October 2001

MonetaryTrends

THE FEDERAL RESERVE BANK of ST. LOUIS

The Monetary/Fiscal Policy Debate: A Controlled Experiment

In the 1960s and early 1970s, Keynesian economics was the dominant macroeconomic policy paradigm. Monetary policy was widely thought to have only a minor impact on the real economy or inflation. Fiscal policy—which many thought to be important both for stabilizing the real economy and for controlling inflation—reigned supreme. The objective of macroeconomic policy was to choose a preferred combination of inflation and unemployment rates along a stable long-run Phillips curve.

Several empirical studies in the 1960s challenged this reigning orthodoxy. One of these, published in 1968 by Leonall C. Andersen and Jerry L. Jordan in this Bank's *Review*, showed that changes in money have larger and more predictable effects on nominal gross national product than do changes in government spending. Evidence suggesting that monetary policy was relatively more effective than fiscal policy gave birth to a long-running debate about the relative importance of monetary versus fiscal policy that has never been settled. The debate was preempted when the U.S. government began running large and persistent fiscal deficits in the early 1970s. Advocacy of counter-cyclical fiscal policy largely died, not because Keynesians conceded that fiscal policy was relatively ineffective, but because counter-cyclical fiscal policy was not viewed as an option in an environment of large and persistent deficits.

The experience of Japan during the last decade provides more recent evidence about the importance of fiscal policy. After decades of strong economic growth and only one relatively mild recession (in 1974), the Japanese economy has been in a period of sluggish growth since the early 1990s. From 1991 to 2000, Japan's GDP grew at a compound average annual rate of 1.2 percent—3.0 percentage points below the rate of the previous decade.

The Japanese government shunned monetary policy, as the growth of M2+CDs (a broad monetary aggregate) declined from an average rate of 9.9 percent in 1975-1990 to just 2.6 percent in 1991-2000. Instead, to stimulate the economy, the Japanese government followed a Keynesian fiscal-policy prescription and in 1992 began implementing a series of unprecedented tax cuts and expenditure increases. General government outlays rose from 30.9 percent of GDP in 1991 to 38.1 percent of GDP in 1999, while general government tax and non-tax receipts declined from 33.8 percent of GDP to 31.1 percent. Not surprisingly, the government budget went from a surplus of 2.9 percent of GDP in 1991 to a deficit of 7 percent of GDP in 1999. (In contrast, the largest general [federal, state, and local] government deficit in the U.S. in the deficit-ridden 1980s was 5.3 percent of GDP in 1986). Because of its repeated efforts to stimulate the economy through fiscal policy, Japan now faces a serious debt problem (Japan's debt-to-GDP ratio has nearly doubled in the last decade, rising from 0.58 in 1991 to 1.1 in 2000).[1]

Many of the reasons advanced for the apparent failure of the fiscal policy measures to stimulate the Japanese economy sound familiar: some of the measures were viewed as temporary and, consequently, had little impact on aggregate demand; the actual fiscal policy measures were not large enough—more aggressive action would have been successful; the actions were smaller than originally announced; the wrong set of expenditure programs were introduced—other programs would have been successful. Any or all of these criticisms may be valid, but they imply that implementing a successful fiscal policy is difficult. Hence, either the implication is true—fiscal policy is relatively ineffective—or implementing a successful fiscal policy is difficult. Either way, the Japanese fiscal policy experiment suggests that the practical usefulness of fiscal policy may be limited.

—Robert H. Rasche and Daniel L. Thornton

[1]See Christopher J. Neely, "How Big is Japan's Debt?" *International Economic Trends*, February 1999.

Table*of*Contents

Conventions used in this publication:

1. Unless otherwise indicated, data are monthly.

2. Shaded areas indicate recessions, as dated by the National Bureau of Economic Research.

3. The *percent change at an annual rate* is the simple, not compounded, monthly percent change multiplied by 12. For example, using consecutive months, the percent change at an annual rate in x between month *t-1* and the current month *t* is: $[(x_t / x_{t-1}) - 1] \times 1200$. Note that this differs from *National Economic Trends*. In that publication monthly percent changes are compounded and expressed as annual growth rates.

4. The *percent change from year ago* refers to the percent change from the same period in the previous year. For example, the percent change from year ago in x between month *t-12* and the current month *t* is: $[(x_t / x_{t-12}) - 1] \times 100$.

We welcome your comments addressed to:

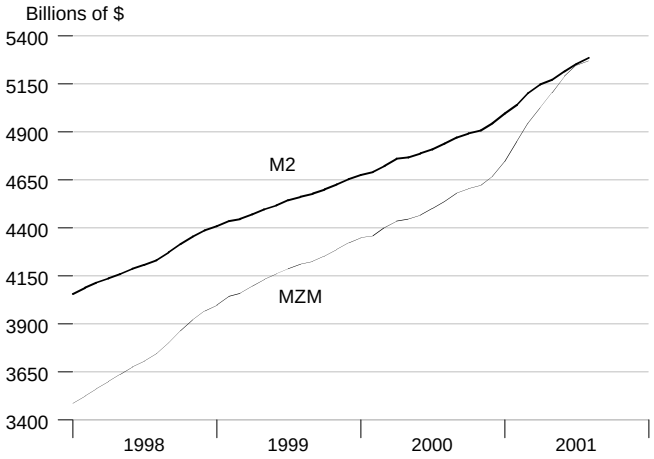
Editor, *Monetary Trends*
Research Division
Federal Reserve Bank of St. Louis
P.O. Box 442
St. Louis, MO 63166

or to:

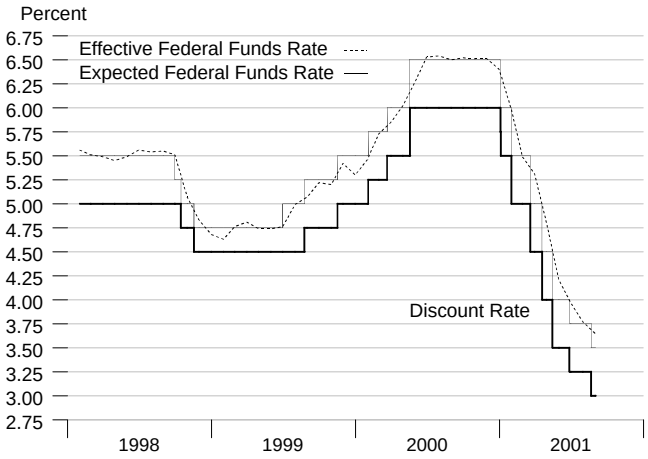
webmaster@stls.frb.org

Monetary Trends is published monthly by the Research Division of the Federal Reserve Bank of St. Louis. Single-copy subscriptions are available free of charge by writing Public Affairs Office, Federal Reserve Bank of St. Louis, Post Office Box 442, St. Louis, MO 63166-0442 or by calling (314) 444-8809. Subscription forms can also be filled out electronically at http://www.stls.frb.org/research/order/pubform.html. For more information on data, please call (314) 444-8590. Information in this publication is also available on the Internet at http://www.stls.frb.org/fred. The entire publication is also available electronically at http://www.stls.frb.org/publications/mt.

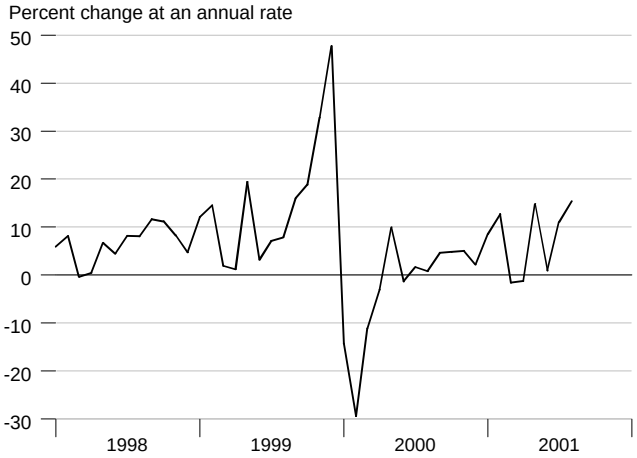
M2 and MZM



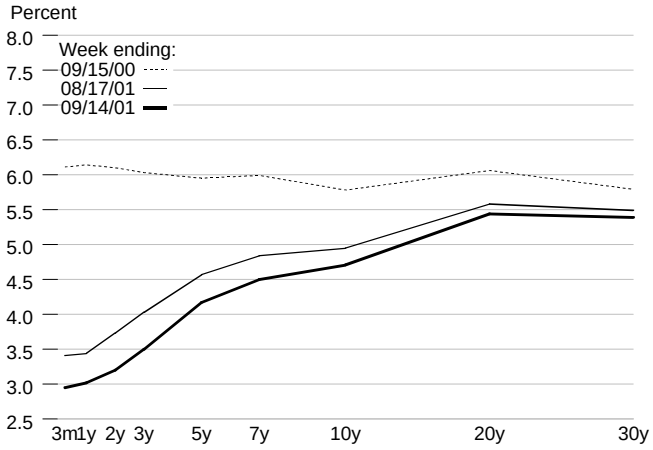
Reserve Market Rates



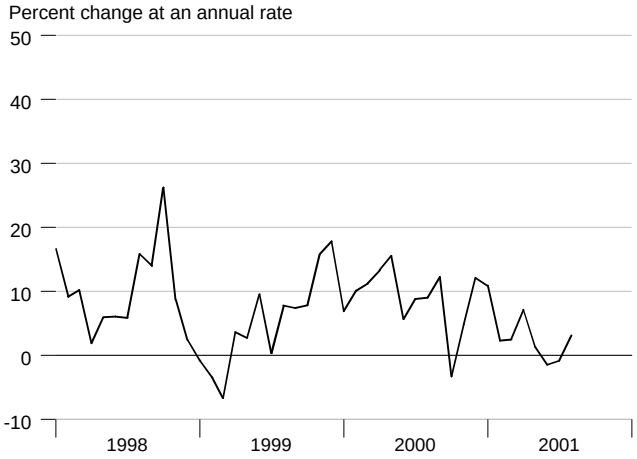
Adjusted Monetary Base



Treasury Yield Curve



Total Bank Credit

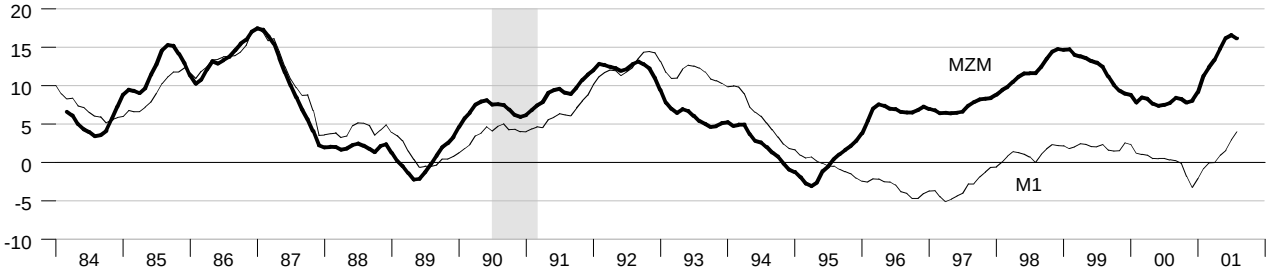


Interest Rates

	Jun 01	Jul 01	Aug 01
Federal Funds Rate	3.97	3.77	3.65
Discount Rate	3.47	3.25	3.16
Prime Rate	6.98	6.75	6.67
Conventional Mortgage Rate	7.16	7.13	6.95
Treasury Yields:			
3-month constant maturity	3.57	3.59	3.44
6-month constant maturity	3.56	3.56	3.39
1-year constant maturity	3.58	3.62	3.47
3-year constant maturity	4.35	4.31	4.04
5-year constant maturity	4.81	4.76	4.57
10-year constant maturity	5.28	5.24	4.97
30-year constant maturity	5.67	5.61	5.48

