

U.S. Monetary Policy in the Greenspan Era: 1987 – 2003

Donald D. Hester
Professor of Economics, Emeritus
University of Wisconsin - Madison

Abstract

This paper critically reviews monetary policy during the first sixteen years of Chairman Alan Greenspan's term at the Federal Reserve. In this period or shortly before, there were revolutionary changes in the formulation of monetary policy. Almost all of the conventional indicators of monetary policy – such as various monetary aggregates, net free reserves, and unborrowed reserves – have been de-emphasized or abandoned. The sole surviving indicator is the real federal funds rate. Similarly, several conventional instruments of monetary policy have been discarded or become obsolete. Thus, the Federal Reserve abandoned regulation Q, which set ceilings on deposit interest rates, and the discount rate, which was replaced by an interest rate for short-term borrowing that is automatically 100 basis points above the target federal funds rate. Reserve requirements were effectively abandoned when the Federal Reserve introduced required clearing balances and allowed sweeping of transactions balances. Open market operations have been expanded in scope and together with “moral suasion” are the surviving instruments.

The first half of Greenspan's term was dominated by events that resulted from the passage of the Tax Reform Act of 1986 and the Financial Institutions Reform, Recovery, and Enforcement Act (FIRREA) of 1989 and from instability in equity markets. When a short recession occurred in late 1990 real short-term interest rates were lowered to near zero. This policy was abandoned in early 1994. Although real short-term interest rates averaged more than three percent for the next six years, substantial bubbles were allowed to develop in equity and housing markets. The final ten quarters of the period again had real interest rates approaching zero, which were prompted by a new recession. This turbulent history is analyzed in some detail.

Madison, Wisconsin

November 14, 2003

© 2003 by Donald D. Hester. This paper has been extracted from a larger manuscript by the author, who reserves all rights to it and to its continued inclusion in a larger manuscript.

U.S. Monetary Policy in the Greenspan Era: 1987 – 2003

Donald D. Hester
Professor of Economics, Emeritus
University of Wisconsin - Madison

I Introduction

This paper is a preliminary attempt to evaluate monetary policy by the Federal Reserve during the years of Chairman Alan Greenspan. It is preliminary because he has not completed his term as this is being written and the effects of the most recent policy actions have yet to be fully realized. It is widely acknowledged that the Chairman of the Federal Reserve is the dominant person in the U.S. central bank; it is only a slight exaggeration to associate monetary policy failures and successes with him.¹

Because I focus narrowly on monetary policy, some important concurrent restructuring changes in U.S. financial markets resulting from the Riegle-Neal Interstate Banking and Efficiency Act of 1994 and the Gramm-Leach-Bliley Act of 1999 are not considered. Similarly, significant international financial crises in Mexico in 1994 and in East Asia in 1997 that tangentially engaged the Federal Reserve are not addressed in this paper. The collapse of the hedge fund Long-Term Capital Management in 1998 is only briefly mentioned; its resolution was promoted by the Federal Reserve Bank of New York, but no Federal Reserve funds were expended.

Alan Greenspan was appointed Chairman of the Board of Governors of the Federal Reserve System on August 11, 1987 by President Ronald Reagan. 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, between September 1974 and January 1977. He succeeded Paul A. Volcker, who had guided the Federal Reserve through a difficult period in which the inflation, real short-term interest, and unemployment rates had each exceeded ten percent in the early 1980s and the U.S. dollar had reached an all-time high against foreign currencies in February 1985.

¹ For a sense of the Chairman's power and how it is used, see Maisel, Sherman J., [1973], Ch. 6.

At the end of Volcker's term, the economy was steadily recovering from this traumatic history. The rate of inflation of the GDP price deflator was 3.73%, the real overnight federal funds rate was 2.92%, and the unemployment rate was 6.3% on average in the second quarter of 1987 (hereafter 1987:2). Indeed, the economy seemed to be expanding a little too rapidly because the unemployment rate had fallen from an average of 7.2% and the inflation rate had risen from 2.21% in 1986:2. As a result in the last quarter of Volcker's term the Federal Reserve began to tighten monetary policy.

Monetary policy in the United States at that time was evaluated using several indicators of monetary stringency. At various times, the major indicator variables included nominal and real short-term interest rates, net free reserves (excess reserves minus funds borrowed from the Federal Reserve discount window), unborrowed reserves, borrowings from the discount window, a transactions measure of money (M1), and a broader measure of money (M2). In 1986, the Federal Reserve reported that the relations between M1 and its target variables, GDP and the inflation rate, had broken down and that it was no longer relying on M1 as an indicator variable.² (M1 had been growing very rapidly since the end of 1984, while the rate of inflation had been falling.) Of the other indicators, net free reserves fell and the nominal federal funds, Treasury bill (hereafter, t-bill), and 10-year constant maturity interest rates and discount window borrowing rose in 1987:2. The real federal funds rate, constructed by subtracting the contemporaneous rate of inflation in the GDP implicit price deflator from the nominal federal fund rate, had been falling rapidly, from 6.08% in 1986:1 to 2.93% in 1987:1. It was little changed at 2.92% in 1987:2.

There were several other events and conditions that complicated the situation inherited by Chairman Greenspan. First, because of an agreement among the Group of Five at the Plaza Hotel in September 1986, there was a concerted international effort to

² "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." Source: Board of Governors of the Federal Reserve System, [1987], "Monetary Policy Objectives for 1987: Summary Report of the Federal Reserve Board," February 19, p. 3.

lower the value of the dollar. The trade-weighted value of the dollar fell from 158 (1973=100) in February 1985 to 97 in 1987:2, which would eventually reduce the large U.S. balance of trade deficit. Second, a severe crisis was affecting savings and loan associations and mutual savings banks that would need to be resolved in the near future. The crisis was a consequence of the fact that these financial institutions had a large negative gap before interest rates rose in the early 1980s; the subsequent period of high interest rates had essentially consumed all of their net worth.³ Third, as is discussed further below a major piece of tax reform, the Tax Reform Act of 1986, had just been enacted and would substantively impact several markets – especially mortgage markets. Finally, landmark institutional reform legislation, the Depository Institutions Deregulation and Monetary Control Act of 1980 (hereafter, DIDMCA), was still being phased in; it would continue to change the scope of reserve requirements through 1988. Among other things, this act effectively eliminated the distinction between banks that were members of the Federal Reserve System and all other depository institutions with offices in the U.S., and thus greatly expanded the number of institutions subject to reserve requirements and given access to the Federal Reserve discount window.

Because of the extraordinary length of Greenspan's term as Chairman, it is convenient to consider it in two subperiods, 1987:3 – 1995:2 and 1995:3 – 2003:3.

II Monetary Policy from 1987:3 through 1995:2

As can be seen in Table 1, which is a quarterly summary of real conditions in the U.S. economy, the unemployment rate continued to fall until 1988:3 and the civilian labor force participation rate rose, as discouraged workers reentered the labor market.⁴ Real GDP grew strongly but unevenly until 1990:3. Because of large Reagan administration income tax cuts that occurred between 1981 and 1983 and rapidly rising expenditures on national defense, the National Income and Products Accounts federal deficit did not fall much as the economy grew. The balance of payments deficit began to

³ A gap at time t is defined as 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 the higher interest rates.

⁴ The civilian labor force participation rate is the percentage of the noninstitutionalized population over age 16 that is either employed or actively seeking employment.

