September 2000

MonetaryTrends

THE FEDERAL RESERVE BANK of ST. LOUIS

Spring of Disconnect Across Stock Markets?

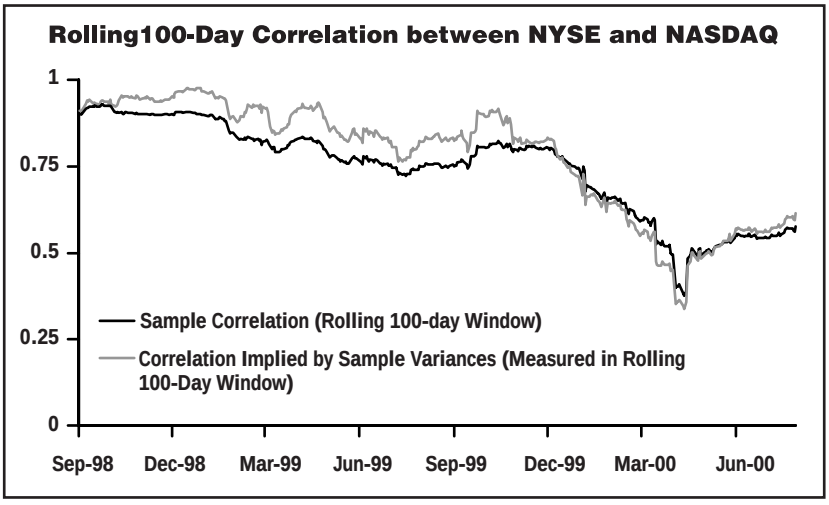
Rates of return on broad stock market indices, such as the composite New York Stock Exchange (NYSE) and the National Association of Securities Dealers Automated Quotations System (NASDAQ), are generally highly correlated with one another. Although the two indices are comprised of different stocks, both of their rates of return are influenced by macroeconomic shocks and a common underlying rate of discounting future profits. In the spring of 2000, however, the NASDAQ and NYSE seemed to disconnect, in that their movements were substantially less correlated than usual.

Mico Loretan and William English suggest that changes across time in the measured correlation between financial rates of return can reflect changes in the volatility of one asset relative to another.[1] If NASDAQ returns, for example, experience an idiosyncratic increase in volatility that is not shared by NYSE returns, then the correlation between the returns of the two indices will be lower than average during the period of high volatility. On the other hand, if events cause the volatilities of NASDAQ and NYSE returns to increase in tandem, then the correlation will be higher than average. In the spring of 2000, NASDAQ returns experienced unprecedented volatility and NYSE returns did not. Of special concern to investors during that period was uncertainty about the future profitability of internet stocks, which make up a relatively larger share of the NASDAQ index than of the NYSE. This idiosyncratic increase in the volatility of NASDAQ returns might help us understand why we observed low correlations between NASDAQ and NYSE returns last spring.

The attached chart shows 100-day rolling sample correlations between NYSE and NASDAQ returns (dark line) and how the sample correlation would be expected to vary from its long-run average due solely to changes in the volatilities of returns, holding the underlying correlation structure constant (gray line). The volatility-implied degree of correlation proves to be an imperfect indicator during periods of relatively high and stable correlation, but tracks the sample correlations accurately when the sample correlations are far below normal. Thus, sharp drops in sample correlations do not necessarily represent a fundamental break in the correlation structure between the two stock markets. The link between the idiosyncratic volatility of NASDAQ returns and the sample correlations between NASDAQ and NYSE returns suggests a gradual return to normal correlations as NASDAQ volatility subsides from the high levels reached this spring.

—Michael Dueker

[1]Mico Loretan and William B. English, "Special Feature: Evaluating changes in correlations during periods of high market volatility," *BIS Quarterly Review*, June 2000, pp. 29-36.



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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: $[(x_t / x_{t-12}) - 1] \times 100$.