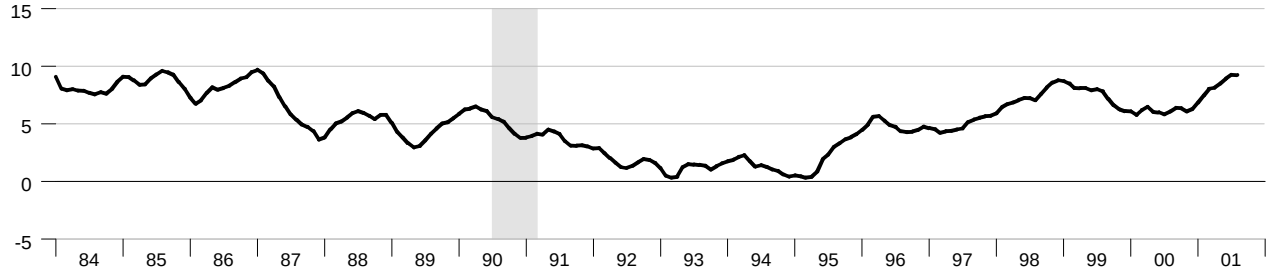
MZM and M1

Percent change from year ago



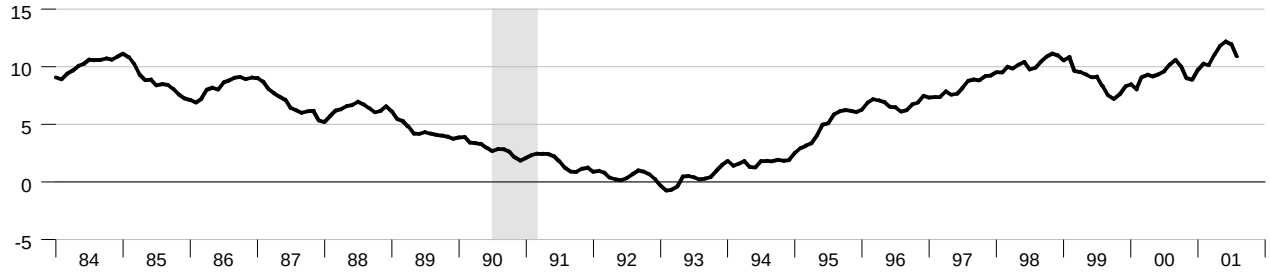
M2

Percent change from year ago



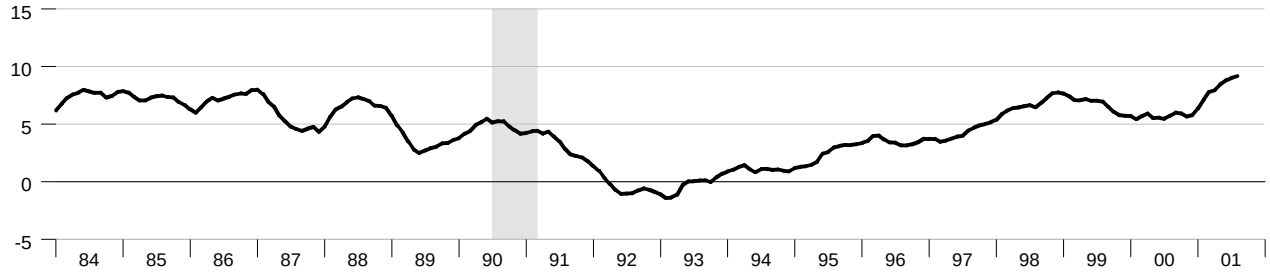
M3

Percent change from year ago

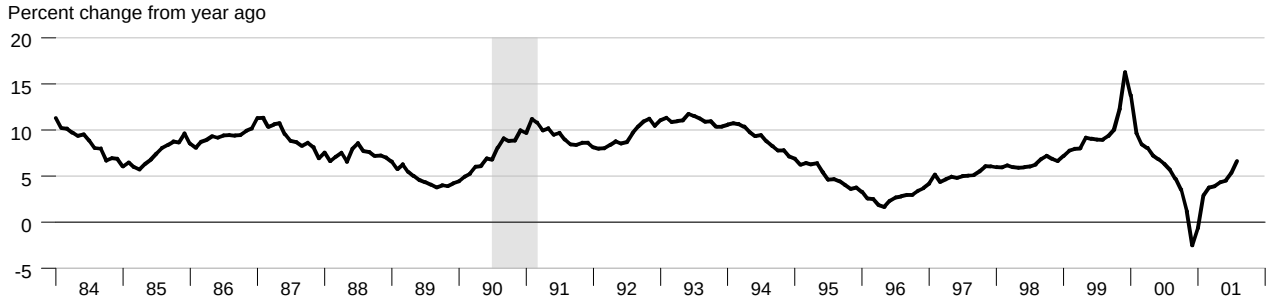


Monetary Services Index - M2

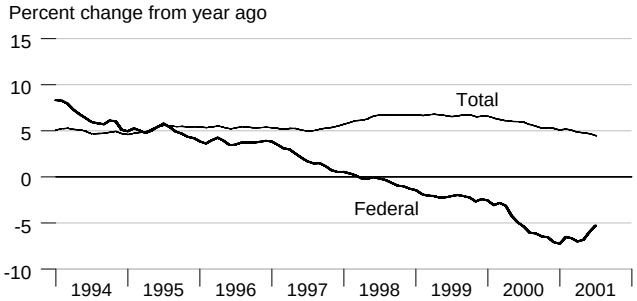
Percent change from year ago



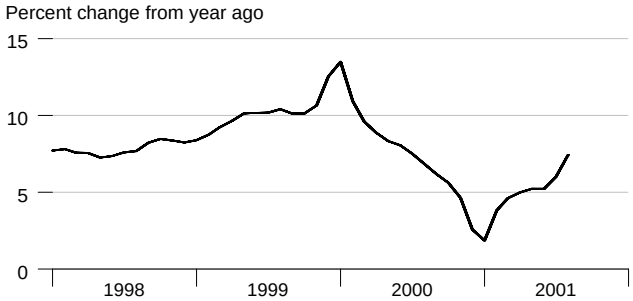
Adjusted Monetary Base



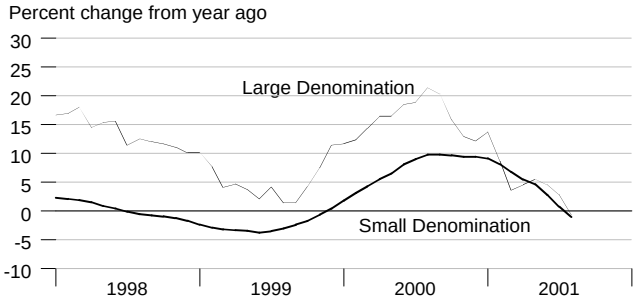
Domestic Nonfinancial Debt



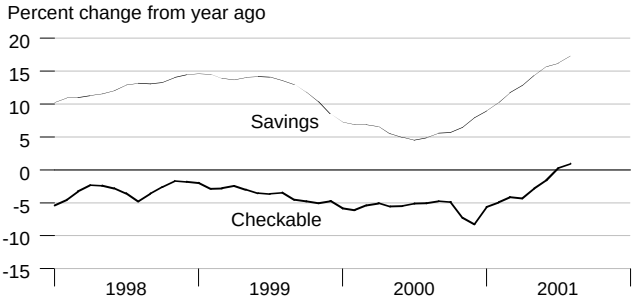
Currency Held by the Nonbank Public



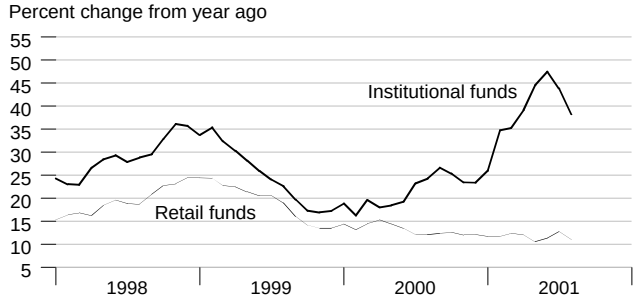
Time Deposits



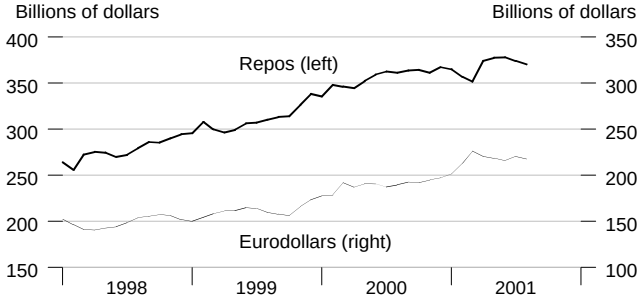
Checkable and Savings Deposits



Money Market Mutual Fund Shares

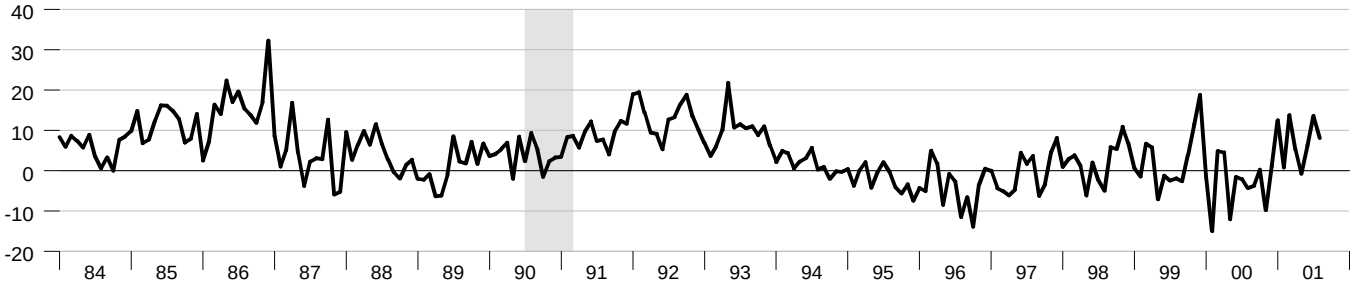


Repurchase Agreements and Eurodollars



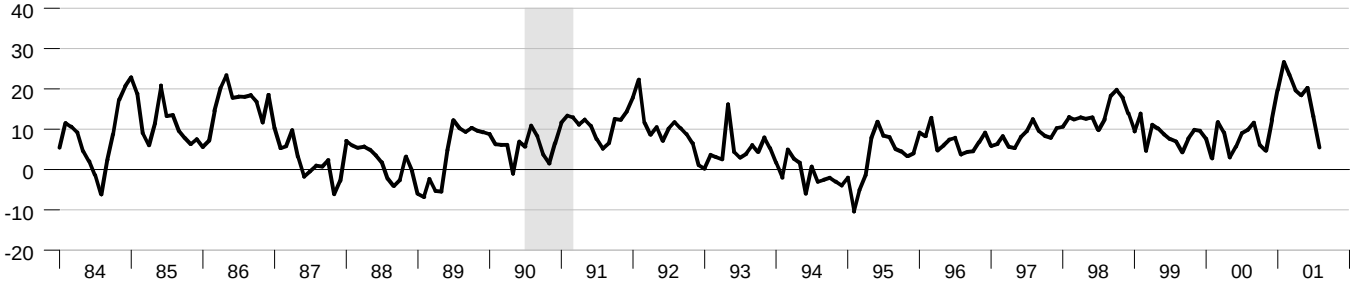
M1

Percent change at an annual rate