Table 1
Substantive Measures of Economic Activity: 1987:3 – 1995:2⁵

quarter	unemploy- ment rate	civilian participation rate	nominal GDP	GDP deflator	annual % rate inflation	real fedfunds rate	federal surplus	balance on current account
1987:3	6.0	65.6	4770.2	77.84	3.06	3.78	- 136.7	- 160.5
1987:4	5.8	65.7	4891.6	78.46	2.91	4.01	- 143.6	- 165.1
1988:1	5.7	65.8	4957.0	78.98	3.37	3.29	- 147.4	- 131.8
1988:2	5.5	65.8	5066.5	79.79	4.34	2.82	- 134.4	- 115.6
1988:3	5.5	66.0	5151.5	80.71	3.82	4.16	- 130.7	- 111.7
1988:4	5.3	66.1	5258.3	81.33	3.66	4.81	- 136.9	- 125.6
1989:1	5.2	66.4	5379.0	82.20	4.09	5.35	- 108.9	- 109.8
1989:2	5.2	66.4	5461.7	83.01	3.42	6.31	- 127.4	- 102.5
1989:3	5.2	66.5	5527.5	83.62	2.94	6.14	- 140.5	- 91.0
1989:4	5.4	66.5	5588.0	84.24	3.70	4.91	- 143.3	- 94.7
1990:1	5.3	66.7	5720.8	85.18	4.51	3.74	- 172.0	- 88.6
1990:2	5.3	66.5	5800.0	86.16	4.18	4.06	- 171.0	- 80.2
1990:3	5.7	66.5	5844.9	86.99	3.63	4.53	- 164.8	- 89.8
1990:4	6.1	66.4	5847.3	87.74	4.03	3.71	- 184.1	- 57.2
1991:1	6.6	66.2	5886.3	88.76	3.74	2.69	- 160.1	45.1
1991:2	6.8	66.3	5962.0	89.40	2.75	3.11	- 213.5	8.7
1991:3	6.9	66.1	6015.9	89.99	2.38	3.26	- 234.6	- 18.6
1991:4	7.1	66.1	6080.7	90.47	2.59	2.23	- 253.2	- 20.2
1992:1	7.4	66.3	6183.6	91.16	2.63	1.39	- 288.3	- 21.6
1992:2	7.6	66.6	6276.6	91.67	1.77	2.00	- 291.8	- 50.1
1992:3	7.6	66.6	6345.8	91.97	1.91	1.35	- 316.5	- 48.7
1992:4	7.4	66.3	6469.8	92.55	2.92	0.12	- 293.5	- 73.6
1993:1	7.1	66.2	6521.6	93.32	2.72	0.32	- 300.8	- 52.6
1993:2	7.1	66.3	6596.7	93.82	1.96	1.04	- 267.2	- 83.2
1993:3	6.8	66.3	6655.5	94.24	2.06	1.00	- 275.5	- 85.1
1993:4	6.6	66.3	6795.5	94.79	2.19	0.80	- 253.1	- 109.2
1994:1	6.6	66.6	6887.8	95.28	1.93	1.28	- 237.5	- 93.4
1994:2	6.2	66.5	7015.7	95.71	2.09	1.85	- 190.5	- 114.1
1994:3	6.0	66.5	7096.0	96.28	2.14	2.35	- 212.0	- 124.9
1994:4	5.6	66.7	7217.7	96.74	2.42	2.75	- 209.4	- 140.6
1995:1	5.5	66.8	7297.5	97.45	2.30	3.51	- 208.3	- 114.9
1995:2	5.7	66.6	7342.6	97.86	1.74	4.28	- 188.9	- 123.2

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 a basic identity in the national

⁵ Inflation rates for the GDP deflator 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 National Income and Product (NIPA) measure. Apart from the annualized percentage inflation and real federal funds rates, all data are from the Federal Reserve Bank of St. Louis's FRED2 data bank in this and Table 3 below. The current account balance has been expressed at an annualized rate.

income accounts, these changes implied that net private saving fell substantially.⁶ The rate of inflation fell through the end of 1987, but then rose and oscillated around 3.75% through 1991:1.

In Table 2, quarterly data on several indicators are reported. They suggest that the tightening begun at the end of the Volcker term continued after Greenspan took over, but there was vacillation in some indicators after the stock market experienced a very sharp short-term collapse in October 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. Other nominal interest rates exhibited similar patterns.

With the exceptions of 1988:2 and 1988:3, M1 had almost no growth until 1990:1; real M1 (adjusted for inflation) fell. Because of the de-emphasis 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 Federal Open Market Committee (hereafter, FOMC) as focusing on M2 or some other higher aggregate rather than attempting to slow the economy with extremely weak monetary growth.⁷ However, 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 its desired growth rates.^{8,9} Between 1987:3 and 1989:4, currency

⁶ 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 deficit. If net private saving were zero, then the trade deficit in the national income accounts would equal the federal government's deficit.

⁷ The Federal Open Market Committee was established in 1935 and consists of the seven governors of the Federal Reserve Board and five regional Federal Reserve Bank presidents, who serve as voting members on the FOMC on an alternating basis, except for the President of the Federal Reserve Bank of New York who is always a voting member. The Humphrey-Hawkins Act requires that the Federal Reserve Board make semiannual reports to the U.S. Congress describing its monetary policies and how they are related to policies that are established by the Executive Branch of the Government. See the following footnote.

⁸ This information is available in semiannual summary reports of the Federal Reserve Board, "Monetary Policy Objectives," that were submitted pursuant to the Full Employment and Balanced Growth Act of 1978 (Humphrey-Hawkins) on February 23, 1988, July 13, 1988, February 21, 1989, July 20, 1989, and February 20, 1990.

⁹ M1 is 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 is 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 is the sum of M2, large

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. (Depository institutions were increasingly satisfying their reserve requirements with vault cash instead of reserve balances with Federal Reserve banks; some went into ATM machines.) An unknown amount was disappearing into foreign currency hoards. Although net free reserves were essentially flat, it seems plausible that the Federal Reserve was putting a great deal of pressure on some depository institutions. Discount window borrowings rose in 1988 and 1989 when a large number of bank failures occurred – the largest number per annum since the early 1930s. The real federal funds rate, reported in Table 2, rose to its highest level since 1984:3 in 1989:2. Not surprisingly this restrictive policy contributed to inducing a recession that was evidenced by a decrease in real GDP in 1990:3.

Other forces were at work and it is important to put this tightening of monetary policy in context. As already noted, stock markets were experiencing instability and a wave of bank failures was occurring. In addition, possibly because of actual or potential bank failures, funds raised through repurchase agreements peaked in 1989:1 and then began a sustained decline – the first since 1970.¹⁰ However, their level in 1989:4 was still higher than it was in 1987:3.

Second, as a result of the Tax Reform Act of 1986, major changes were occurring in real estate markets. This act reduced the attractiveness of commercial real estate investments to passive investors. There had been a steady increase in vacancy rates that

time deposits, large denomination term repurchase agreements, institutional-investor money market mutual funds, and certain term Eurodollar deposits.

¹⁰ Data on the volume of repurchase agreements are not available before 1970:1 and data were not widely accessible until 1977. Repurchase agreements are borrowings that are collateralized by U.S. government or government agency securities and, hence, essentially free of default risk. These transactions are attractive to banks because unlike deposits, funds acquired through repurchase agreements are not subject to reserve requirements and relatively costless, because the interest rates on repurchase agreements are less than the federal funds rate. Corporations and state governments find them attractive, because interest is 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 suffered when they lost idle demand deposit balances to repurchase agreements arranged by security dealers. For a technical discussion of repurchase agreements, see Smith, Wayne J., [1978].

Table 2
Monetary Instruments and Indicators: 1987:3 – 1995:2¹¹

quarter	net free reserves	federal funds rate	M1	discount rate	treasury bill rate	discount borrowing	repurchase agreements	currency	reserve bank cred.	10-yr. rate
1987:3	0.4	6.84	746.0	5.65	6.04	0.8	174.3	216.9	235.2	8.88
1987:4	0.7	6.92	752.3	6.00	5.86	0.8	180.6	223.0	242.6	9.12
1988:1	0.7	6.66	757.7	6.00	5.72	1.1	177.8	225.3	241.5	8.42
1988:2	0.5	7.16	772.0	6.00	6.21	2.9	186.0	230.7	249.7	8.91
1988:3	0.2	7.98	783.7	6.29	7.01	3.2	190.8	236.0	254.0	9.10
1988:4	0.6	8.47	784.3	6.50	7.73	2.3	195.2	240.6	259.2	8.96
1989:1	0.6	9.44	783.0	6.70	8.54	1.7	196.1	246.7	259.0	9.21
1989:2	0.4	9.73	775.0	7.00	8.41	1.8	194.1	245.7	265.7	8.77
1989:3	0.3	9.08	780.0	7.00	7.84	0.7	184.5	249.3	260.8	8.11
1989:4	0.6	8.61	788.3	7.00	7.65	0.4	173.1	252.6	264.2	7.91
1990:1	0.5	8.25	797.0	7.00	7.76	1.3	168.1	256.0	267.5	8.42
1990:2	0.5	8.24	806.0	7.00	7.75	1.3	168.4	262.7	274.6	8.68
1990:3	0.3	8.16	816.3	7.00	7.48	0.8	169.7	270.7	282.1	8.70
1990:4	0.8	7.74	821.3	6.93	6.99	0.3	156.6	278.6	288.1	8.40
1991:1	1.4	6.43	831.7	6.17	6.02	0.3	140.5	285.0	285.3	8.02
1991:2	0.8	5.86	848.7	5.66	5.56	0.3	133.7	289.0	287.6	8.13
1991:3	0.5	5.64	867.0	5.40	5.38	0.7	131.8	294.0	294.8	7.94
1991:4	0.8	4.82	887.0	4.56	4.54	0.2	131.4	299.8	302.9	7.35
1992:1	0.9	4.02	922.7	3.50	3.89	0.1	131.6	302.5	306.5	7.30
1992:2	0.9	3.77	948.7	3.50	3.68	0.2	130.5	307.9	307.4	7.38
1992:3	0.7	3.26	975.7	3.01	3.08	0.3	135.6	316.0	318.2	6.62
1992:4	1.0	3.04	1014.3	3.00	3.07	0.1	139.6	325.1	328.3	6.74
1993:1	1.1	3.04	1033.0	3.00	2.96	0.1	143.2	330.4	336.5	6.28
1993:2	0.9	3.00	1062.0	3.00	2.97	0.1	155.0	338.8	348.1	5.99
1993:3	0.7	3.06	1095.0	3.00	3.00	0.3	165.8	348.6	358.2	5.62
1993:4	0.9	2.99	1121.7	3.00	3.06	0.2	169.1	357.4	368.1	5.61
1994:1	1.1	3.21	1135.0	3.00	3.24	0.1	169.2	364.4	374.4	6.07
1994:2	0.8	3.94	1142.0	3.25	3.99	0.2	179.0	374.5	384.1	7.08
1994:3	0.6	4.49	1151.0	3.75	4.48	0.5	185.1	384.7	391.6	7.33
1994:4	0.7	5.17	1149.7	4.38	5.28	0.3	189.1	393.8	399.7	7.84
1995:1	0.9	5.81	1147.0	5.08	5.74	0.1	201.5	398.8	402.9	7.48
1995:2	0.7	6.02	1144.7	5.25	5.60	0.2	208.2	407.5	412.0	6.62

began with a recession which occurred in 1980. Beginning in 1987 there were growing capital losses on commercial properties.¹²

Third, 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

¹¹ All interest rates are expressed as percent per year. Data on nominal M1 are seasonally adjusted. All information is from the Federal Reserve Bank of Saint Louis FRED2 data bank.