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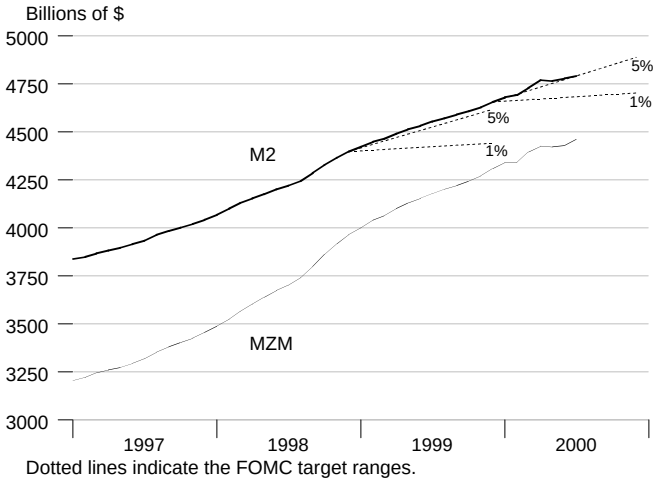
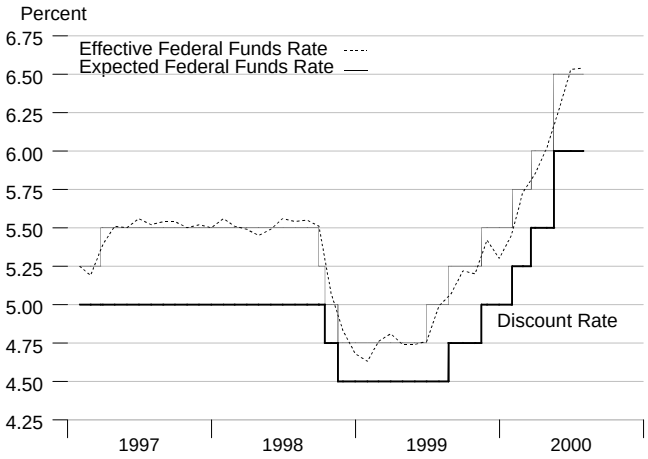
M2 and MZM

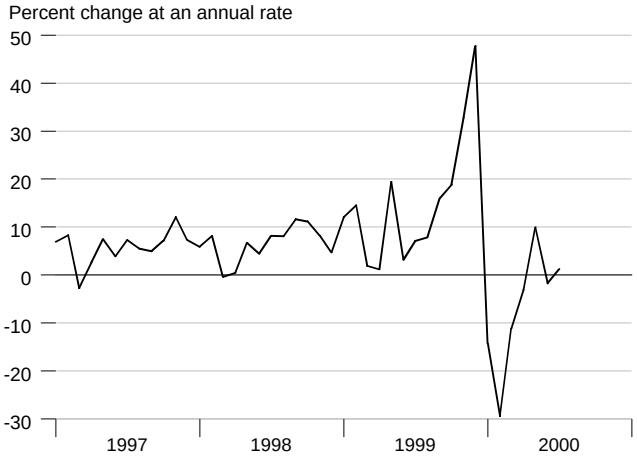


Dotted lines indicate the FOMC target ranges.