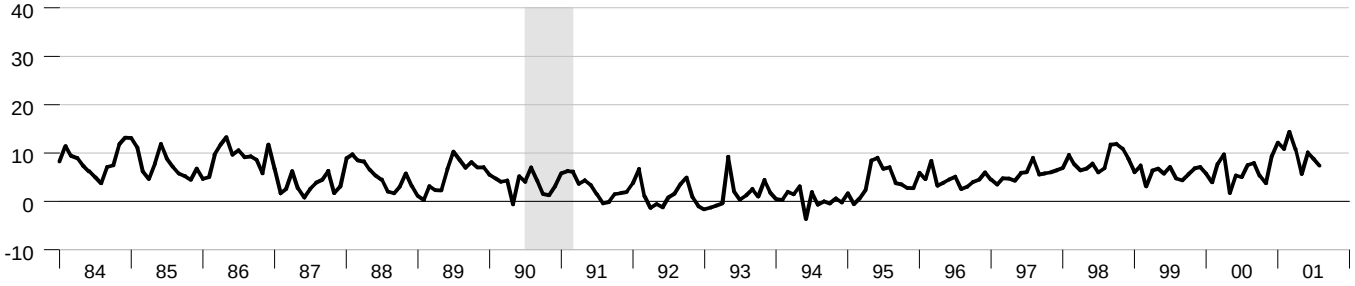
MZM

Percent change at an annual rate



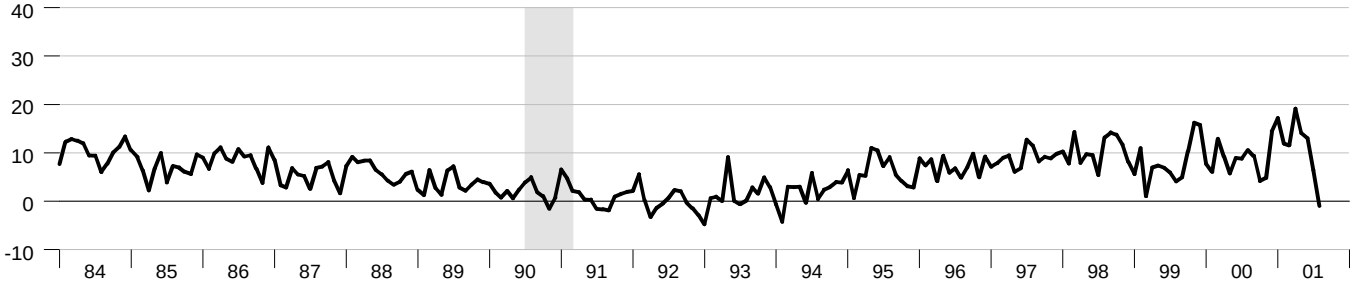
M2

Percent change at an annual rate

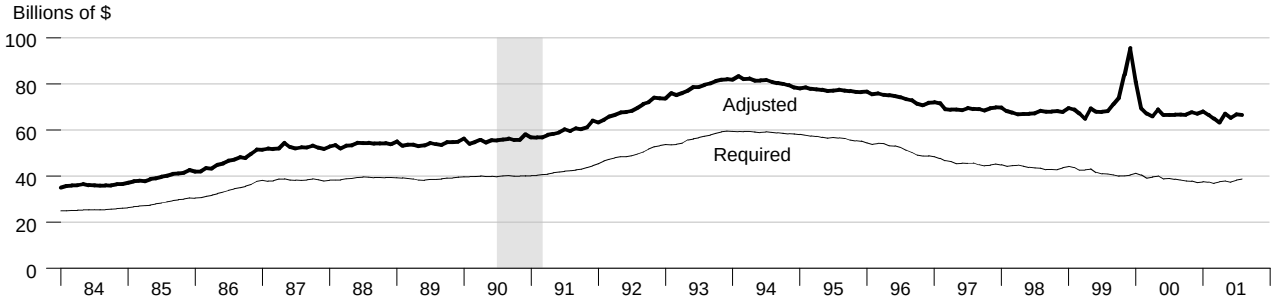


M3

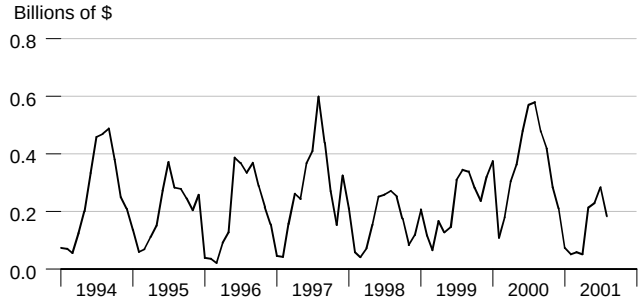
Percent change at an annual rate



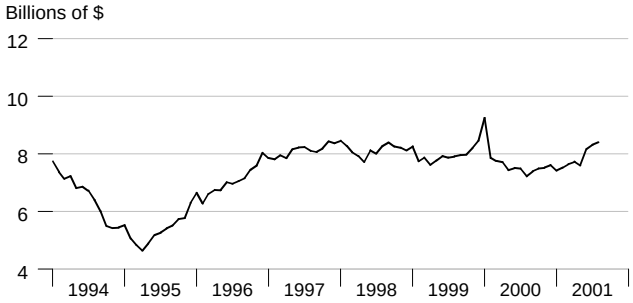
Adjusted and Required Reserves



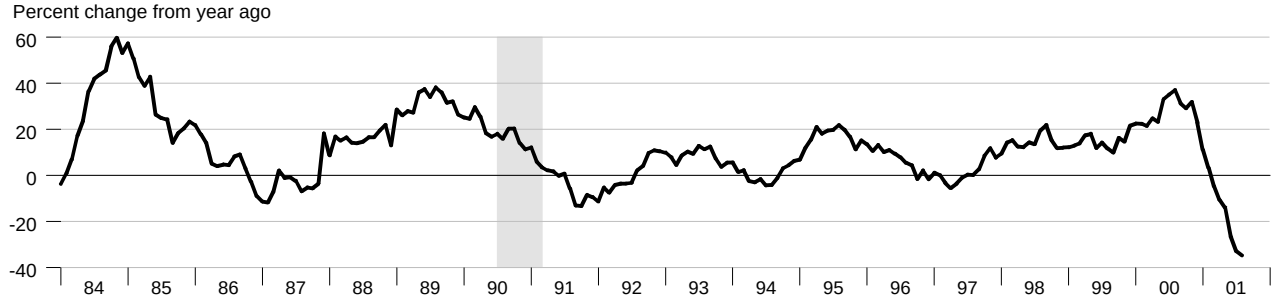
Total Borrowings, nsa



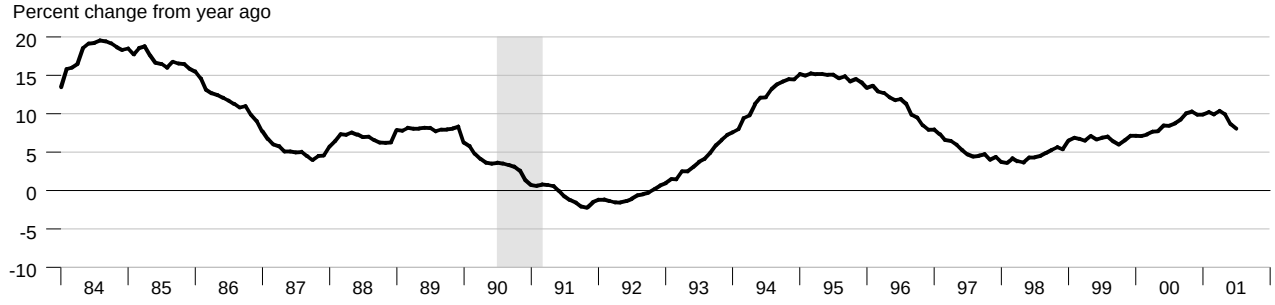
Excess Reserves plus RCB Contracts



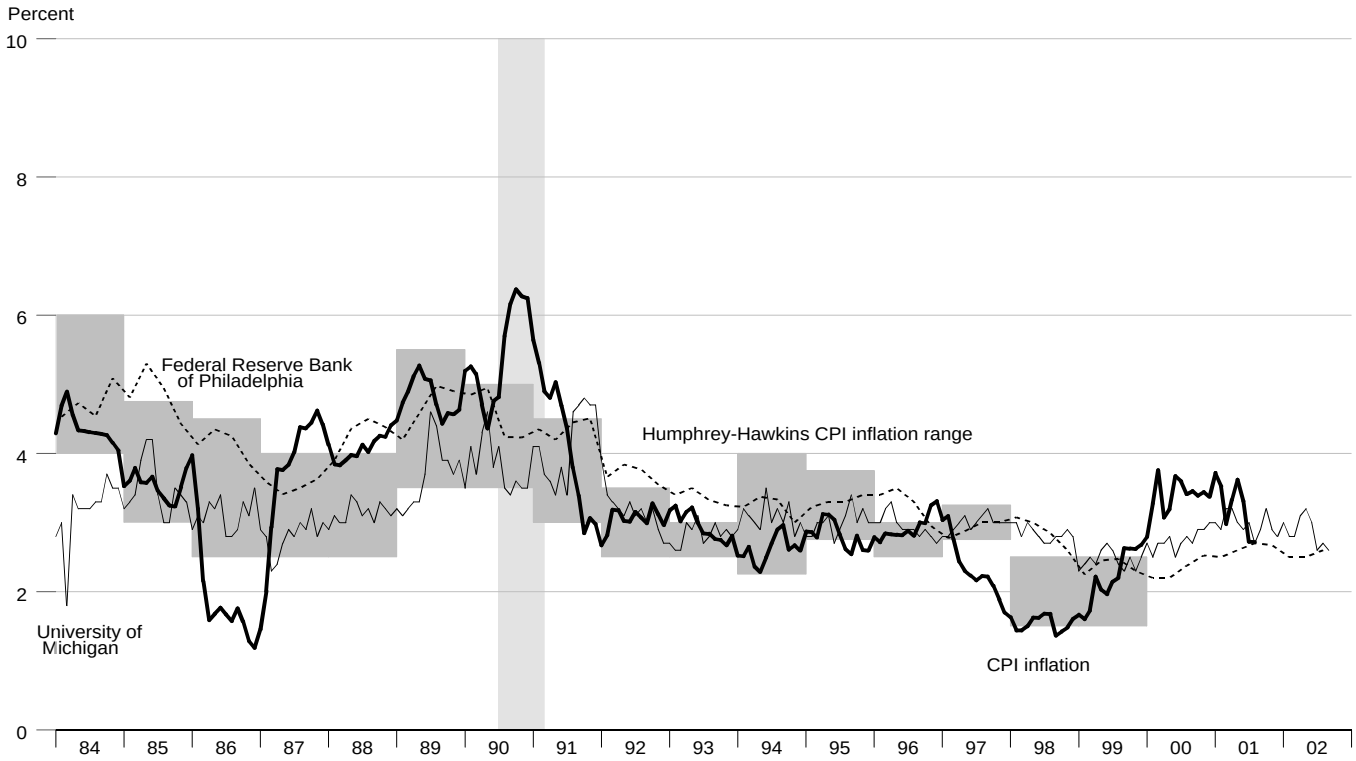
Nonfinancial Commercial Paper



Consumer Credit

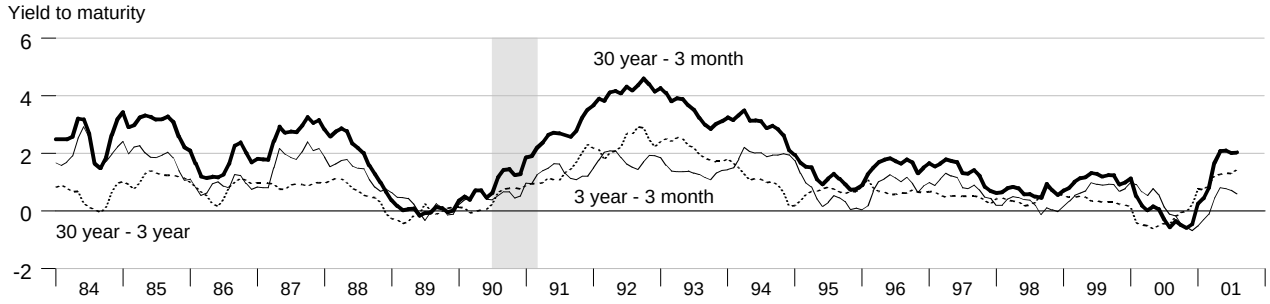


Inflation and Inflation Expectations

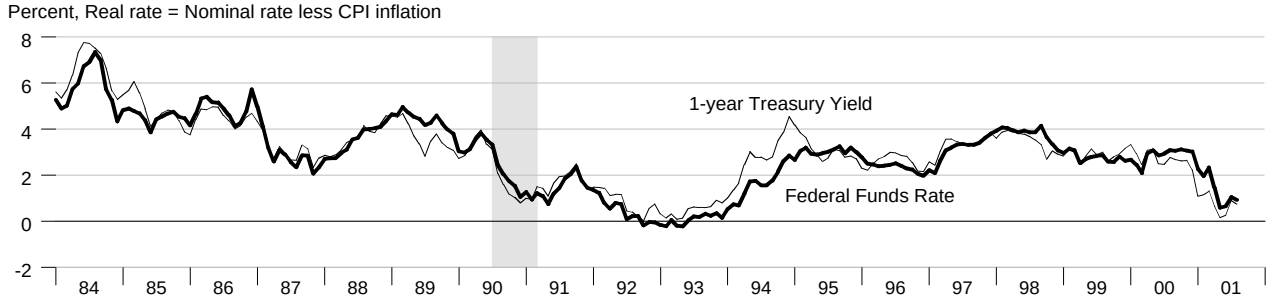


The shaded region shows the Humphrey-Hawkins CPI inflation range. Beginning in January 2000, the Humphrey-Hawkins inflation range was reported using the PCE price index and therefore is not shown on this graph. See page 19 for information.