¹² See Hester, Donald D., [1993], p. 127.

purchases made on credit. The major exception was interest on residential mortgage loans, which would make home ownership doubly attractive. A home 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 volumes of home equity lines of credit, which permitted home owners to borrow flexibly against equity in homes. This act led to considerable increases in house prices, construction, and homeowners' ratio of debt to equity.

Fourth, the resolution of the crisis in the thrift industry, which had been postponed by the passage of the Garn-St Germain Act of 1982 and several subsequent pieces of legislation, would finally begin in 1989 when the Financial Institutions Reform, Recovery, and Enforcement Act (FIRREA) was passed.¹³ 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 and shallow; real GDP (in 1996\$) fell from a peak of \$6,732 billion in 1990:3 to \$6,632 billion in 1991:4 and passed its previous peak in 1992:1. 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 fell from a peak of 4.51% in 1990:1 to 1.77% in 1992:1 and then averaged about 2.25% through mid 1995. The recession was associated with lower 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 1 improved much more than the trade balance because of grants of funds by foreign governments to the U.S. that reimbursed it for assuming the lion's share of the cost of the war in Kuwait. The federal deficit, which rose

¹³ The Garn-St Germain Act was passed in September 1982; it authorized a number of emergency measures to stave off an imminent collapse of the savings and loan and mutual savings bank industries and the introduction of two new deposit forms that paid close to money market interest rates, Money Market Deposit Accounts and Super NOW Accounts. For a fuller description of the act, see Federal Reserve Bank of Chicago, [1983], pp. 28-49.

because of the war and the operation of automatic stabilizers, reached a maximum in 1992:3 and then began to fall as the economy slowly recovered from the recession and as 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 2. 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 depository institution vault cash. The real federal funds rate in Table 1 was 4.51% in 1990:3 and had risen for two consecutive quarters. All of these indicators began to signal easing in 1990:4.¹⁴ They continued to signal easing until 1994:1, when a sudden 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 dubious because of the ongoing marketing of repossessed 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. The Federal Reserve's paternalistic policy of keeping interest rates low would help depository institutions. The cost of deposits would be low and depository institutions would continue to earn high interest income on their portfolio of longer term assets. A negative gap is desirable when interest rates fall and remain at the new low level! There was little apparent cost to continuing ease, because the inflation rate continued to be low.

Further actions to help troubled financial 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

¹⁴ 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 Economic Report of the President, [1993], p. 52.

weekly reporting banks.¹⁵ 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.

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.¹⁶ To avoid growing restrictions and penalties on daylight overdrafts, institutions needed to increase funds on deposit at Federal Reserve Banks.¹⁷ These funds took the form of “required clearing balances”, which were established shortly after the enactment of DIDMCA. To establish such balances, an institution contracts with its Federal Reserve Bank to maintain an average balance over a time interval that coincides with the period over which its reserve requirements are enforced, traditionally one or two weeks. While these balances do not pay interest explicitly, the balances yield credits that may be used to pay for services that the institution receives from the Federal Reserve. The amount of such balances rose sharply in 1991 after the cuts in reserve requirements.¹⁸ 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

¹⁵ The Federal Reserve allows small institutions to file information about their deposit liabilities less frequently than large institutions.

¹⁶ Depository institution reserve balances with Federal 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 deposit sweeps, which are described below. Sources: Board of Governors of the Federal Reserve System, [1996] and [2002], Table 3.

¹⁷ A daylight overdraft occurs during a business day if a bank wires more funds or securities out of its accounts 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 were closed. For a discussion of this, see Hester, Donald D., [1982], pp. 310-2. 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, Terrence M., 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 discussion, see Richards, Heidi Willmann, [1995].

¹⁸ See Edwards, Cheryl L., [1997], pp. 869-71. For a good discussion of required clearing balances, see Stevens, E. J., [1993].

usually earn implicit interest.¹⁹ The amount of required clearing balances a bank chooses to contract for is an element that was missing from existing models of cash management.

Depository institution fragility and 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.²⁰ 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 Act of 1978 (Humphrey-Hawkins), 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 circumstances, 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.²¹

With this de-emphasis of M2 and the 1986 Volcker reservations about the meaning of M1, the Federal Reserve clearly stated that it did not accept the doctrine of “Monetarism.”²² It had never specifically accepted the monetarist dogma, but it might

¹⁹ The relation between the discount rate, other short-term interest rates, and net free reserves had been clarified in a widely circulated 1958 manuscript by James Tobin, which would not be published until 1998. In Chapter 9 of Tobin [1998] there is an extensive discussion of a bank’s demand for net free reserves as a fraction of a bank’s defensive assets, which suggests that in the absence of a federal funds market 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.

²⁰ See Greenhouse, Steven, [1993a], “Clinton Goes Head to Head with the Fed,” *New York Times*, January 18, pp. C1, C5 and Greenhouse, Steven, [1993b], “Fed Chief Sways to Clinton’s New Economic Tune,” *New York Times*, February 27, pp. C1, 26.

²¹ Board of Governors of the Federal Reserve, [1993], “1993 Monetary Policy Objectives: Midyear Review of the Federal Reserve Board”, July 20, pp. 9-10.

²² For a discussion of Monetarism, see Mayer, Thomas, [1990].

have been interpreted as having tacitly accepted it at times. 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 rational. 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.²³ Indeed, 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.²⁴

Pre-1994 data in Table 1 did not suggest that a strong case for tightening existed. However, there was a sizable (unreported) increase in outstanding consumer installment debt that commenced in late 1993.²⁵ 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 1, inflation was well contained. Because of 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.”²⁶

Federal Reserve policy raised the nominal federal funds rate in Table 2 from 2.99% in 1993:4 to 6.02% in 1995:2. Nominal M1 fell for three consecutive quarters

²³ See Greenhouse, Steven, [1993c], “Fed Fears a Market Bubble If It Lowers Interest Rates,” New York Times, September 16, pp. C1-C2.

²⁴ See Bradsher, Keith, [1994], “The Federal Reserve Is Signaling A New Increase in Interest Rates,” New York Times, April 15, pp. A1, C5.

²⁵ See Board of Governors of the Federal Reserve System, [1996], pp. 153-4.

²⁶ Edwards, Cheryl L., [1997], p. 862.

ending in 1995:2 while currency outstanding continued to expand rapidly.²⁷ By implication, transactions deposits fell considerably, if M1 was 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. Another consequence of tightening was that the growth of real GDP slowed in 1995:1 and 1995:2 and the unemployment rate rose 0.2% in 1995:2.

In January 1994, an important innovation, retail sweeps, occurred that partly explains the decline in M1 mentioned in the preceding paragraph.²⁸

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.²⁹

Thus, after 1993, transactions deposit balances reported in M1 no longer measure transaction balances available to households and small businesses. Swept balances are available to them for completing transactions and are conceptually similar to negotiable certificates of deposit, Eurodollar balances, and overnight repurchase agreements that large corporations use to manage funds – with one important difference. Corporations gained income and flexibility – often at the expense of banks that were forced to offer them to meet competitive challenges. Banks gained from introducing sweep programs because 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.

²⁷ 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, Richard D. and Ruth A. Judson, [1996], who report that more than half of U.S. currency was abroad in 1995.

²⁸ See the February 20, 1996 Humphrey-Hawkins Report to Congress, as reproduced in the Federal Reserve Bulletin, 82, 4 (April), p. 300.

²⁹ Source: Edwards, Cheryl L., [1997], p. 870.

The Federal Reserve has made no attempt to measure the amounts in sweep accounts other than to ask banks to report the initial amounts that were swept when they introduced sweep programs.³⁰ Clearly, 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 first introduced by the Franklin National Bank; the unused limits on them were potentially transactions balances.