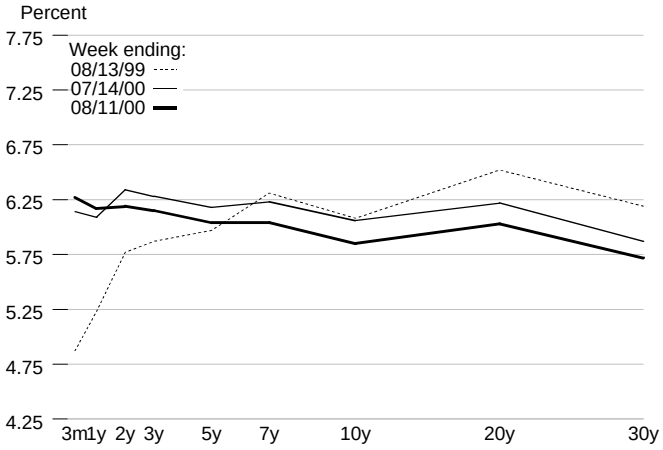
Reserve Market Rates



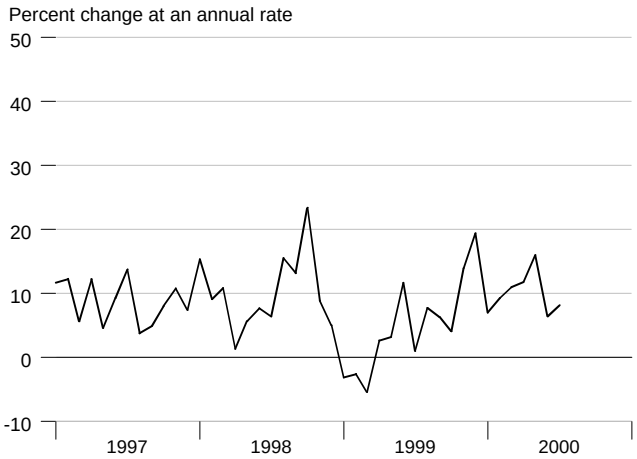
Adjusted Monetary Base



Treasury Yield Curve



Total Bank Credit

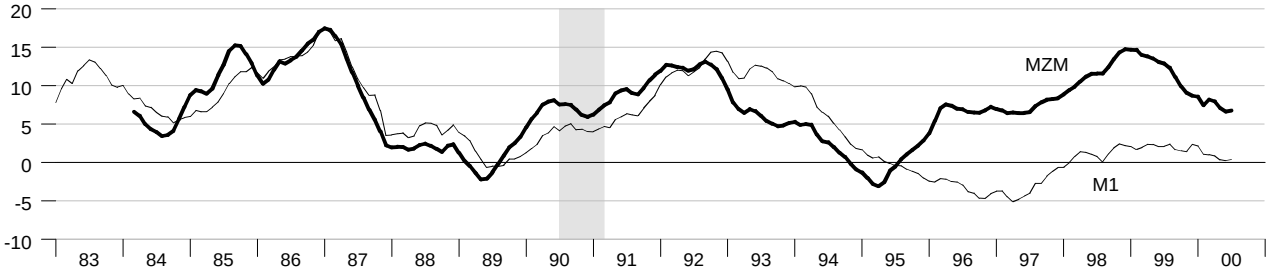


Interest Rates

	May 00	Jun 00	Jul 00
Federal Funds Rate	6.27	6.53	6.54
Discount Rate	5.71	6.00	6.00
Prime Rate	9.24	9.50	9.50
Conventional Mortgage Rate	8.52	8.29	8.15
Treasury Yields:			
3-month constant maturity	5.99	5.86	6.14
6-month constant maturity	6.39	6.24	6.27
1-year constant maturity	6.33	6.17	6.08
3-year constant maturity	6.77	6.43	6.28
5-year constant maturity	6.69	6.30	6.18
10-year constant maturity	6.44	6.10	6.05
30-year constant maturity	6.15	5.93	5.85

