft fees and the Federal Reserve's payment system risk policy. Fed Res Bull 81:1065−1077
Roach S (2002) Smoking Gun. Morgan Stanley Glob Econ Forum, Text available at: Morganstanley.com/GEFdata/digests, February 27
Robinson J (1951) The rate of interest. Econometrica 19:92−111
_____, (1975) What has become of the Keynesian revolution? In Keynes M (ed) Essays on John Maynard Keynes, Cambridge, Cambridge
Romer T, Weingast BR (1992) Political foundations of the thrift debacle. In Barth JR, Brumbaugh RD (eds) The reform of federal deposit insurance: disciplining the government and protecting taxpayers, HarperCollins, New York, 167−202
Salamon J (1982) Chagrined Chase: How New York bank got itself entangled in Drysdale's dealings. Wall Str Journ, June 11, 1, 12
Samuelson PA (1945) The effect of interest rate increases on the banking system. Amer Econ Rev 35:16−27
Samuelson PA, Solow RM (1960) Analytical aspects of anti-inflation policy. Amer Econ Rev 50: (May) 177−194
Scholtes S (2007) US credit defaults on rise. Fin Times, August 28, 13
Scott IO (1957) The availability of credit doctrine: theoretical underpinnings. Rev of Econ Studies, 25, 4: 41−48
Shiller RJ (2000) Irrational Exuberance. Princeton, Princeton
Simons HC (1936) Rule versus authorities in monetary policy. Journ of Pol Econ 44:1−30
Simpson TD (1980) The redefined monetary aggregates. Fed Res Bull 66:97−114
Smith WJ (1978) Repurchase agreements and federal funds. Fed Res Bull 64:353−360
Stevens EJ (1993) Required clearing balances. Fed Res Bank of Cleveland Econ Rev, 29, 4:2−14
Stiglitz JE, Greenwald B (2003) Towards a new paradigm in monetary economics, Raffaelo Mattioli Lectures. Cambridge, Cambridge
Strunk N, Case F (1988) Where deregulation went wrong: a look at the causes behind savings and loan failures in the 1980s. United States League of Savings Institutions
Summers BJ (1980) Negotiable certificates of deposit. Fed Res Bank of Richmond Econ Rev, July/August, 8−19
Summers L (2007) Beware the moral hazard fundamentalists. Fin Times, September 24, 11
Taylor JB (1993) Discretion versus policy rules in practice. Carnegie-Rochester Conf Series on Public Policy 39:195−214

_____, (1999) (ed.) Monetary Policy Rules. Chicago, Chicago
_____, (2007) Housing and monetary policy. Paper read at Federal Reserve Bank of Kansas City symposium on housing, housing finance, and monetary policy, August 31
Telser LG (2007) The Fed's real job. Berkeley Electronic Press, June, Text available at: http://www.bepress.com/ev/vol4/iss4/art4/
Tett G (2007) Use of 'cov-lite' deals spirals in spite of loss-exposure warnings. Fin Times, June 19, 19
Tinbergen J (1952) On the theory of economic policy. North-Holland, Amsterdam
Tobin J (1956) The interest-elasticity of transactions demand for cash. Rev of Econ and Stat 38:241−247
_____ , with Golub SS (1998) Money, credit, and capital. Irwin/McGraw Hill, New York
United States Bureau of the Census (1975) Historical statistics of the United States: colonial times to 1970, vol II:1021−1022
_____, (1986) Statistical abstract of the United States: 1987. U.S. Govt. Printing Office, Washington
United States Congress Joint Committee on the Economic Report, (1952) Hearings before the Subcommittee on General Credit Control and Debt Management. U.S. Govt. Printing Office, Washington, March 10-31
United States Congress Joint Economic Committee (1985), Employment Act of 1946, as amended. U.S. Govt. Printing Office
United States Department of Commerce, Survey of Current Business, various years
United States House of Representatives (1969) The growth of unregistered bank holding companies – problems and prospects. Staff report for the Committee on Banking and Currency, U.S. Govt. Printing Office, Washington, February 11
United States League of Savings Associations, various years, Savings and loan fact book, Chicago
Van Horne, JC (1990) Financial market rates and flows. Prentice-Hall, Englewood Cliffs NJ
Volcker PA, Gyohten T (1992) Changing fortunes: the world's money and the threat to American leadership. Times Books, New York
Wallich HC, Keir PM (1979) The role of operating guides in U.S. monetary policy. Fed Res Bull 65:679−691
Warburg PM (1930) The Federal Reserve System. Macmillan, New York
White LJ (1991) The S & L debacle: public policy lessons for bank and thrift regulation. Oxford University Press, New York
Wicksell K (1935) Lectures on political economy. Routledge & Kegan Paul, London
Wighton D, Guha K (2007) Asset price warning for $75bn superfund. Fin Times, October 22, 1
Wirtz RA (2000) Financial evolution, not revolution. The Region, Fed Res Bank of Minneapolis, March, 7−9, 56−57

Woolley JT (1984) Monetary politics: the Federal Reserve & the politics of monetary policy. Cambridge, Cambridge

Wrase JM (1998) Is the Fed being swept out of (monetary) control? Fed Res Bank of Philadelphia Bus Rev, November/December, 3−12

Young RA (1958) Tools and processes of monetary policy. In United States monetary policy, The American Assembly, New York, 13−48

Zhang PG (1997) Exotic options: a guide to second generation options. World Scientific Publishing Co, Singapore