III Monetary Policy from 1995:3 through 2003:3

As can be inferred from Table 3, 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. 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. Partly because of the Bush and Clinton tax rate increases and partly because of the expansion in economic activity the federal deficit fell and turned into a surplus beginning in 1998:1. The surplus was over \$200 billion in calendar year 2000. The deficit in the balance on current account soared to a record of \$443.9 billion in 2000:4, which coincided with a then record trade deficit on goods and services.³¹

In the light of the slowdown in 1995:3 and 1995:4, 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 allowed the former to increase 25 basis points in 1997:2.

³⁰ In August 1997 the estimated volume of reservable deposits initially swept was \$226 billion. Source: Edwards, Cheryl L., [1997], p. 870.

³¹ A growing trade deficit and federal surplus imply a sharply falling private saving rate, because of the aforementioned national income and product accounting identity. The reasons for the low saving rate and the trade imbalance are unclear.

Table 3
Substantive Measures of Economic Activity: 1995:3 – 2003:3

quarter	unemploy- ment rate	civilian participation rate	nominal GDP	GDP deflator	annual % rate inflation	real fedfunds rate	federal surplus	balance on current account
1995:3	5.7	66.6	7432.8	98.30	1.87	3.93	- 197.6	- 102.3
1995:4	5.6	66.5	7529.3	98.78	2.21	3.51	- 173.2	- 83.0
1996:1	5.5	66.5	7629.6	99.39	1.93	3.43	- 176.5	- 98.0
1996:2	5.5	66.7	7782.7	99.74	1.66	3.58	- 137.0	- 115.4
1996:3	5.3	66.8	7859.0	100.22	1.78	3.53	- 130.1	- 140.7
1996:4	5.3	67.0	7981.4	100.63	2.23	3.05	- 103.7	- 117.2
1997:1	5.2	67.0	8124.2	101.34	2.35	2.93	- 86.5	- 129.7
1997:2	5.0	67.1	8279.8	101.82	1.53	3.99	- 68.0	- 106.6
1997:3	4.9	67.2	8390.9	102.12	1.31	4.22	- 33.7	- 120.4
1997:4	4.7	67.2	8478.6	102.49	1.25	4.26	- 25.0	- 156.8
1998:1	4.6	67.1	8627.8	102.76	1.01	4.51	19.6	- 163.3
1998:2	4.4	67.0	8697.3	103.01	1.20	4.30	33.0	- 197.2
1998:3	4.5	67.1	8816.5	103.38	1.24	4.29	65.7	- 229.1
1998:4	4.4	67.2	8984.5	103.65	1.43	3.43	57.0	- 225.7
1999:1	4.3	67.2	9092.7	104.12	1.65	3.08	88.7	- 238.7
1999:2	4.3	67.1	9171.7	104.51	1.36	3.39	112.9	- 280.6
1999:3	4.2	67.0	9316.5	104.83	1.45	3.64	117.4	- 320.6
1999:4	4.1	67.1	9516.4	105.27	2.36	2.95	128.8	- 331.6
2000:1	4.0	67.3	9649.5	106.07	2.66	3.02	223.2	- 376.2
2000:2	4.0	67.2	9820.7	106.68	1.97	4.30	197.2	- 392.4
2000:3	4.1	66.9	9874.8	107.12	1.87	4.65	213.2	- 428.7
2000:4	3.9	66.9	9953.6	107.68	2.84	3.63	193.8	- 443.9
2001:1	4.2	67.1	10028.1	108.65	3.02	2.57	173.8	- 416.0
2001:2	4.5	66.8	10049.8	109.32	2.32	2.01	144.4	- 399.9
2001:3	4.8	66.7	10097.8	109.92	0.84	2.66	- 51.7	- 414.5
2001:4	5.6	66.8	10152.9	109.78	0.40	1.73	21.3	- 344.6
2002:1	5.6	66.6	10313.1	110.14	1.27	0.46	- 145.8	- 426.9
2002:2	5.8	66.7	10376.9	110.48	1.16	0.59	- 195.6	- 491.3
2002:3	5.8	66.6	10506.2	110.76	1.39	0.35	- 210.5	- 490.9
2002:4	5.9	66.5	10588.8	111.25	2.05	- 0.61	- 256.6	- 514.3
2003:1	5.8	66.3	10688.4	111.90	1.66	- 0.41	- 280.1	- 554.8
2003:2	6.2	66.5	10802.7	112.18	1.37	- 0.12	- 390.2	- 554.7
2003:3	6.1	66.2	11038.4	112.67				

The Federal Reserve can be interpreted as attempting to keep the real federal funds rate between 3.5% and 4.5%, which historically would coincide with periods of moderately restrictive monetary policy.³² The real federal funds rate rose above 4% when the unemployment rate fell below 5%. All three interest rates fell dramatically in 1998:4 after

³² 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 paper 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.

a financial 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. This rate should be interpreted as correctly forecasting that the extraordinary period of expansion was about to end. It was not the only indicator of trouble ahead. After a long string of gains, the monthly average of the Standard and Poor's 500 stock index peaked at 1,485 (1941-1943 =10) in August 2000 and then fell to 1,331 in December.

Although the Federal Reserve had de-emphasized monetary aggregates, it is instructive to examine nominal M1 in Table 4 between 1995:3 and 2000:4. 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. 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 adjusted components, currency in the hands of the public, rose from \$367.3 billion in July 1995 to \$529.9 billion in December 2000.³³ The transactions deposit component of M1 fell considerably during this five-year period of rapid economic expansion, in large part because of the introduction of retail sweep accounts. It is likely that much of the increment to the currency component disappeared into overseas currency hoards, but there are no reliable measures of them.³⁴

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

³³ These sums are smaller than those shown in Table 4 because they exclude vault cash in depository institutions.

³⁴ For a useful discussion of currency, see Lambert, Michael J. and Kristin D. Stanton, [2001].

Table 4
Monetary Instruments and Indicators: 1995:3 – 2003:3

quarter	net free reserves	federal funds rate	M1	discount rate ³⁵	treasury bill rate	borrowing		repurchase agreements	currency	reserve bank cred.	10-yr. rate
						Federal Reserve	from				
1995:3	0.7	5.80	1144.7	5.25	5.37	0.3		205.7	410.7	410.6	6.32
1995:4	0.9	5.72	1132.3	5.25	5.26	0.2		200.6	415.0	414.8	5.89
1996:1	1.1	5.36	1119.7	5.08	4.93	0.0		199.7	415.5	413.1	5.91
1996:2	0.8	5.24	1116.3	5.00	5.02	0.2		212.7	420.5	418.7	6.72
1996:3	0.6	5.31	1103.7	5.00	5.10	0.4		211.7	429.8	425.4	6.78
1996:4	0.9	5.28	1082.0	5.00	4.98	0.2		211.3	438.0	432.4	6.34
1997:1	1.1	5.28	1075.3	5.00	5.06	0.1		214.8	442.5	436.4	6.56
1997:2	0.9	5.52	1062.7	5.00	5.05	0.3		221.9	448.8	448.9	6.70
1997:3	0.8	5.53	1068.7	5.00	5.05	0.5		229.5	457.0	450.5	6.24
1997:4	1.3	5.51	1068.3	5.00	5.09	0.2		248.2	467.7	461.2	5.91
1998:1	1.5	5.52	1075.3	5.00	5.05	0.1		265.3	473.1	466.7	5.59
1998:2	1.3	5.50	1075.3	5.00	4.98	0.2		275.2	478.8	475.5	5.60
1998:3	1.3	5.53	1076.0	5.00	4.82	0.3		277.6	488.8	482.5	5.20
1998:4	1.4	4.86	1091.7	4.66	4.25	0.1		287.7	503.3	496.2	4.67
1999:1	1.2	4.73	1095.7	4.50	4.41	0.1		303.1	511.8	504.6	4.98
1999:2	1.1	4.75	1099.7	4.50	4.45	0.1		302.4	523.8	517.7	5.54
1999:3	0.8	5.09	1098.7	4.60	4.65	0.3		308.5	537.3	530.1	5.88
1999:4	1.0	5.31	1111.7	4.87	5.04	0.3		323.5	573.9	566.6	6.14
2000:1	1.2	5.68	1111.7	5.19	5.52	0.2		345.6	572.3	564.8	6.48
2000:2	0.7	6.27	1106.3	5.70	5.71	0.4		353.9	566.4	559.4	6.18
2000:3	0.5	6.52	1103.0	6.00	6.02	0.5		360.8	570.2	559.6	5.89
2000:4	1.0	6.47	1092.7	6.00	6.02	0.3		361.2	577.4	569.4	5.57
2001:1	1.4	5.59	1100.0	5.11	4.82	0.1		360.1	583.9	576.6	5.05
2001:2	1.1	4.33	1116.3	3.83	3.66	0.2		378.9	591.3	584.3	5.27
2001:3	5.9	3.50	1162.7	3.06	3.17	1.3		366.1	607.2	607.3	4.98
2001:4	1.4	2.13	1167.3	1.64	1.91	0.1		366.7	623.3	619.7	4.77
2002:1	1.3	1.73	1184.3	1.25	1.72	0.1		378.7	636.7	632.9	5.08
2002:2	1.1	1.75	1182.3	1.25	1.72	0.1		375.5	649.5	647.6	5.10
2002:3	1.2	1.74	1191.7	1.25	1.64	0.3		395.2	661.2	657.8	4.26
2002:4	1.6	1.44	1205.0	0.94	1.33	0.2		442.1	669.8	672.1	4.01
2003:1	1.7	1.25	1227.9	n.a.	1.16	0.0		489.2	680.6	697.7	3.92
2003:2	1.6	1.25	1256.0	n.a.	1.04	0.1		520.0	690.0	713.4	3.62
2003:3	2.2	1.02	1283.9	n.a.	0.93	0.2		488.0	695.7	718.5	4.23