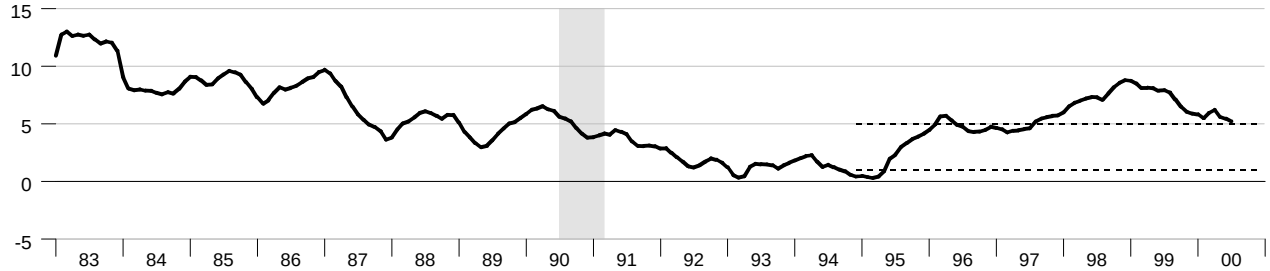
MZM and M1

Percent change from year ago



M2

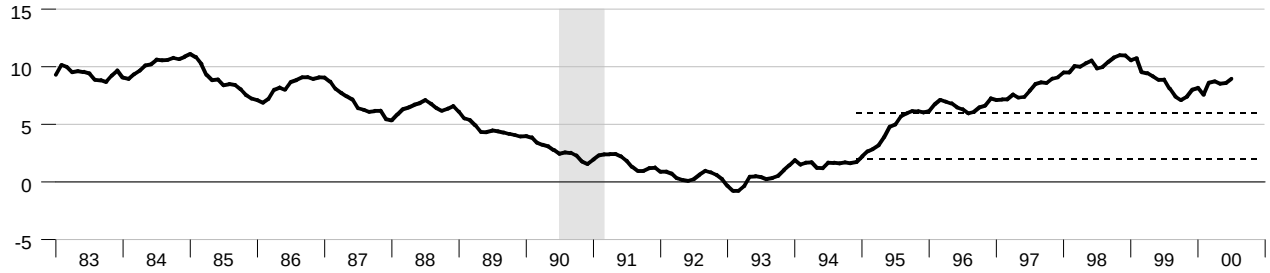
Percent change from year ago



Dotted lines indicate the FOMC target ranges.

M3

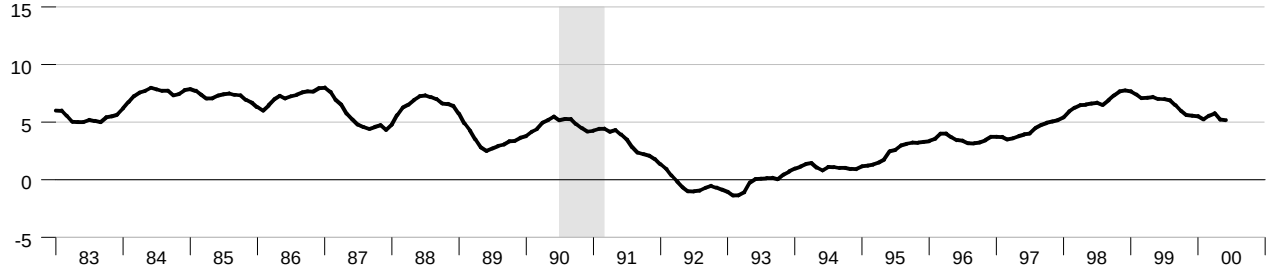
Percent change from year ago



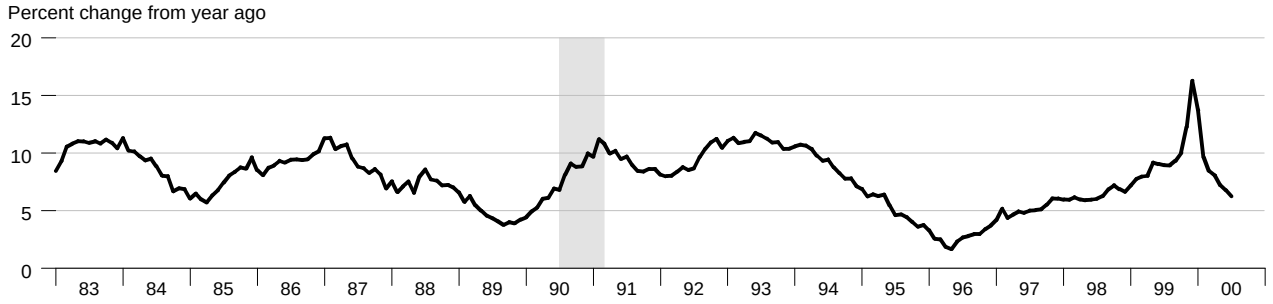
Dotted lines indicate the FOMC target ranges.