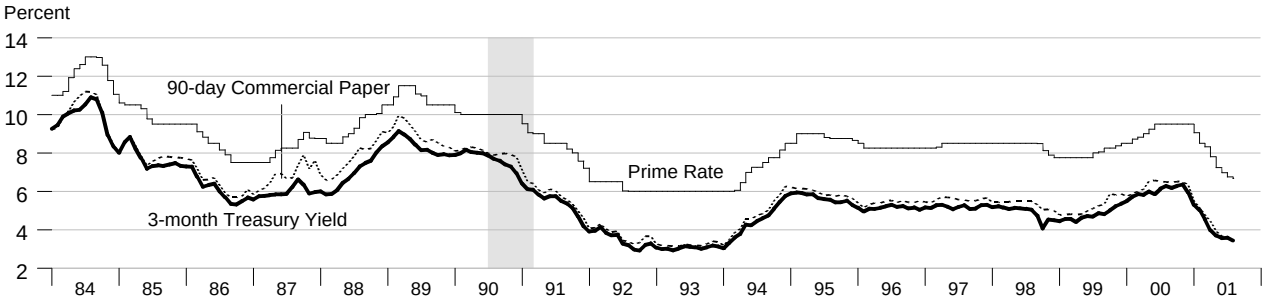
Treasury Security Yield Spreads



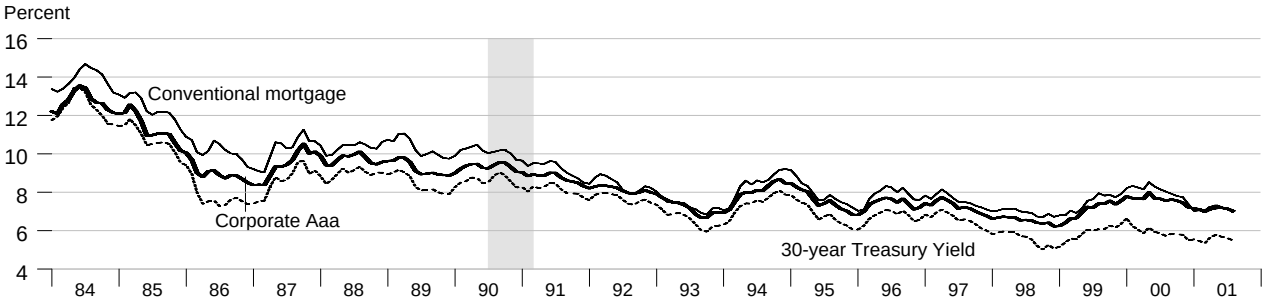
Real Interest Rates



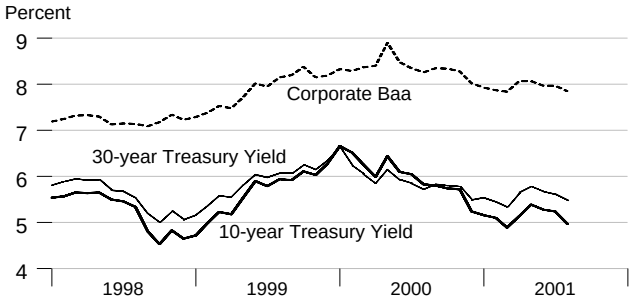
Short Term Interest Rates



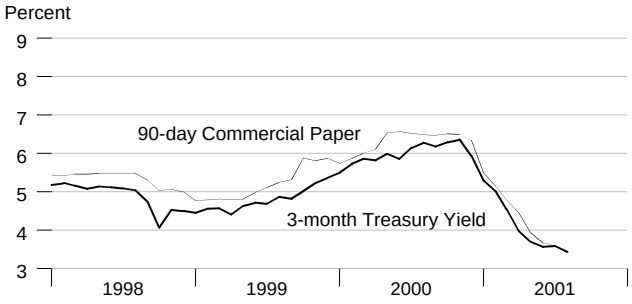
Long Term Interest Rates



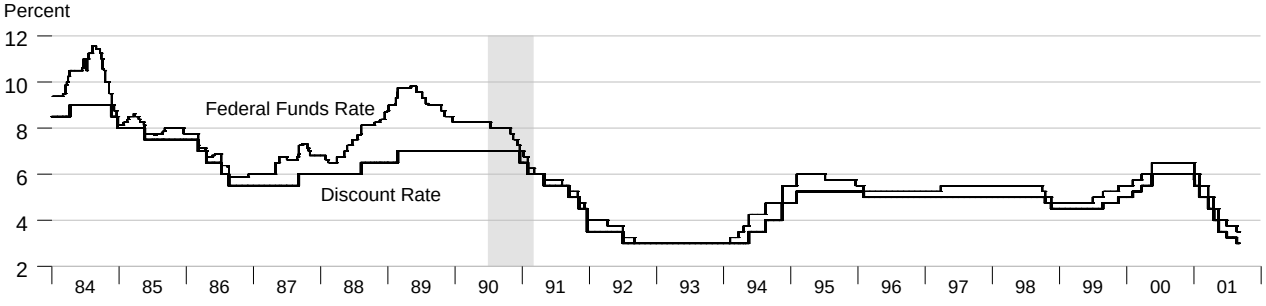
Long Term Interest Rates



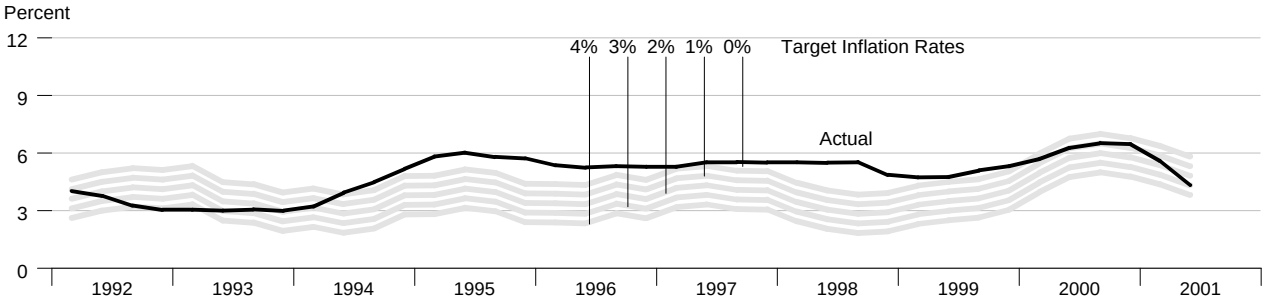
Short Term Interest Rates



FOMC Expected Federal Funds Rate and Discount Rate

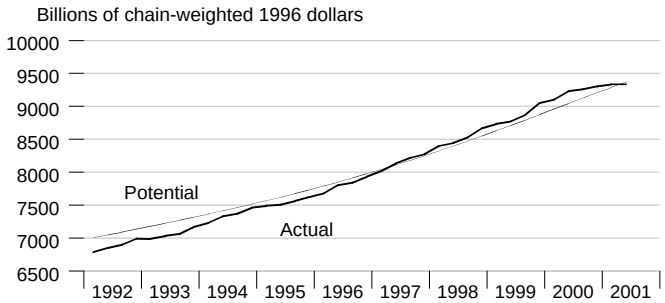


Federal Funds Rate and Inflation Targets

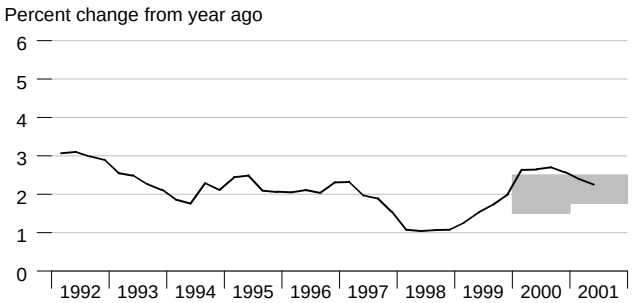


Calculated federal funds rate is based on Taylor's rule. See notes on page 19.

Actual and Potential Real GDP

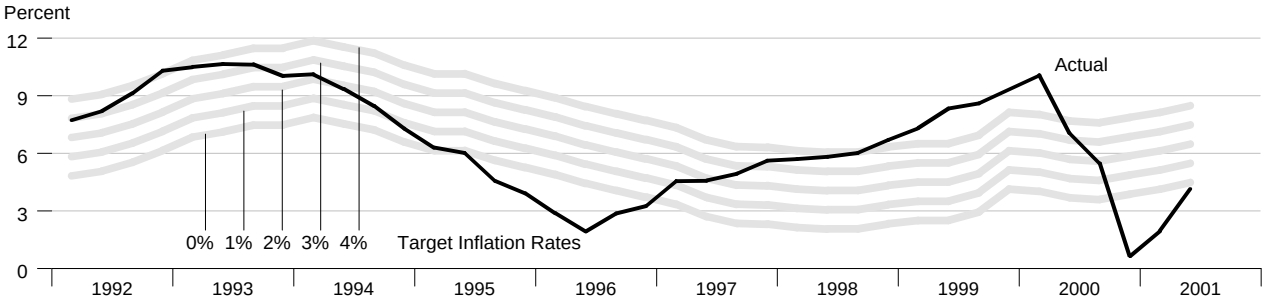


PCE Inflation and Projections



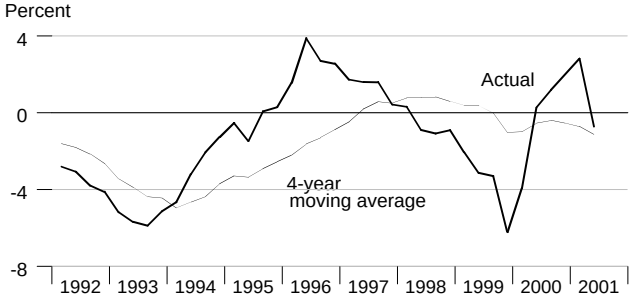
The shaded region shows the range of projections published in the Monetary Policy Report to Congress. See page 19 for information.

Monetary Base Growth* and Inflation Targets

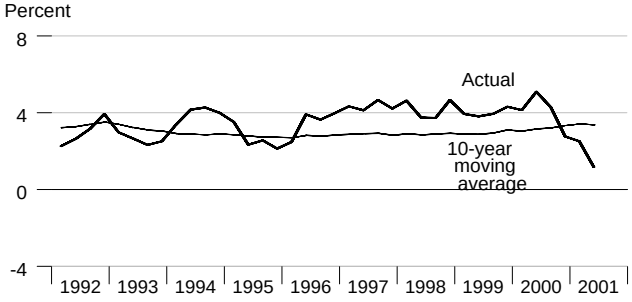


*Modified for the effects of sweeps programs on reserve demand.
Calculated base growth is based on McCallum's rule. Actual base growth is percent change from year ago.