Finally, it should be noted that the volatility of net free reserves and discount window borrowing in Table 4 is much lower than in most preceding postwar periods. This low volatility is partly a consequence of growing required clearing balances. As in the case of monetary aggregates, they are no longer very informative about monetary

³⁵ Beginning 2003:1, the Federal Reserve no longer reports a discount rate. For an explanation, see Madigan, Brian F. and William R. Nelson, [2002].

policy. Indeed, a legal announcement in the December 2002 Federal Reserve Bulletin (pp. 482-3) effectively announced the abandonment of the discount rate as a policy instrument. The Federal Reserve replaced it with an interest rate on discount window primary credit that will be one percentage point above the Federal Reserve's desired federal funds rate. Depository institutions that are judged to be in good financial condition will be allowed to borrow funds at this rate for short periods. Thus, the Board has adopted a form of collateralized penalty bank rate such as has long existed at the Bank of England and is similar to Lombard rates, at which temporary funds are offered by the European Central Bank. Depository institutions that do not qualify to borrow at the primary rate may be allowed to borrow from the Federal Reserve at a still higher penalty secondary rate.

The negative signals from the 10-year constant maturity rate and the Standard and Poor's 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 imports. Net international portfolio income had turned negative in 2002 and together with recovery-induced rising imports led the U.S. to experience new record deficits in the balance on current account at the end of the period, as reported in Table 4. The rate of inflation fell during the recession and stayed very low during the recovery. Indeed, Federal Reserve governors openly discussed the possibility of deflation occurring.³⁶ In addition to the foregoing, hijacked airliners attacked the World Trade Center in New York and the Pentagon in Washington and the Bush administration launched attacks on Afghanistan and Iraq, with Great Britain and Australia as minor partners in the latter. These events would result in increased government spending and further spending obligations in the coming years.

³⁶ See, for example, Bernanke, Ben S., [2003], "An Unwelcome Fall in Inflation?" Speech given at Economics Round Table, University of California-San Diego, La Jolla, California, July 23

Rather ominously, major equity markets continued to fall; the monthly average Standard and Poor's 500 stock 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, but its future course is unclear as this being written. (The index has a value of 1038 on October 22, 2003, about 30% below its peak level in August 2000.) Many individuals, including Chairman Greenspan had been suggesting the possibility that a bubble was developing in equity markets – especially in the NASDAQ – for several years.³⁷

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% in June 24, 2003.³⁸ As is evident in Table 4, 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 the unprecedented 4.75% reduction in this desired rate, but similar to that of the 1990 recession. The large interest rate reduction may also have curbed the increase in the rate of unemployment, but as of this writing labor market conditions have continued to be sluggish as can be seen in the continuing high rate of unemployment and the falling civilian labor force participation rate. The recovery in unemployment 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 in the United States, net free reserves have been steadily positive and discount window borrowing has been almost negligibly low. M1 has been rising strongly since 2000:4. Funds acquired through repurchase agreements have risen by more than 40% between 2000:4 and 2003:2, almost equaling the increase in M1, which again was largely an increase in its currency component. Perhaps because of continuing low interest rates, funds acquired through repurchase agreements fell sharply in 2000:3. As in the top half of Table 4,

³⁷ 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, Stephen, [2002], “Smoking Gun,” Morgan Stanley Global Economic Forum, www.Morganstanley.com/GEFdata/digests, February 27, 2002. See also Browne, Lynn Elaine, [1999] and Shiller, Robert, [2000].

³⁸ This change is not apparent in Table 4 which is an average of monthly averages of daily effective federal funds rates that existed in each quarter.

changes in monetary aggregates continue to be uninformative about how monetary policy is proceeding.

However, in Table 3 it can be seen that the real federal funds interest rate fell to near zero in 2002:1 as it did in 1992 and 1993 in the preceding recession, and has remained there for the six subsequent quarters. It remains to be seen whether this expansionary stance will work again. After the events of the 1970s, the Federal Reserve has been hesitant to keep it down for extended periods. Beginning in July 2003, the slope of the yield curve dramatically increased. This suggests that traders in security markets anticipate that interest rates are about to rise. At least, that is the way Chairman Greenspan read such tea leaves in 1993 in his Humphrey- Hawkins testimony!

IV Interpretation and Conclusion

a) *Indicators and instruments.* During the term of Chairman Greenspan there have been dramatic changes in the way monetary policy has been formulated and presented to U.S. citizens. Following up on Chairman Volcker's decision to de-emphasize M1 as an indicator of monetary policy, Chairman Greenspan renounced M2 as a reliable guide to monetary policy. These two actions can be read as a Federal Reserve rejection of the monetarist dogma that by controlling some monetary aggregate a central bank would be able to guide an economy to high levels of real activity without inflation.³⁹ In part, the immeasurable amount of currency that is in overseas hoards has made control of the monetary base and monetary aggregates difficult. The usefulness of the monetary aggregates has also depreciated because of the proliferation of close substitutes and innovations that have been discussed above.⁴⁰ These include overnight repurchase agreements and sweep accounts, but also off-shore "shell branches" of U.S. and foreign

³⁹ Even Milton Friedman appears to agree. "The use of quantity of money as a target has not been a success. . . . I'm not sure I would as of today push it as hard as I once did." Source: London, Simon, [2003], "The Long View," Financial Times, June 7/8, p. w3.

⁴⁰ An imaginative characterization of the high rate of turnover of indicators is "Goodhart's Law," named after its proponent, Professor Charles Goodhart of the London School of Economics. The law argues that the relation between an indicator and target variables collapses as soon as the indicator is used and widely recognized. 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 potential rate of return to innovators.

banks that have been used after 1981 to transfer immediately available funds across the border through the New York Clearing House Interbank Payments System (CHIPS).

The introduction of required clearing balances after DIDMCA has made system-wide excess reserves an unpredictable random variable. After 1980 increasing restrictions on daylight overdrafts and implicit interest paid on required clearing balances induced banks to increase required clearing balances to the point where required reserves were not binding. Consequently excess reserves and, thus, net free reserves became uninformative as indicators of monetary policy.

Since 1993, the Federal Reserve has been almost exclusively focusing on the real federal funds interest rate when implementing monetary policy. This is an ironic twist and a return to ancient history, because the Federal Reserve was using short-term interest rates as indicators in the 1950s. The difference today, if any, lies in its focus on real rather than nominal short-term rates. Much depends upon how it goes about forecasting the rate of inflation.

Policy instruments have had a similar high mortality rate. Because of the Depository Deregulation and Monetary Control Act of 1980 (still being phased in when Greenspan became Chairman), it was necessary to reconsider how reserve requirements and the discount window could be used to implement monetary policy. The act vastly increased the number of financial institutions subject to reserve requirements and, therefore, the collective reporting burden of depository institutions. The Federal Reserve's information about the extent to which reserve requirements are binding is inevitably less complete than before the act. As a result, the effects on the economy of a change in reserve requirements have become murky and the instrument has not been used to restrict bank credit in more than twenty-five years. As noted above, increasing restrictions on daylight overdrafts and implicit interest paid on required clearing balances induced banks to increase required clearing balances to the point where reserve requirements were often not binding. Reserve requirements still represent a form of tax, because banks earn no interest on required reserves. Reductions in reserve requirements

in the early 1990s reduced the tax burden. The introduction of retail sweep accounts in 1994 further reduced the burden almost to insignificance.

The volume of discount window borrowing was high during the late 1980s primarily because of the large number of bank failures, not because of monetary policy initiatives. As can be seen in Table 2, the discount rate was steadily below the federal funds rate until 1992:4 and, thus, not a penalty rate. In 2003 the discount rate was abandoned as a policy instrument; its successor, the rate for primary credit, is inflexibly 100 basis points above the target federal funds rate.