Monetary Services Index - M2

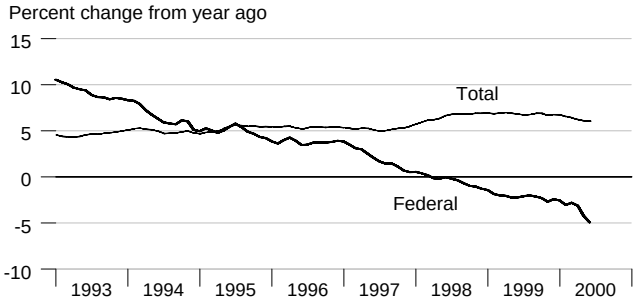
Percent change from year ago



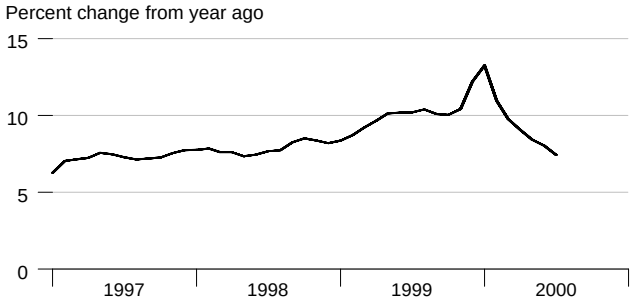
Adjusted Monetary Base



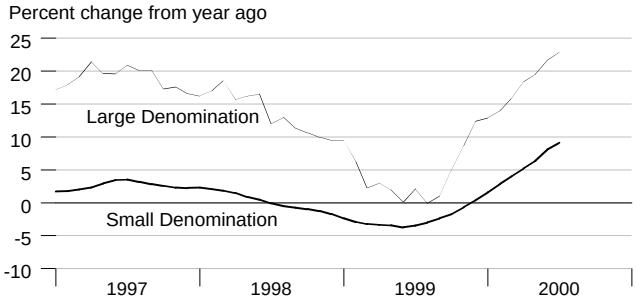
Domestic Nonfinancial Debt



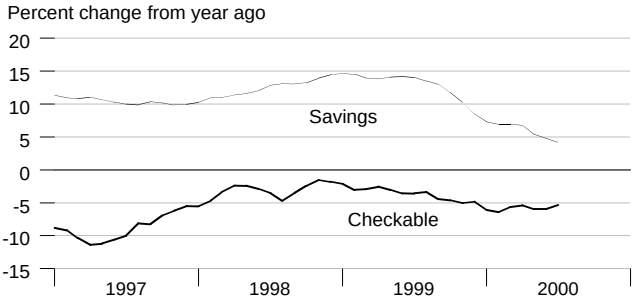
Currency Held by the Nonbank Public



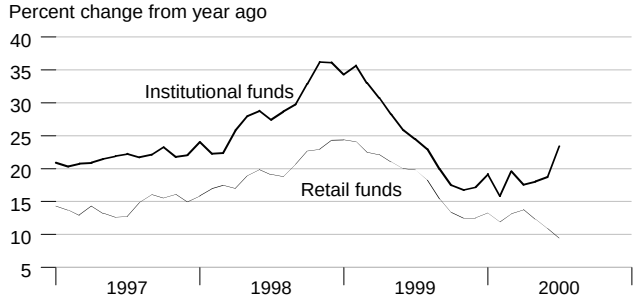