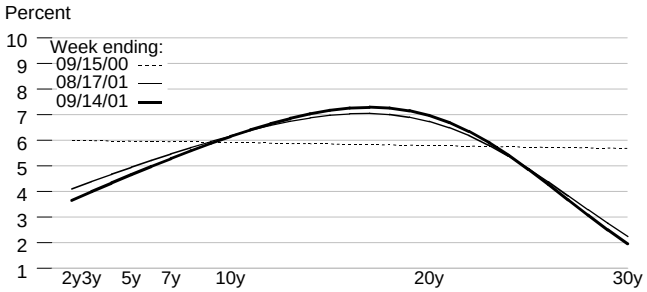
Monetary Base Velocity Growth



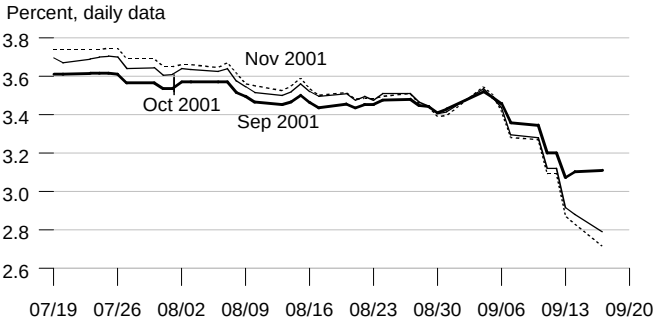
Real Output Growth



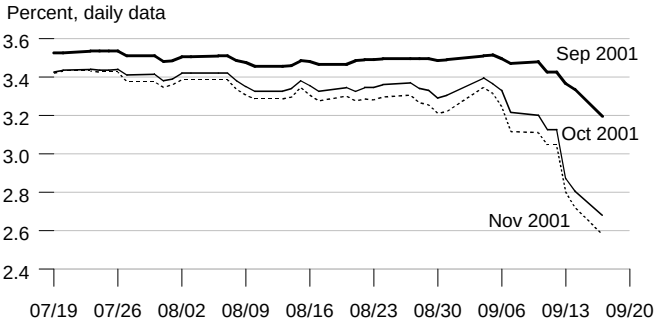
Implied One-Year Forward Rates



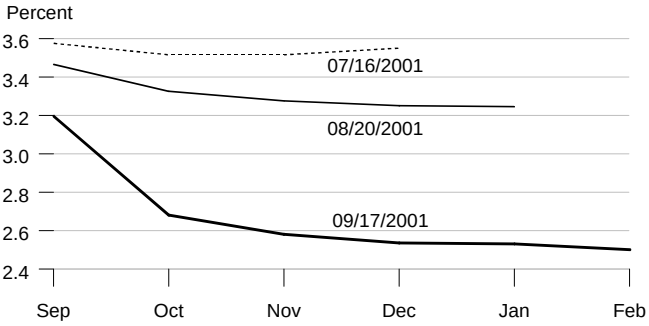
Rates on 3-Month Eurodollar Futures



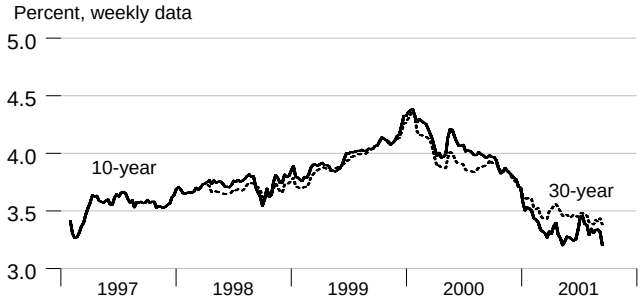
Rates on Selected Fed Funds Futures Contracts



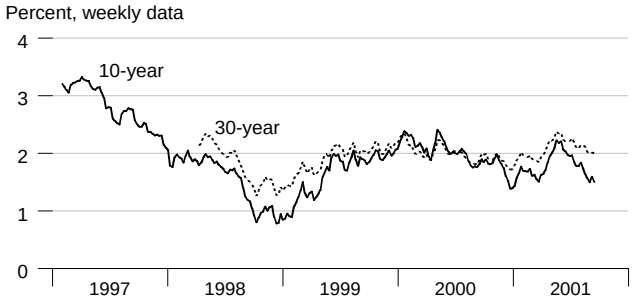
Implied Yields on Fed Funds Futures



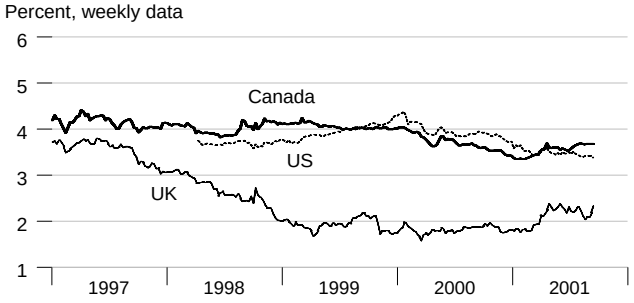
Inflation-Protected Treasury Yields



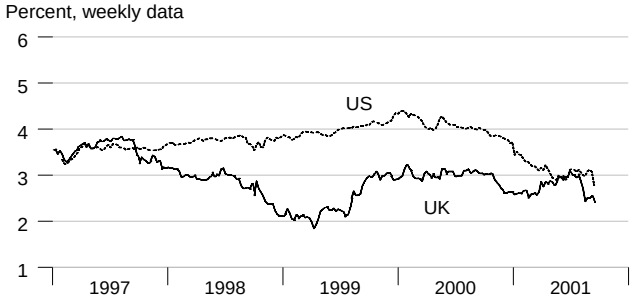
Inflation-Protected Treasury Yield Spreads