A third set of policy instruments, regulations, are very wide ranging and difficult to interpret concisely. There are thirty-one broad classes of regulations, many of which are designed to maintain desirable and orderly processes in financial markets and not to effect monetary policy.⁴¹ One regulation that had been important in the transmission of monetary policy was Regulation Q, which specified maximum interest rates that may be paid on deposits. In 1986 the Federal Reserve discarded this policy instrument when it eliminated restrictions on interest rates paid on time and savings deposits. The Emergency Credit Control Act of 1969 has been repealed, which eliminated a large number of possible discretionary interventions in financial markets whenever the act was activated.⁴² 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 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. On the other hand, the reach of its regulatory arm has increased considerably with the 1970 amendments to the Bank Holding Company Act of 1956, the International

⁴¹ For a summary of regulations, see <http://www.federalreserve.gov/regulations/default.htm>.

⁴² The Emergency Credit Control Act of 1969 was activated in early 1980 by President Carter. It authorized the Federal Reserve to impose draconian controls on credit markets that resulted in a sharp collapse in credit and GDP. Its activation was cancelled in June 1980 and the act was subsequently repealed.

Banking Act of 1978, and the Depository Institutions Deregulation and Monetary Control Act of 1980.⁴³

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, FOMC meetings minutes, Congressional testimony, monetary policy reports to the Congress, etc.; it 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 “Fed watchers” and other participants in financial markets. In the context of the diminishing importance of the instruments described in the preceding paragraphs, statements from the Board and FOMC appear to have taken on greater importance over time, especially after the aforementioned 1994 changes in FOMC disclosure practices.

The fifth policy instrument, of course, is open market operations, which since the Accord in 1951 has been the principal tool used by the FOMC in its attempt to influence the economy.⁴⁴ It has evolved over time as the Federal Reserve shifted from its “bills only (or preferably?)” doctrine at the time of the Accord to operating over much of the maturity range of the U.S. government security yield curve at the time of “operation twist.”⁴⁵

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

⁴³ The 1970 amendments to the Bank Holding Company Act closed a loophole that had exempted one-bank holding companies from Federal Reserve supervision. The International Banking Act brought branches and agencies of foreign banks operating in the United States into the set of banks that the Federal Reserve regulated. The Depository Institutions Deregulation and Monetary Control Act extended reserve requirements and access to the discount window to all depository institutions that operated in the United States. Previously only banks that were members of the Federal Reserve System were subject to Federal Reserve reserve requirements and had access to the discount window.

⁴⁴ The Accord was a March 1951 agreement between the Federal Reserve and the Treasury that released the Federal Reserve from its World War II obligation to “peg” the yield curve.

⁴⁵ Operation twist was a 1961 attempt by the Federal Reserve and the Kennedy administration to raise short-term interest rates to protect U.S. gold and to lower long-term rates to encourage investment. Prior to that date, the Federal Reserve had conducted open market operations almost exclusively in t-bills.

are conducted has changed over time with the introduction of new technology and instruments.⁴⁶ Published data on transactions in the system's open market account are only available since 1961.⁴⁷ In the early years outright purchases and sales of government securities were larger than repurchase agreements 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 purchase and sale transactions. As late as 1989 the Federal Reserve of New York is reported not to have automated the large volume of work that is needed to conduct system open market operations.⁴⁸

An especially interesting and technically creative period for open market operations in the years of Chairman Greenspan 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 large possible shortages of reserves if computers failed to transition properly into year 2000.⁴⁹ 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, which would be handled by two large clearing banks using triparty settlement arrangements.⁵⁰ 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 New York Federal Reserve Bank trading desk repurchase agreements were auctioned off to counterparty dealers so that the dealers were guaranteed

⁴⁶ "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, Ann-Marie, [1989], p. 156.)

⁴⁷ See Board of Governors of the Federal Reserve System, [1976b], pp. 40-5.

⁴⁸ See Meulendyke, Ann-Marie, [1989], p. 172.

⁴⁹ Sources: Federal Reserve Bank of New York, [2000] and "Minutes of the August 24, 1999 FOMC Meeting," [1999], Federal Reserve Bulletin, 85, 12 (December), pp. 820-1.

⁵⁰ Stripped securities are created from a standard U.S. government bond or note by separating the payment obligations, coupons or principal, that the bond or note has on different dates. The payment obligations are traded in markets as discount bonds, which 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 discussion of these assets, see Beckett, Sean, [1988].

temporary access to funds. As it happened there was no cash crisis, but the trading desk 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 short-term transient effect on exchange rates. However, 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.⁵¹ The foreign central banks were clearly holding dollar denominated assets in order to prevent their currencies from appreciating relative to the U.S. dollar. If they should sell this large amount of securities, their actions would have enormous effects on exchange rates and/or interest rates. That is, they could either amplify or offset FOMC open market operations, if they chose to. In a global market without exchange rate controls, they could engage in similar operations even if they held no dollar denominated assets. The wisdom of holding their portfolio of U.S. government securities is beyond the scope of this analysis; however, effective U.S. monetary policy must take account of what other central banks and foreign investors are doing.

b) What has changed that allows one to believe that real interest rates can influence real 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 Japan and China are unwilling to allow their currencies to rise 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 ability to vary real interest rates should make U.S. monetary policy more effective in achieving inflation and output targets in the coming years.⁵² In particular, one should observe an increase in the interest elasticity of the balance of trade; the difference

⁵¹ Source: The Financial Times, September 11, 2003, p. 18.

⁵² For arguments justifying this claim, see Mundell, Robert, [1963] and Fleming, Marcus, [1962].

between U.S. exports and imports is expected to be negatively related to real U.S. interest rates.

Second, advances in the theory of corporate finance are likely to have steadily increased the sensitivity of project selection decisions to real interest rates over the postwar period.⁵³ Therefore, the interest elasticity of the demand for gross investment in the GDP accounts is likely to have increased over time; gross investment is expected to be 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 consumption goods has increased. Home equity loans frequently have interest rates that are indexed to market rates. An increase in real interest rates is expected to discourage spending.

Fourth, arguably there is a reduced willingness of commercial bank lenders to extend credit to firms with weak credit ratings when market interest rates rise, as was argued in the availability of credit doctrine that held sway in the 1950s.⁵⁴ However, if marginal borrowing firms are characterized as being small firms, Oliner and Rudebusch have reported that during the period 1974-91 a “bank lending channel does not appear to have been an important part of the monetary transmission mechanism.”⁵⁵ There is a large related empirical literature that claims that monetary policy may still be effective through a “credit channel” 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 nor conclude that a credit channel for monetary policy exists.⁵⁶

c) Conclusions to be drawn from the (incomplete) Greenspan term as Chairman.

As the preceding section argues, there are good reasons for believing that the Federal

⁵³ See Copeland, Thomas E. and J. Fred Weston, [1988], pp. 47-9.

⁵⁴ See Scott, Ira O. Jr., [1957].

⁵⁵ Oliner, Stephen D. and Glenn D. Rudebusch, [1996], p. 308.

⁵⁶ See Hubbard, R. Glenn, [1998] and Federal Reserve Bank of Boston, [1995] for references to this literature.

Reserve is finally focusing on the best indicator of monetary policy, real interest rates. It is, however, not a sufficient statistic and it will always be necessary to intervene with injections of reserves and lending from the discount window when disorderly conditions arise. 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. Addressing innovations and institutional changes requires flexibility. Unlike many of his critics, Chairman Greenspan appears to accept 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 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.⁵⁷

The Federal Reserve should respond and during the Greenspan era commendably often has responded aggressively when short-term events occur that threaten capital market stability. Examples include its response to 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.

Discretion rather than rules increases the need for citizens to hold the FOMC fully accountable for its decisions. Accountability requires that full disclosure of the reasoning and information underlying decisions be made public in a timely fashion. Timely does not mean immediately, but surely within a few weeks. Immediate disclosure could create unfair opportunities for profit by individuals with low cost and relatively rapid access to markets, and might compromise the technical implementation of policy.

⁵⁷ Greenspan, Alan, [2003], "Monetary Policy under Uncertainty," Remarks by Chairman Alan Greenspan at a symposium sponsored by the Federal Reserve Bank of Kansas City, Jackson Hole, Wyoming, August 29.

Varying real interest rates inevitably have distributional consequences that must be taken into account. As a simple example, high (low) interest rates harm (help) borrowers and help (harm) savers. 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 interest rates could not vary greatly without threatening the quasi-fixed exchange rate structure, but it has become serious since then.

Indeed, since that system collapsed in 1971, there have been a series of bubbles in major markets that have raised havoc and redistributed wealth. 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. The bubbles were precipitated by a combination of institutional changes, defects in the U.S. economy, 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 low inflation, high employment, and strong economic growth. The following excerpt from a speech about the stock market bubble in the 1990s by Chairman Greenspan provides 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.⁵⁸

During the Greenspan era, the following bubble-type events occurred. The Tax Reform Act of 1986's changes in the taxation of passive investments led to a collapse in commercial real estate markets. Depressed residential real estate markets followed the enactment of FIRREA in 1989. While arguably both were adjustments to new regimes rather than bubbles, they had the radical wealth redistributing characteristic of bubbles. The Federal Reserve responded to the recession resulting from these real estate market

⁵⁸ Greenspan, Alan, [2002], "Economic Volatility," Remarks by Chairman Alan Greenspan at a symposium sponsored by the Federal Reserve Bank of Kansas City, Jackson Hole, Wyoming, August 30.

events by lowering real short-term interest rates essentially to zero in 1992 and 1993 – thus cushioning the deflationary effects of these events.