Time Deposits



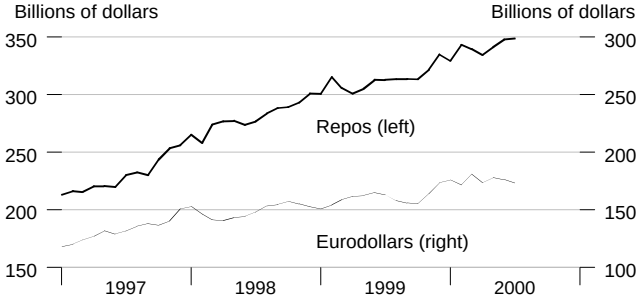
Checkable and Savings Deposits



Money Market Mutual Fund Shares

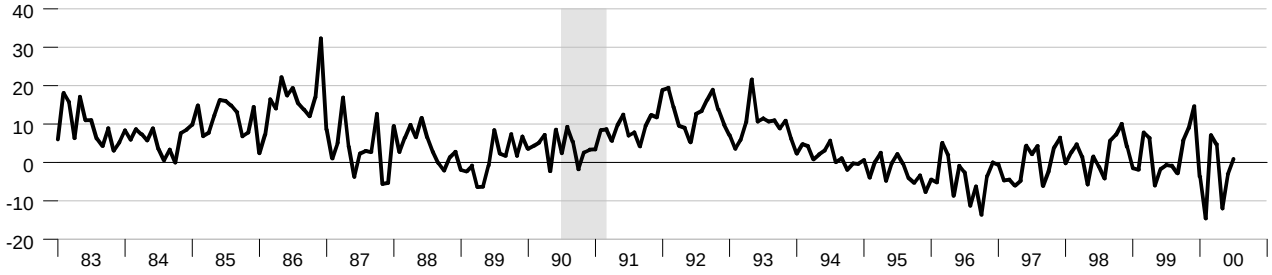


Repurchase Agreements and Eurodollars



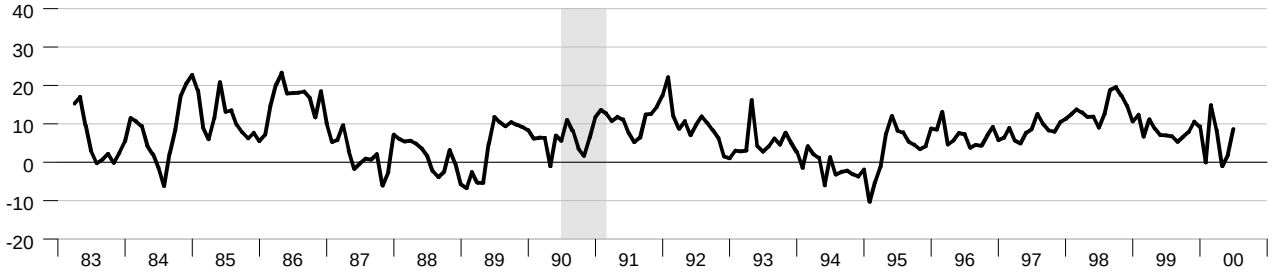
M1

Percent change at an annual rate



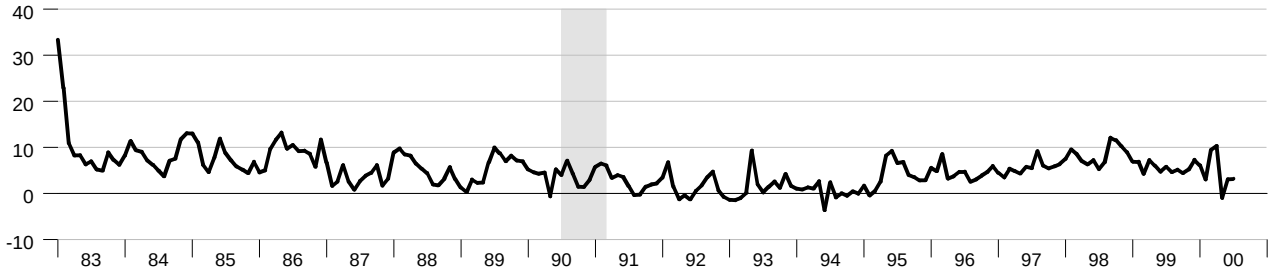
MZM

Percent change at an annual rate