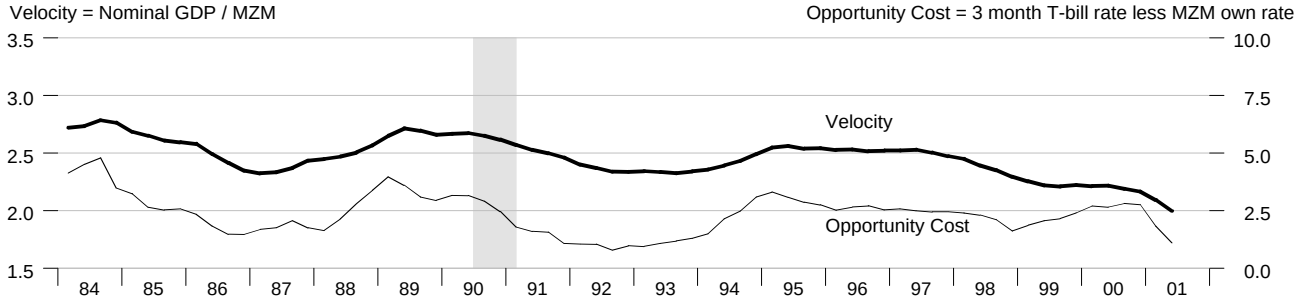
Inflation-Indexed 30-Year Bonds



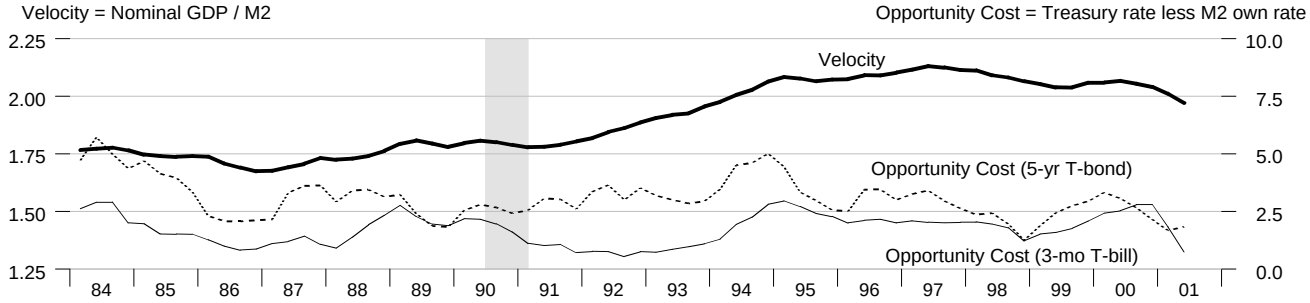
Inflation-Indexed 10-Year Bonds



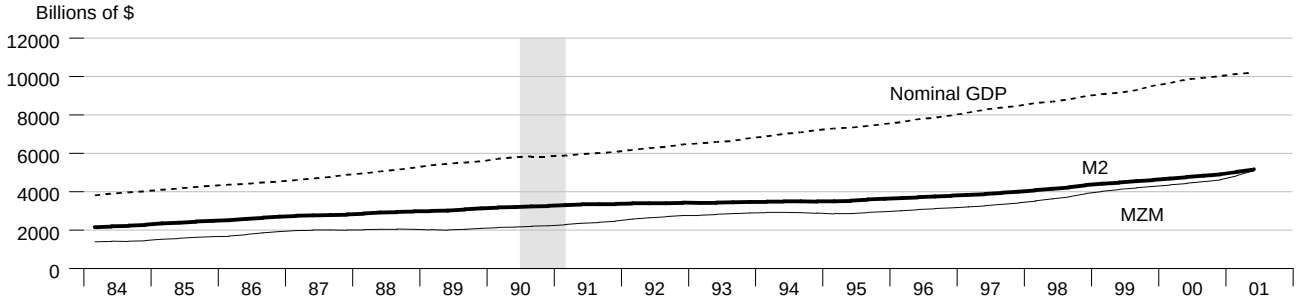
MZM Velocity and Opportunity Cost



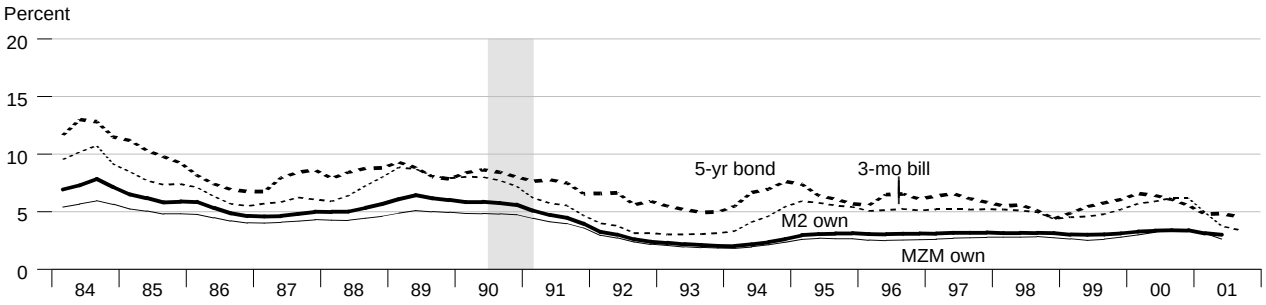
M2 Velocity and Opportunity Cost



M2, MZM and Nominal GDP

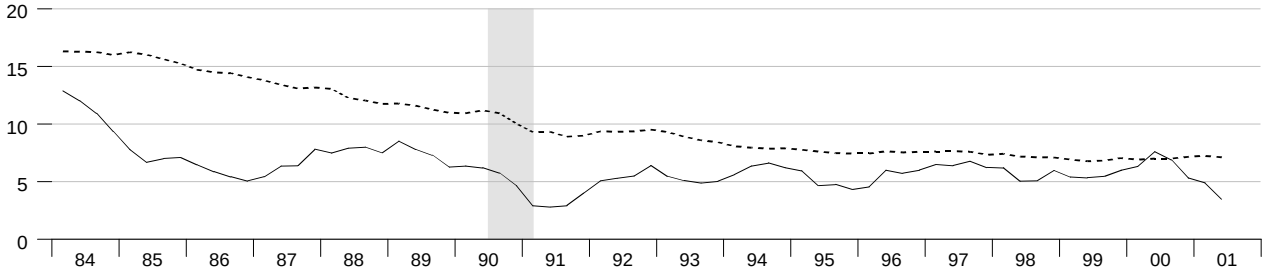


Interest Rates



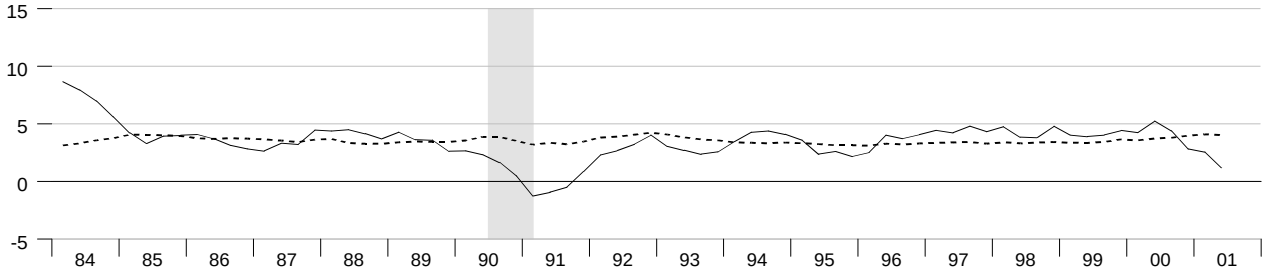
Gross Domestic Product

Percent change from year ago



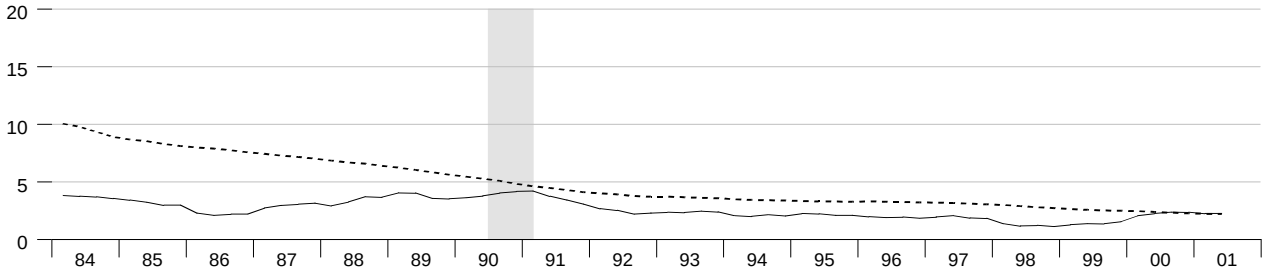
Real Gross Domestic Product

Percent change from year ago



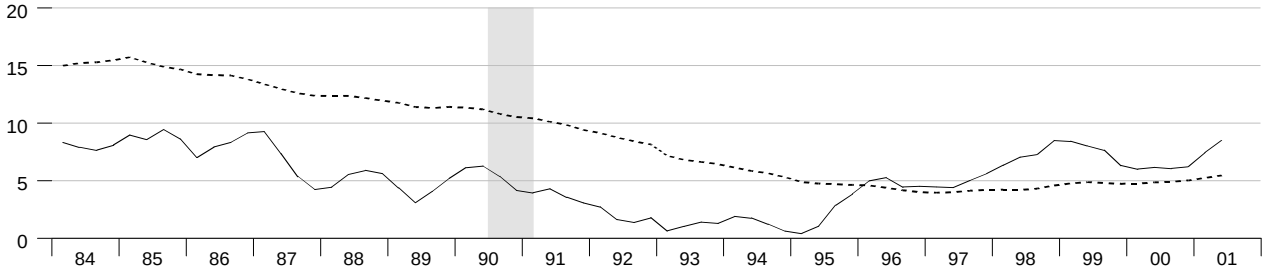
Gross Domestic Product Price Index

Percent change from year ago



M2

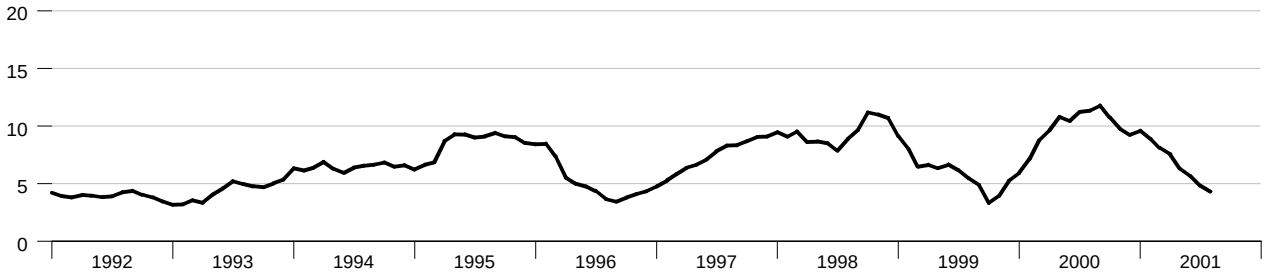
Percent change from year ago



Dashed lines indicate 10-year moving averages

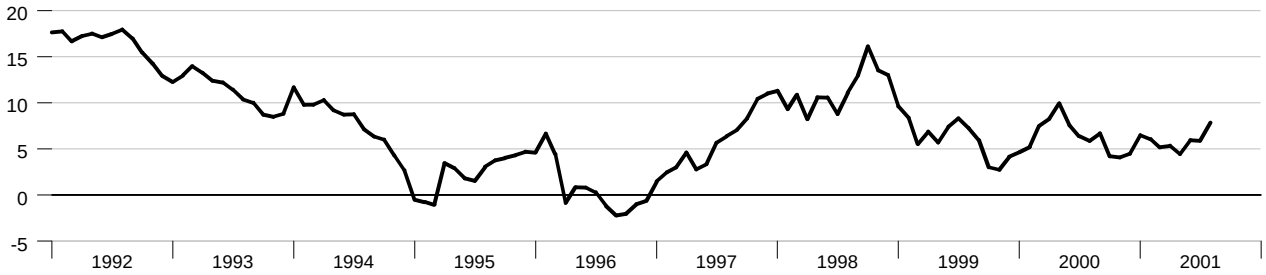
Bank Credit

Percent change from year ago



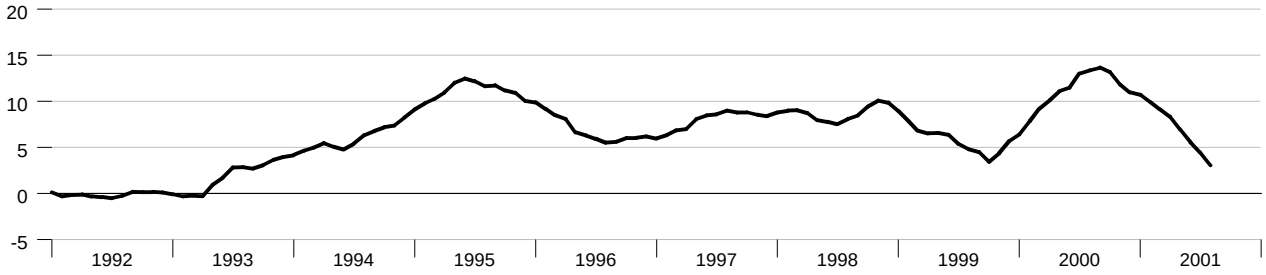
Investment Securities in Bank Credit at Commercial Banks

Percent change from year ago



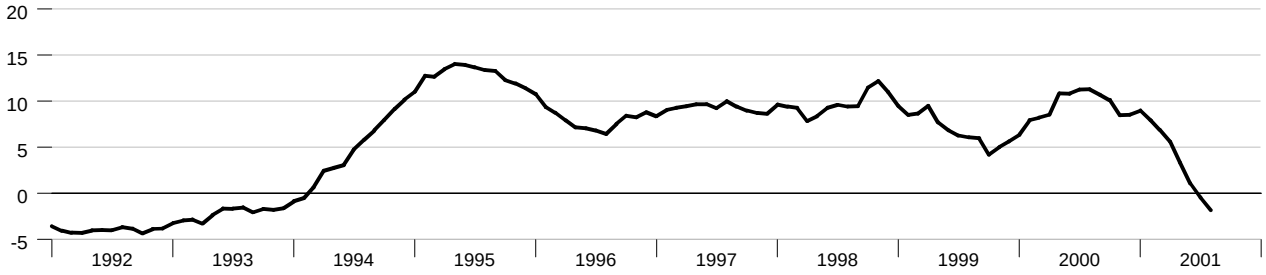
Total Loans and Leases in Bank Credit at Commercial Banks

Percent change from year ago

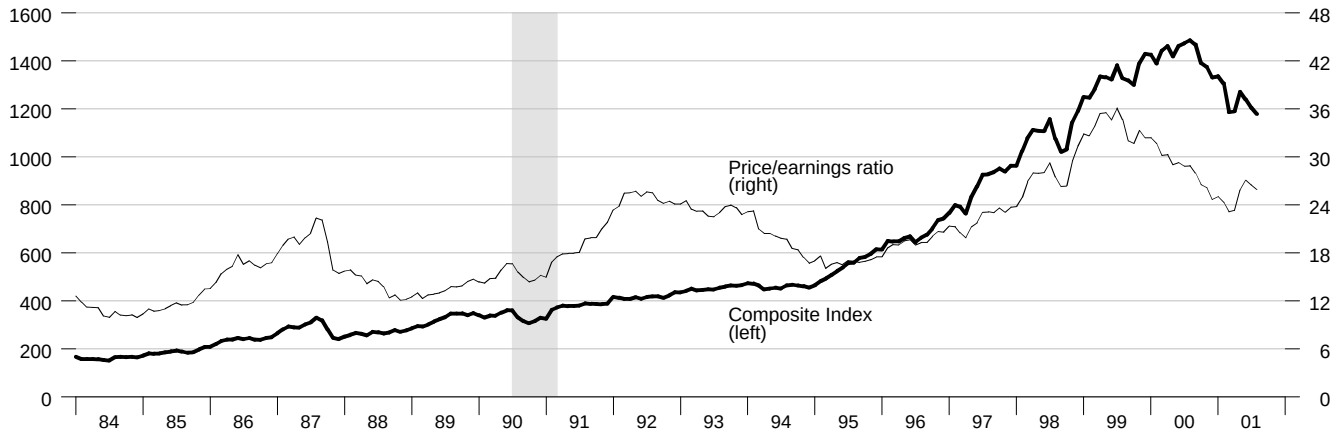


Commercial and Industrial Loans at Commercial Banks

Percent change from year ago



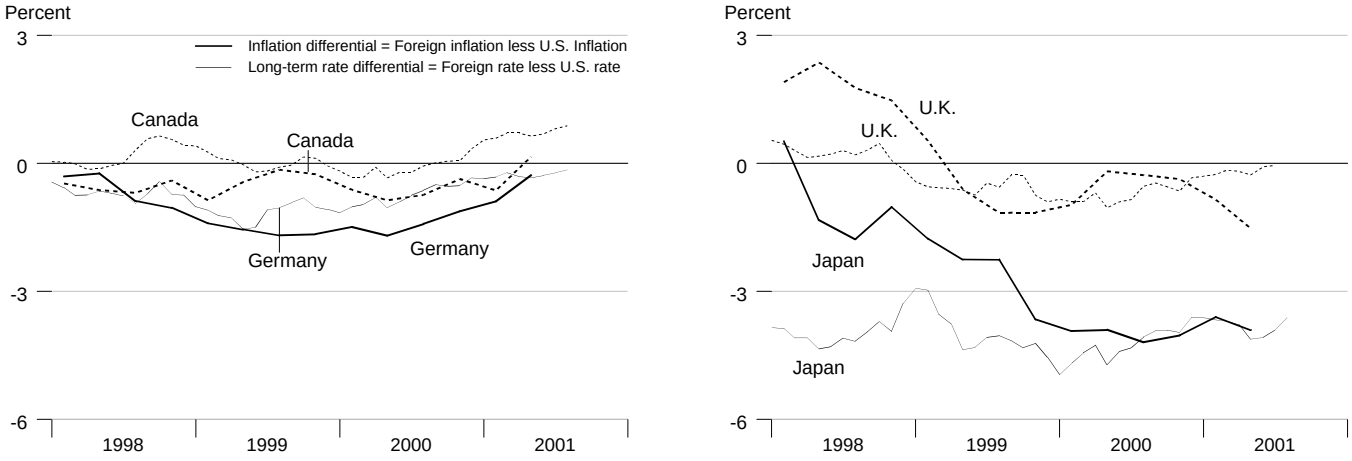
Standard and Poor's 500



Inflation and Long-Term Interest Rates

	Trend in Consumer Price Inflation Rates Percent change from year ago				Recent Long-Term Government Bond Rates Percent			
	2000Q3	2000Q4	2001Q1	2001Q2	May01	Jun01	Jul01	Aug01
United States	3.47	3.44	3.41	3.44	5.39	5.28	5.24	4.97
Canada	2.73	3.08	2.77	3.60	6.03	5.97	6.05	5.85
France	1.89	1.89	1.29	2.02	5.60	5.57	5.46	.
Germany	2.05	2.32	2.52	3.16	5.05	5.00	5.02	4.82
Italy	2.32	2.67	2.89	3.05	5.45	5.39	5.40	5.22
Japan	-0.72	-0.59	-0.20	-0.46	1.27	1.20	1.33	1.36
United Kingdom	3.20	3.07	2.55	1.91	5.12	5.20	5.19	.