The sharp increase in the real federal funds interest rate in 1994, possibly in response to surging consumer installment credit, may have anticipated a further period of turbulence. Housing and equity markets have been especially exuberant in the years since 1994. The 1986 Tax Reform Act's impact on housing was strongly expansionary when it made mortgage loan interest expense almost unique in being deductible from taxable household income; the subsequent resulting rise in the desired stock of houses would take many years to be satisfied. Whether a bubble in housing markets is occurring as this is being written is not completely clear, but symptoms of rising demand and, perhaps, a bubble are rapid growth in the number of new houses and accelerating prices. After hitting a low of 1.1 million units in several years in the early 1990s, when institutions created in FIRREA were resolving the savings and loan debacle, the number of units completed in a year has risen to 1.7 million in 2002.⁵⁹ The purchase price of new houses has risen much faster than the overall rate of inflation. Thus, in January 1986 the average price of a new house was \$108,600; it was \$148,500 in January 1990, \$179,200 in January 1996, \$223,700 in January 2000, and \$278,900 in January 2003.⁶⁰ The most recent spurt in numbers and prices has surely been abetted by the near-zero real federal funds rates reported in Table 4.

It is much clearer that a bubble existed in the stock market. Conventional valuation models of common stock depict the value of firms' stock as a discounted sum of expected future real corporate earnings. While it is unclear exactly how investors form expectations, it is not unreasonable to think that they extrapolate recent trends in real corporate profits.⁶¹ Nominal after-tax corporate profits rose 142% between 1970 and 1980, but real (using the GDP implicit price deflator) after-tax profits only rose about

⁵⁹ Source: Economic Report of the President, [2003], p. 341.

⁶⁰ Sources: Board of Governors of the Federal Reserve System, [1996], pp. 143-8; Board of Governors of the Federal Reserve System, [2002], pp. 136-40; and Federal Reserve Bulletin, [2003], 89, 8 (August), p. A32.

⁶¹ "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." Source: Greenspan, Alan, [2002], "Economic Volatility," Remarks by Chairman Alan Greenspan at a symposium sponsored by the Federal Reserve Bank of Kansas City, Jackson Hole, Wyoming, August 30.

24% during this period.⁶² During the 1980s, nominal after-tax corporate profits rose 136%, from \$113 billion in 1980 to \$267 billion in 1990, and real after-tax profits rose about 55%. Subsequently, nominal after-tax corporate profits rose from \$267 billion in 1990 to a peak of \$596 billion in 1997, or about 123% over seven years. Real after-tax corporate profits rose 80% during these seven years, or at about twice the annual percentage rate of the preceding decade and about five 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 have yet to exceed the peak reached in 1997.⁶³ The Standard and Poor's 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 noted 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 noncontributed funds showed up as corporate profits; as a result, corporate profits were increased artificially.⁶⁴ After stock prices fell in the early 2000s, firms were required to increase contributions to pension funds, which amplified the decline in reported corporate profits. It is surely true that the Congress, not the Federal Reserve, was responsible for this amplification of fluctuations in corporate profits.

⁶² Data on corporate profits are from Federal Reserve Bank of Saint Louis's Fred II data base.

⁶³ Nominal after-tax corporate profits were \$538 billion in 1998, \$558 billion in 1999, \$528 billion in 2000, \$532 billion in 2001, and \$574 billion in 2002.

⁶⁴ There are many alternatives in how one chooses to report corporate profits. For examples, see Fuerbringer, Jonathan, [2003], "Counting the Ways to Count Corporate Earnings," New York Times, September 21, p. BU6. Pension fund management in the U.S. is also a very controversial area. For a sample, see Copeland, Thomas E. and J. Fred Weston, [1988], pp. 638-56, Johnston, David Cay, [1995], and Oppel, Richard A. Jr., [1999].

However, the dramatic fall in the real federal funds rate after 2000 was a Federal Reserve initiative that may lead to a further bubble, if investors believe that low interest rates will continue to be the rule. Although the FOMC is sending mixed signals as this is being written, it appears that the FOMC fears the possibility of a deflationary spiral after the stock bubble burst. Mushrooming federal government deficits, the associated trade deficits, and a zero real federal funds rate do not promise a smooth ride in the coming years! Surely individuals depending upon interest income have cause for concern. It remains doubtful that low rates will result in increased investment in plant and equipment, because capacity utilization rates are currently very low in the U.S.

The Federal Reserve must, on occasion, be willing to intervene in asset markets to deflate bubbles. The recent stock market bubble and related instability in pension programs is indefensible. The bubble was evident to many economists, including Chairman Greenspan, with his references to irrational exuberance in 1996, as has been noted above. It surely takes courage to deflate bubbles before they explode with devastating force. Determining precisely when a bubble is present is obviously a judgment call, not hard science, but that is why discretionary policy is desirable. Free market ideology and cheerleading for the gains from productivity are no defense for inaction. Chairman Greenspan, for example, has interpreted the recent rise in stock prices with oracular 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 prices rose further, responding to the growing optimism about greater stability, strengthening investment, and faster productivity growth.⁶⁵

There are other less felicitous interpretations of what was going on and the costs to the Federal Reserve's nonresponse to a bubble are likely to be high in the coming decade. Pension funds and individual retirement accounts have been savaged. Losses will be amplified if and when the apparent bubble in the housing market bursts.

⁶⁵ Greenspan, Alan, [2002].

The Federal Reserve should intervene when potentially large disruptive bubbles appear – not after they burst. Bubbles adversely affect its attempts to achieve high employment, low inflation, and high economic growth. Further, bubbles are likely to have a cumulative adverse effect on citizens' views about the fairness of efficient market outcomes. There is growing evidence that irresponsible marketing of equities, accounting fraud, and unfair trading of equity mutual funds contributed to the rapid rise of stock prices in the 1990s. Widely held doubts about the efficiency and fairness of private sector markets were reasons for the extensive federal government interventions during the 1930s – Roosevelt's New Deal.

The relation between efficiency and central bank interventions 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. Individuals can, in effect, “game” the central bank. On the other hand, failure to intervene increases 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 complete abstinence from intervening is not likely to be optimal.

How does one score the Federal Reserve when confronting the bubbles of the mid 1990s? As can be seen in Tables 1 and 3, on average it kept the real federal funds rate above 3% between 1995:1 and 2000:4, which by post World War II standards is a relatively restrictive monetary policy stance. Clearly, 3% or 4% was not enough to deflate bubbles in the equity and housing markets. Even with the benefit of hindsight, one does not know what real rate was necessary to halt them – possibly 8% or more – but irrational exuberance could have been ended. Predictably, such rates would have brought loud protests from Congress and the Clinton administration as they approached the presidential election year of 1996. Nevertheless, as an earlier long-serving Federal Reserve Chairman, William McChesney Martin, Jr. once said: “The Federal Reserve's

job is to take away the punch bowl just when the party gets going.”⁶⁶ Chairman Greenspan and others on the FOMC were not willing to remove the punch bowl.

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. In my view, the Federal Reserve should continue to make independent assessments of the economy and undertake policies that it believes will lead to the best outcomes. It should not attempt to coordinate monetary and fiscal policies with any administration.⁶⁷ For this to be successful, monetary policies must be fully explained to the public and defended. In some important respects, the Federal Reserve under Chairman Greenspan has failed in the last dimension. While it was an important advance in 1994 to be explicit about the target nominal federal funds rate, and subsequently to identify concerns about the trajectory of the economy that arose in FOMC meetings, the reasoning and information backing each has not been fully disclosed in a reasonable time span.⁶⁸ Further, detailed minutes of FOMC meetings are no longer available to the public, even after a sizable time interval.⁶⁹ More accountability is needed in a democracy.

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 circumstances administrations and the central bank are likely to come to similar policy recommendations, but they should be reached independently. That in my view is the meaning of an independent central bank.

⁶⁶ Greider, William, [1987], p.65.

⁶⁷ I am aware that this recommendation contradicts the spirit and, perhaps, the letter of the law as 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.

⁶⁸ The lack of transparency in Federal Reserve decision making is widely recognized. For two recent acknowledgements of its absence, see Fels, Joachim, [2003] and an editorial in the Financial Times, “Monetary message gets mauled,” October 28, p. 16.

⁶⁹ “When Congress was enacting the Freedom of Information Act, Federal Reserve Chairman Arthur Burns decided to abolish the full transcript [of FOMC meetings].” Greider, William [1978], pp. 44-45.