Inflation and Long-Term Interest Rates Differentials



		Money Stock				Bank			
		M1	MZM	M2	M3	Credit	Monetary Base	Reserves	MSI M2
	1996	1105.818	3096.125	3739.297	4811.846	3685.227	455.572	73.952	217.463
	1997	1069.145	3318.867	3921.981	5206.953	3953.479	478.708	69.523	226.608
	1998	1079.795	3706.274	4208.613	5740.107	4326.587	508.942	67.808	241.647
	1999	1101.661	4163.696	4527.993	6251.212	4585.140	557.865	72.360	258.034
	2000	1103.866	4496.753	4805.105	6834.212	5031.454	590.821	68.319	272.755
1999	1	1098.625	4032.495	4429.975	6094.477	4517.043	536.334	68.521	252.787
	2	1102.740	4128.668	4494.332	6188.695	4528.382	545.912	67.392	256.223
	3	1095.559	4207.215	4561.360	6278.751	4586.089	557.969	69.050	259.750
	4	1109.718	4286.407	4626.303	6442.925	4709.047	591.246	84.477	263.377
2000	1	1115.416	4368.912	4695.981	6615.463	4845.544	593.102	72.390	266.963
	2	1109.967	4448.594	4771.350	6763.296	4994.047	586.045	67.097	270.750
	3	1099.561	4538.641	4838.632	6915.511	5110.852	589.054	66.636	274.657
	4	1090.519	4630.863	4914.457	7042.577	5175.372	595.084	67.150	278.650
2001	1	1104.185	4846.699	5045.396	7281.213	5274.675	604.850	66.513	285.920
	2	1119.119	5105.928	5177.062	7554.527	5318.281	610.943	65.171	293.497
1999	Aug	1095.762	4210.268	4561.817	6277.216	4586.477	556.711	68.158	259.760
	Sep	1093.388	4225.147	4578.436	6303.230	4614.814	564.135	71.113	260.750
	Oct	1096.970	4251.923	4599.722	6357.521	4645.008	572.990	73.928	261.920
	Nov	1107.434	4286.589	4625.905	6443.344	4706.170	588.675	84.023	263.320
	Dec	1124.750	4320.709	4653.281	6527.911	4775.962	612.073	95.479	264.890
2000	Jan	1123.267	4348.064	4675.512	6569.730	4803.490	604.796	80.824	266.040
	Feb	1109.242	4358.041	4690.942	6602.927	4843.914	589.984	69.258	266.710
	Mar	1113.739	4400.631	4721.490	6673.732	4889.229	584.525	67.089	268.140
	Apr	1117.934	4434.341	4759.663	6725.071	4943.488	583.053	65.913	270.090
	May	1106.712	4445.362	4766.589	6757.266	5007.474	587.863	68.889	270.450
	Jun	1105.255	4466.080	4787.799	6807.550	5031.178	587.220	66.490	271.710
	Jul	1103.351	4499.522	4807.879	6857.459	5068.080	588.032	66.555	272.930
	Aug	1099.380	4536.293	4838.017	6917.651	5106.212	588.435	66.664	274.640
	Sep	1095.953	4580.107	4870.001	6971.423	5158.265	590.694	66.689	276.400
	Oct	1096.147	4603.242	4891.430	6995.687	5144.180	593.064	66.687	277.470
	Nov	1087.217	4621.121	4906.816	7023.679	5164.956	595.549	67.685	278.240
	Dec	1088.194	4668.227	4945.124	7108.366	5216.981	596.639	67.079	280.240
2001	Jan	1099.502	4744.973	4995.163	7210.101	5264.305	600.887	67.999	282.980
	Feb	1100.229	4850.193	5040.334	7281.667	5274.379	607.236	66.558	285.720
	Mar	1112.823	4944.930	5100.692	7351.872	5285.340	606.426	64.981	289.060
	Apr	1117.625	5025.857	5146.302	7468.874	5316.582	605.803	63.241	291.580
	May	1116.939	5102.939	5170.664	7556.406	5322.391	613.264	67.022	293.300
	Jun	1122.792	5188.988	5214.220	7638.301	5315.871	613.761	65.249	295.610
	Jul	1135.476	5245.796	5252.589	7679.026	5312.167	619.434	66.748	297.540
	Aug	1143.121	5269.638	5284.982	7672.747	5325.908	627.370	66.495	299.820

*All values are given in billions of dollars

		Federal Funds	Discount Rate	Prime Rate	3-mo CDs	Treasury Yields 3 mo	3 yr	30 yr	Corporate Aaa Bonds	S & L Aaa Bonds	Conventional Mortgage
	1996	5.30	5.02	8.27	5.39	5.15	5.99	6.70	7.37	5.52	7.80
	1997	5.46	5.00	8.44	5.62	5.20	6.10	6.61	7.26	5.32	7.60
	1998	5.35	4.92	8.35	5.47	4.91	5.14	5.58	6.53	4.93	6.94
	1999	4.97	4.62	7.99	5.33	4.78	5.49	5.87	7.04	5.28	7.43
	2000	6.24	5.73	9.23	6.46	6.00	6.22	5.94	7.62	5.58	8.06
1999	1	4.73	4.50	7.75	4.90	4.53	4.87	5.37	6.42	4.87	6.88
	2	4.75	4.50	7.75	4.98	4.59	5.35	5.80	6.93	5.05	7.20
	3	5.09	4.60	8.10	5.38	4.79	5.71	6.04	7.33	5.42	7.80
	4	5.31	4.87	8.37	6.06	5.20	6.00	6.25	7.49	5.79	7.83
2000	1	5.68	5.19	8.69	6.03	5.70	6.56	6.30	7.71	5.82	8.26
	2	6.27	5.74	9.25	6.57	5.89	6.52	5.98	7.77	5.72	8.32
	3	6.52	6.00	9.50	6.63	6.20	6.16	5.80	7.61	5.45	8.03
	4	6.47	6.00	9.50	6.59	6.20	5.63	5.69	7.40	5.32	7.64
2001	1	5.59	5.11	8.62	5.26	4.95	4.64	5.44	7.08	5.03	7.01
	2	4.33	3.83	7.34	4.10	3.75	4.43	5.70	7.22	5.11	7.13
1999	Aug	5.07	4.56	8.06	5.41	4.87	5.77	6.07	7.40	5.47	7.94
	Sep	5.22	4.75	8.25	5.50	4.82	5.75	6.07	7.39	5.56	7.82
	Oct	5.20	4.75	8.25	6.13	5.02	5.94	6.26	7.55	5.78	7.85
	Nov	5.42	4.86	8.37	6.00	5.23	5.92	6.15	7.36	5.77	7.74
	Dec	5.30	5.00	8.50	6.05	5.36	6.14	6.35	7.55	5.82	7.91
2000	Jan	5.46	5.00	8.50	5.95	5.50	6.49	6.63	7.78	5.91	8.21
	Feb	5.73	5.24	8.73	6.01	5.73	6.65	6.23	7.68	5.88	8.33
	Mar	5.85	5.34	8.83	6.14	5.86	6.53	6.05	7.68	5.68	8.24
	Apr	6.02	5.50	9.00	6.28	5.82	6.36	5.85	7.64	5.60	8.15
	May	6.27	5.71	9.24	6.71	5.99	6.77	6.15	7.99	5.87	8.52
	Jun	6.53	6.00	9.50	6.73	5.86	6.43	5.93	7.67	5.69	8.29
	Jul	6.54	6.00	9.50	6.67	6.14	6.28	5.85	7.65	5.53	8.15
	Aug	6.50	6.00	9.50	6.61	6.28	6.17	5.72	7.55	5.43	8.03
	Sep	6.52	6.00	9.50	6.60	6.18	6.02	5.83	7.62	5.40	7.91
	Oct	6.51	6.00	9.50	6.67	6.29	5.85	5.80	7.55	5.46	7.80
	Nov	6.51	6.00	9.50	6.65	6.36	5.79	5.78	7.45	5.38	7.75
	Dec	6.40	6.00	9.50	6.45	5.94	5.26	5.49	7.21	5.11	7.38
2001	Jan	5.98	5.52	9.05	5.62	5.29	4.77	5.54	7.15	4.99	7.03
	Feb	5.49	5.00	8.50	5.26	5.01	4.71	5.45	7.10	5.09	7.05
	Mar	5.31	4.81	8.32	4.89	4.54	4.43	5.34	6.98	5.00	6.95
	Apr	4.80	4.28	7.80	4.53	3.97	4.42	5.65	7.20	5.14	7.08
	May	4.21	3.73	7.24	4.02	3.70	4.51	5.78	7.29	5.15	7.15
	Jun	3.97	3.47	6.98	3.74	3.57	4.35	5.67	7.18	5.03	7.16
	Jul	3.77	3.25	6.75	3.66	3.59	4.31	5.61	7.13	4.79	7.13
	Aug	3.65	3.16	6.67	3.48	3.44	4.04	5.48	7.02	4.89	6.95

*All values are given as a percent at an annual rate

		M1	MZM	M2	M3
Percent change from previous period					
	1996	-3.21	6.56	4.80	6.75
	1997	-3.32	7.19	4.89	8.21
	1998	1.00	11.67	7.31	10.24
	1999	2.02	12.34	7.59	8.90
	2000	0.20	8.00	6.12	9.33
1999	1	0.83	2.97	1.80	1.89
	2	0.37	2.38	1.45	1.55
	3	-0.65	1.90	1.49	1.46
	4	1.29	1.88	1.42	2.61
2000	1	0.51	1.92	1.51	2.68
	2	-0.49	1.82	1.60	2.23
	3	-0.94	2.02	1.41	2.25
	4	-0.82	2.03	1.57	1.84
2001	1	1.25	4.66	2.66	3.39
	2	1.35	5.35	2.61	3.75
1999	Aug	-0.16	0.57	0.40	0.34
	Sep	-0.22	0.35	0.36	0.41
	Oct	0.33	0.63	0.46	0.86
	Nov	0.95	0.82	0.57	1.35
	Dec	1.56	0.80	0.59	1.31
2000	Jan	-0.13	0.63	0.48	0.64
	Feb	-1.25	0.23	0.33	0.51
	Mar	0.41	0.98	0.65	1.07
	Apr	0.38	0.77	0.81	0.77
	May	-1.00	0.25	0.15	0.48
	Jun	-0.13	0.47	0.44	0.74
	Jul	-0.17	0.75	0.42	0.73
	Aug	-0.36	0.82	0.63	0.88
	Sep	-0.31	0.97	0.66	0.78
	Oct	0.02	0.51	0.44	0.35
	Nov	-0.81	0.39	0.31	0.40
	Dec	0.09	1.02	0.78	1.21
2001	Jan	1.04	1.64	1.01	1.43
	Feb	0.07	2.22	0.90	0.99
	Mar	1.14	1.95	1.20	0.96
	Apr	0.43	1.64	0.89	1.59
	May	-0.06	1.53	0.47	1.17
	Jun	0.52	1.69	0.84	1.08
	Jul	1.13	1.09	0.74	0.53
	Aug	0.67	0.45	0.62	-0.08

Definitions

M1: The sum of currency held outside the vaults of depository institutions, Federal Reserve Banks, and the U.S. Treasury; travelers checks; and demand and other checkable deposits issued by financial institutions (except demand deposits due to the Treasury and depository institutions), minus cash items in process of collection and Federal Reserve float.

MZM: M2 minus small denomination time deposits, plus institutional money market mutual funds. The label MZM was coined by William Poole (1991) for this aggregate, proposed earlier by Motley (1988).

M2: M1 plus savings deposits (including money market deposit accounts) and small-denomination (less than $100,000) time deposits issued by financial institutions; and shares in retail money market mutual funds (funds with initial investments of less than $50,000), net of retirement accounts.

M3: M2 plus large-denomination ($100,000 or more) time deposits; repurchase agreements issued by depository institutions; Eurodollar deposits, specifically, dollar-denominated deposits due to nonbank U.S. addresses held at foreign offices of U.S. banks worldwide and all banking offices in Canada and the United Kingdom; and institutional money market mutual funds (funds with initial investments of $50,000 or more).

Bank Credit: All loans, leases, and securities held by commercial banks.

Domestic Nonfinancial Debt: Total credit market liabilities of the U.S. Treasury, federally sponsored agencies, state and local governments, households, and firms (except depository institutions and money market mutual funds).

Adjusted Monetary Base: The sum of currency in circulation outside Federal Reserve Banks and the U.S. Treasury, deposits of depository financial institutions at Federal Reserve Banks, and an adjustment for the effects of changes in statutory reserve requirements on the quantity of base money held by depositories. This series is a spliced chain index; see Anderson and Rasche (1996a,b).

Adjusted Reserves: The sum of vault cash and Federal Reserve Bank deposits held by depository institutions and an adjustment for the effects of changes in statutory reserve requirements on the quantity of base money held by depositories. This series, a spliced chain index, is numerically larger than the Board of Governors' measure, which excludes vault cash not used to satisfy statutory reserve requirements and Federal Reserve Bank deposits used to satisfy required clearing balance contracts; see Anderson and Rasche (1996a) and www.stls.frb.org/research/newbase.html.

Monetary Services Index: An index that measures the flow of monetary services received by households and firms from their holdings of liquid assets; see Anderson, Jones, and Nesmith (1997). Indexes are shown for the assets included in M2; additional data are available at www.stls.frb.org/research/msi/index.html.

Note: M1, M2, M3, Bank Credit, and Domestic Nonfinancial Debt are constructed and published by the Board of Governors of the Federal Reserve System. For details, see *Federal Reserve Bulletin*, tables 1.21 and 1.26. MZM, Adjusted Monetary Base, Adjusted Reserves, and Monetary Services Index are constructed and published by the Research Division of the Federal Reserve Bank of St. Louis.

Notes

Page 3: **MZM,** or "Money, Zero Maturity," includes the zero maturity, or immediately available, components of M3. MZM equals M2 minus small-denomination time deposits, plus institutional money market mutual funds (that is, the money market mutual funds included in M3 but excluded from M2). Readers are cautioned that since early 1994 the level and growth of M1 have been depressed by retail sweep programs that reclassify transactions deposits (demand deposits and other checkable deposits) as savings deposits overnight, thereby reducing banks' required reserves; see Anderson and Rasche (2001) and www.stls.frb.org/research/swdata.html. For analytical purposes, MZM largely replaces M1. The **Discount Rate** and **Expected Federal Funds Rate** shown in the chart **Reserve Market Rates** are plotted as of the date of the change, while the **Effective Federal Funds Rate** is plotted as of the end of the month. Interest rates in the table are monthly averages from the Board of Governors H.15 Statistical Release. The **Treasury Yield Curve** shows constant maturity yields calculated by the U.S. Treasury Department for securities with 3 months and 1, 2, 3, 5, 7, 10, 20, and 30 years to maturity. Daily data and descriptions are available at www.stls.frb.org/fred/data/wkly.html. See also *Federal Reserve Bulletin*, table 1.35.

Page 5: **Total Checkable Deposits** is the sum of demand and other checkable deposits. **Total Savings Deposits** is the sum of money market deposit accounts and passbook and statement savings. **Time Deposits** have a minimum initial maturity of 7 days. **Large Time Deposits** are deposits of $100,000 or more. **Retail** and **Institutional Money Market Mutual Funds** are as included in M2 and the non-M2 component of M3, respectively.

Page 7: **Excess Reserves plus RCB (Required Clearing Balance) Contracts** equals the amount of deposits at Federal Reserve Banks held by depository institutions but not applied to satisfy statutory reserve requirements. (This measure excludes the vault cash held by depository institutions that is not applied to satisfy statutory reserve requirements.) **Consumer Credit** includes most short- and intermediate-term credit extended to individuals. See *Federal Reserve Bulletin*, table 1.55.

Page 8: **Inflation Expectations** measures include the quarterly Federal Reserve Bank of Philadelphia *Survey of Professional Forecasters*, the monthly University of Michigan Survey Research Center's *Surveys of Consumers*, and the annual Federal Open Market Committee range as reported to the Congress in the February Humphrey-Hawkins Act testimony each year. Beginning February 2000, the FOMC began using the Personal Consumption Expenditures (PCE) price index to report its inflation range and therefore is not shown on this graph. **CPI Inflation** is the percentage change from a year ago in the CPI for all urban consumers. **Real Interest Rates** are ex post measures, equal to nominal rates minus CPI inflation.

Page 9: **FOMC Expected Federal Funds Rate** is the level (or midpoint of the range, if applicable) of the federal funds rate that the staff of the Federal Open Market Committee expected to be consistent with the desired degree of pressure on bank reserve positions.

Page 10: **Federal Funds Rate and Inflation Targets** shows the observed federal funds rate, quarterly, and the level of the funds rate implied by applying Taylor's (1993) equation

$$f_t^* = 2.5 + \pi_{t-1} + (\pi_{t-1} - \pi^*)/2 + 100 \times (y_{t-1} - y_{t-1}^P)/2$$

to five alternative target inflation rates, $\pi^* = 0, 1, 2, 3, 4$ percent, where f_t^* is the implied federal funds rate, π_{t-1} is the previous period's inflation rate (PCE) measured on a year-over-year basis, y_{t-1} is the log of the previous period's level of real GDP, and y_{t-1}^P is the log of an estimate of the previous period's level of potential output. **Potential Real GDP** is as estimated by the Congressional Budget Office.

Monetary Base Growth and Inflation Targets shows the quarterly growth of the adjusted monetary base (modified to include an estimate of the effect of sweep programs) implied by applying McCallum's (1988, 1993) equation

$$\Delta MB_t^* = \pi^* + (\text{10-year moving average growth of real GDP}) - (\text{4-year moving average of base velocity growth})$$

to five alternative target inflation rates, $\pi^* = 0, 1, 2, 3, 4$ percent, where ΔMB_t^* is the implied growth rate of the adjusted monetary base. The 10-year moving average growth of real GDP for a quarter "t" is calculated as the average quarterly growth during the previous 40 quarters, at an annual rate, by the formula $((y_t - y_{t-40})/40) \times 4 \times 100$, where y_t is the log of real GDP. The four-year moving average of base velocity growth is calculated similarly. To adjust the monetary base for the effect of retail-deposit sweep programs, we add to the monetary base an amount equal to 10 percent of the total amount swept, as estimated by the Federal Reserve Board staff. These estimates are imprecise, at best. Sweep program data are available at www.stls.frb.org/research/swdata.html.

Page 11: **Implied One-Year Forward Rates** are calculated by this Bank from Treasury constant maturity yields. Yields to maturity, *R(m)*, for securities with $m = 1,...,$ 30 years to maturity are obtained by linear interpolation between reported yields. These yields are smoothed by fitting the regression suggested by Nelson and Siegel (1987),

$$R(m) = a_0 + (a_1 + a_2)(1 - e^{-m/50})/(m/50) - a_2 \times e^{-m/50},$$

and forward rates are calculated from these smoothed yields using equation (a) in table 13.1 of Shiller (1990),

$$f(m) = [D(m)R(m) - D(m-1)] / [D(m) - D(m-1)],$$

where duration is approximated as $D(m) = (1 - e^{-R(m) \times m}) / R(m)$. These rates are linear approximations to the true instantaneous forward rates; see Shiller (1990). For a discussion of the use of forward rates as indicators of inflation expectations, see Sharpe (1997). **Rates on 3-Month Eurodollar Futures** and **Rates on Selected Fed Funds Futures Contracts** each trace through time the yield on three specific contracts. **Implied Yields on Fed Funds Futures** displays a single day's snapshot of yields for contracts expiring in the months shown on the horizontal axis. **Inflation-Protected Treasury Yields** are yields on the most recently issued inflation-protected securities of 10- and 30-year original maturity. **Inflation-Protected Treasury Yield Spreads** equal the differences between the Treasury constant maturity yields and yields on the most recently issued inflation-protected securities of similar original maturity. **Inflation-Indexed Bonds** are, for Canada, the 31-year bond with a maturity date of 12/01/2026; for the U.K., the 37.5-year bond with a maturity date of 07/17/2024 and the 12.1-year bond with a maturity date of 10/21/2004; and, for the U.S., the 30-year bond with a maturity date of 04/15/2028 and the 10-year bond with a maturity date of 01/15/2007.

Page 12: **Velocity** (for MZM and M2) equals the ratio of GDP, measured in current dollars, to the level of the monetary aggregate. **MZM** and **M2 Own Rates** are weighted averages of the rates received by households and firms on the assets included in the aggregates. Two alternative opportunity costs are shown, one relative to the 3-month Treasury constant-maturity yield, the other to the 5-year constant-maturity yield.

Page 13: **Real Gross Domestic Product** is GDP as measured in chained 1996 dollars. The **Gross Domestic Product Price Index** is the implicit price deflator for GDP, which is defined by the Bureau of Economic Analysis, U.S. Department of Commerce, as the ratio of GDP measured in current dollars to GDP measured in chained 1996 dollars.

Page 14: **Investment Securities** are all securities held by commercial banks in both investment and trading accounts.

Sources

Bank of Canada
Canadian inflation-linked bond yields.

Bank of England
U.K. inflation-linked bond yields.

Board of Governors of the Federal Reserve System
Monetary aggregates and components, nonfinancial debt: H.6 release. Bank credit and components: H.8 release. Consumer credit: G.19 release. Required reserves, excess reserves, clearing balance contracts, and discount window borrowing: H.4.1 and H.3 releases. Interest rates: H.15 release. Nonfinancial commercial paper: Board of Governors web site. M2 own rate.

Bureau of Economic Analysis
Gross domestic product.

Bureau of Labor Statistics
Consumer price index.

Federal Reserve Bank of Philadelphia
Survey of Professional Forecasters inflation expectations.

Federal Reserve Bank of St. Louis
Adjusted monetary base and adjusted total reserves, monetary services index, MZM own rate, one-year forward rates.

Organization for Economic Cooperation and Development
International interest and inflation rates.

University of Michigan Survey Research Center
Median expected price change.

Congressional Budget Office
Potential real GDP.

Dow Jones and Co. (Wall Street Journal)
Federal funds futures contracts, Eurodollar futures.

Standard and Poors Inc.
Stock price-earnings ratio, stock price composite index.

U.S. Department of the Treasury
U.S. inflation-protected security yields.

References

Anderson, Richard G. and Robert H. Rasche (1996a). "A Revised Measure of the St. Louis Adjusted Monetary Base," Federal Reserve Bank of St. Louis *Review*, March/April, pp. 3-13.

____ and ____(1996b). "Measuring the Adjusted Monetary Base in an Era of Financial Change," Federal Reserve Bank of St. Louis *Review*, November/December, pp. 3-37.

____ and ____(2001). "Retail Sweep Programs and Bank Reserves, 1994-1999," Federal Reserve Bank of St. Louis *Review*, January/ February, pp. 51-72.

____ , Barry E. Jones and Travis D. Nesmith (1997). "Special Report: The Monetary Services Indexes Project of the Federal Reserve Bank of St. Louis," Federal Reserve Bank of St. Louis *Review*, January/ February 1997, pp. 31-82.

McCallum, Bennett T. (1988). "Robustness Properties of a Monetary Policy Rule," *Carnegie-Rochester Conference Series on Public Policy*, vol. 29, pp. 173-204.

____(1993). "Specification and Analysis of a Monetary Policy Rule for Japan," Bank of Japan *Monetary and Economic Studies*, November, pp. 1-45.

Motley, Brian (1988). "Should M2 Be Redefined?" Federal Reserve Bank of San Francisco *Economic Review*, Winter, pp. 33-51.

Nelson, Charles R. and Andrew F. Siegel (1987). "Parsimonious Modeling of Yield Curves," *Journal of Business*, October, pp. 473-89.

Poole, William (1991). Statement before the Subcommittee on Domestic Monetary Policy of the Committee on Banking, Finance and Urban Affairs, U.S. House of Representatives, November 6, 1991. Government Printing Office, Serial No. 102-82.

Sharpe, William F. (1997). *Macro-Investment Analysis*, on-line textbook available at www.stanford.edu/~wfsharpe/mia/mia.htm.

Shiller, Robert (1990). "The Term Structure of Interest Rates," *Handbook of Monetary Economics*, vol. 1, B. Friedman and F. Hahn, eds., pp. 627-722.

Taylor, John B. (1993). "Discretion versus Policy Rules in Practice," *Carnegie-Rochester Conference Series on Public Policy*, vol. 39, pp. 195-214.

Note: Articles from this Bank's *Review* are available on the Internet at www.stls.frb.org/research/index.html.