Selected References

- Beckett, Sean, [1988], "The Role of Stripped Securities in Portfolio Management," Federal Reserve Bank of Kansas City Economic Review, 73, 5 (May), pp. 20-38.
- Belton, Terrence M., Matthew D. Gelfand, David B. Humphrey, and Jeffrey C. Marquardt, [1987], "Daylight Overdrafts and Payments System Risk," Federal Reserve Bulletin, 73, 11 (November), pp. 839-52.
- Bernanke, Ben S., [2003], "An Unwelcome Fall in Inflation?" Speech given at Economics Round Table, University of California-San Diego, La Jolla, California, July 23. The text is available at:
<http://www.federalreserve.gov/boarddocs/speeches/2003/20030723/default.htm>.
- Board of Governors of the Federal Reserve System, [1987], "Monetary Policy Objectives for 1987: Summary Report of the Federal Reserve Board," February 19, 1987.
- _____, [1991], Annual Statistical Digest: 1980 – 1989.
- _____, [1993], "1993 Monetary Policy Objectives: Midyear Review of the Federal Reserve Board," July 20, 1993.
- _____, [1996], Annual Statistical Digest: 1990 – 1995.
- _____, [2002], Statistical Digest: 1996 – 2000.
- Bradsher, Keith, [1994], "The Federal Reserve Is Signaling A New Increase in Interest Rates," New York Times, April 15, pp. A1, C5.
- Browne, Lynn Elaine, [1999], "U.S. Economic Performance: Good Fortune, Bubble or New Era?" New England Economic Review, Federal Reserve Bank of Boston, May/June, pp. 3-20.
- Copeland, Thomas E. and J. Fred Weston, [1988], Financial Theory and Corporate Policy, Reading, Mass.: Addison-Wesley Publishing Company.
- Council of Economic Advisers, various years, Economic Report of the President, Washington: United States Government Printing Office.
- Edwards, Cheryl L., [1997], "Open Market Operations in the 1990s," Federal Reserve Bulletin, 83, 11 (November), pp. 859-74.
- Federal Reserve Bank of Boston, [1995], Is Bank Lending Important for the Transmission of Monetary Policy? edited by Joe Peek and Eric S. Rosengren, Conference Series No. 39, June.

- Federal Reserve Bank of Chicago, [1983], Leveling the Playing Field.
- Federal Reserve Bank of New York, [2000], Domestic Open Market Operations during 1999. Available at <http://www.newyorkfed.org/pihome/annual.html>.
- Feinman, Joshua N., [1993], "Reserve Requirements: History, Current Practice, and Potential Reform," Federal Reserve Bulletin, 79, 6 (June), pp. 369-89.
- Fels, Joachim, [2003], "Europe – All: A Tale of Three Central Banks," Morgan Stanley Global Economic Forum, Available at: <http://www.morganstanley.com/GEFdata/digests/20030721-mon.html>
- Fuerbringer, Jonathan, [2003], "Counting the Ways to Count Corporate Earnings," New York Times, September 21, p. BU6.
- Fleming, Marcus, [1962], "Domestic Financial Policies under Fixed and under Floating Exchange Rates," IMF Staff Papers, 9, November, pp. 369-79.
- Greenhouse, Steven, [1993a], "Clinton Goes Head to Head with the Fed," New York Times, January 18, pp. C1, C5.
- _____, [1993b], "Fed Chief Sways to Clinton's New Economic Tune," New York Times, February 27, pp. C1, 26.
- _____, [1993c], "Fed Fears a Market Bubble If It Lowers Interest Rates," New York Times, September 16, pp. C1-C2.
- Greenspan, Alan, [2002], "Economic Volatility," Remarks by Chairman Alan Greenspan at a symposium sponsored by the Federal Reserve Bank of Kansas City, Jackson Hole, Wyoming, August 30. Available at: <http://www.federalreserve.gov/boardocs/speeches/2002/20020830/default.htm>
- _____, [2003], "Monetary Policy under Uncertainty," Remarks by Chairman Alan Greenspan at a symposium sponsored by the Federal Reserve Bank of Kansas City, Jackson Hole, Wyoming, August 29. Available at: <http://www.federalreserve.gov/boardocs/speeches/2003/20030829/default.htm>
- Greider, William, [1987], Secrets of the Temple: How the Federal Reserve Runs the Country, New York: Simon and Schuster.
- Hester, Donald D., [1981], "Innovations and Monetary Control," Brookings Papers on Economic Activity, 1, pp. 141-89.
- _____, [1982], "The Effects of Eurodollar and Domestic Money Market Innovations on the Interpretation and Control of Monetary Aggregates," in The Political Economy of Domestic and International Monetary Relations, ed. by

Raymond E. Lombra and Willard E. Witte, Ames, Iowa: Iowa State Press, pp. 306-42.

_____, [1993], "Financial Institutions and the Collapse of Real Estate Markets," in Real Estate and the Credit Crunch, Federal Reserve Bank of Boston Conference Series No. 36, pp. 114-35.

Hubbard, R. Glenn, [1998], "Capital-Market Imperfections and Investment," Journal of Economic Literature, 36, 1 (March), pp. 193-225.

Johnston, David Cay, [1995], "From Washington, The Fading Pension," New York Times, May 4, pp. C1, C6.

Kohn, Donald L., [1990], "Policy Targets and Operating Procedures in the 1990s," Federal Reserve Bulletin, 76, 1 (January), pp. 1-7.

Lambert, Michael J. and Kristin D. Stanton, [2001], "Opportunities and Challenges of the U.S. Dollar as an Increasingly Global Currency: A Federal Reserve Perspective," Federal Reserve Bulletin, 87, 9 (September), pp. 567-75.

London, Simon, [2003], "The Long View," Financial Times, June 7/8 (weekend), p. w3.

Maisel, Sherman J., [1973], Managing the Dollar, New York: W. W. Norton Co.

Mayer, Thomas, [1990], Monetarism and Macroeconomic Policy, Aldershot, England: Edward Elgar Publishing Ltd.

Madigan, Brian F. and William R. Nelson, [2002], "Proposed Revision to the Federal Reserve's Discount Lending Programs," Federal Reserve Bulletin, 88, 7 (July), pp. 313-9.

Malz, Allan M., [1995], "Currency Option Markets and Exchange Rates: A Case Study of the U.S. Dollar in March 1995," Current Issues in Economics and Finance, Federal Reserve Bank of New York, 1, 4 (July).

Meulendyke, Ann-Marie, [1989], U.S. Monetary and Financial Markets, New York: Federal Reserve Bank of New York.

Minehan, Cathy E. and Katerina Simons, [1995], "Managing Risk in the '90s: What Should You Be Asking about Derivatives," New England Economic Review, September/October, pp.4-25.

Mundell, Robert, [1963], "Capital Mobility and Stabilization Policy under Fixed and Flexible Exchange Rates," Canadian Journal of Economics, 29, November, pp. 475-85.

- Oliner, Stephen D. and Glenn D. Rudebusch, [1996], "Monetary Policy and Credit Conditions: Evidence from the Composition of External Finance: Comment," American Economic Review, 86, 1 (March), pp. 300-9.
- Oppel, Richard A. Jr., [1999], "No Small Change as Pension Plans are Converted," New York Times, October 24, p. BU12.
- Porter, Richard D. and Ruth A. Judson, [1996], "The Location of U.S. Currency: How Much Is Abroad?" Federal Reserve Bulletin, 82, 10 (October), pp. 883-903.
- Richards, Heidi Willmann, [1995], "Daylight Overdraft Fees and the Federal Reserve's Payment System Risk Policy," Federal Reserve Bulletin, 81, 12 (December), pp. 1065-77.
- Roach, Stephen, [2002], "Smoking Gun," Morgan Stanley Global Economic Forum, [www. Morganstanley.com/GEFdata/digests](http://www.Morganstanley.com/GEFdata/digests), February 27, 2002.
- Scott, Ira O. Jr., [1957], "The Availability of Credit Doctrine: Theoretical Underpinnings," Review of Economic Studies, 25, 4 (August), pp. 41-8.
- Shiller, Robert, [2000], Irrational Exuberance, Princeton, NJ: Princeton University Press.
- Smith, Wayne J., [1978], "Repurchase Agreements and Federal Funds," Federal Reserve Bulletin, 64, 5 (May), pp. 353-60.
- Stevens, E. J., [1993], "Required Clearing Balances," Federal Reserve Bank of Cleveland Economic Review, 29, 4, pp. 2-14.
- Tobin, James (with Stephen S. Golub), [1998], Money, Credit, and Capital, New York: Irwin/McGraw Hill.
- United States Council of Economic Advisers, [various years], Economic Report of the President together with the Annual Report of the Council of Economic Advisers, Washington: United States Government Printing Office.
- Zhang, Peter G., [1997], Exotic Options: A Guide to Second Generation Options, Singapore: World Scientific Publishing Company.