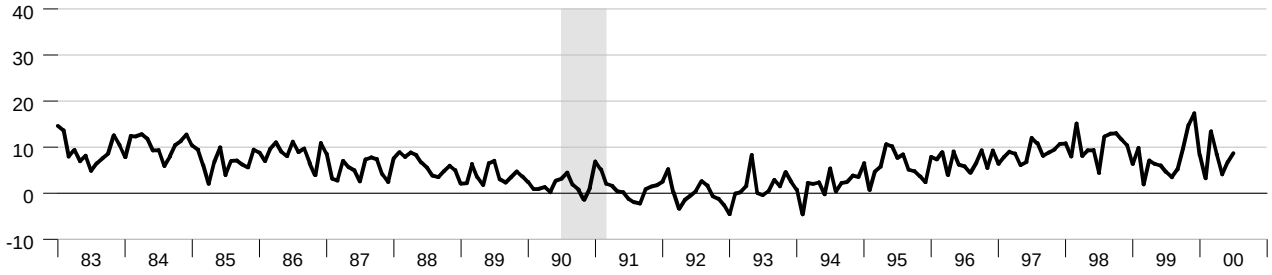
M2

Percent change at an annual rate

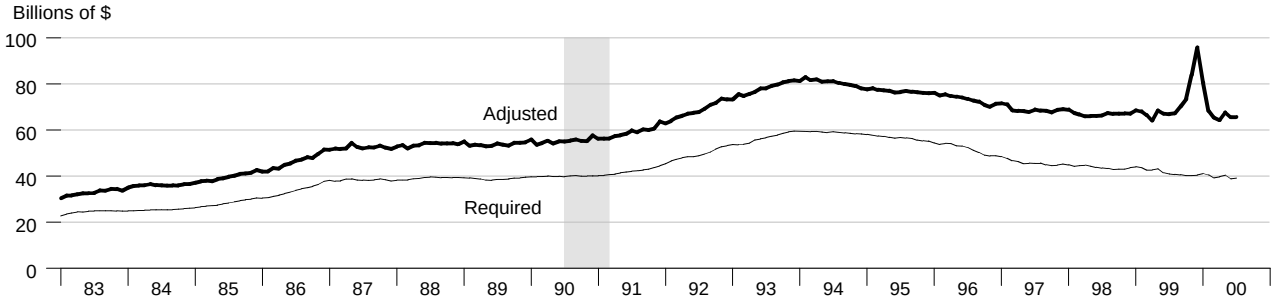


M3

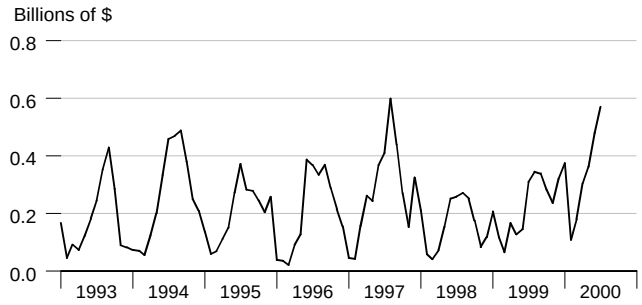
Percent change at an annual rate



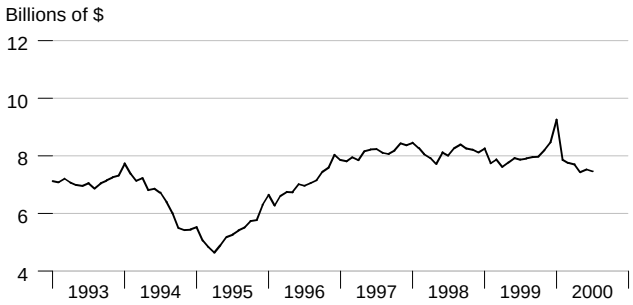
Adjusted and Required Reserves



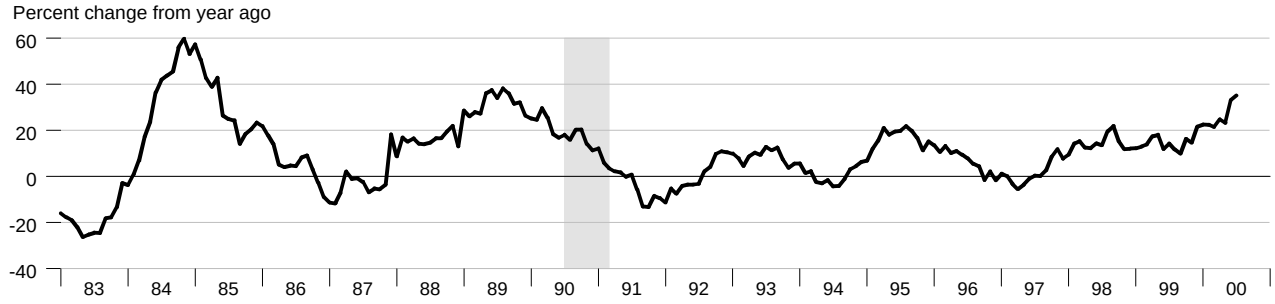
Total Borrowings, nsa



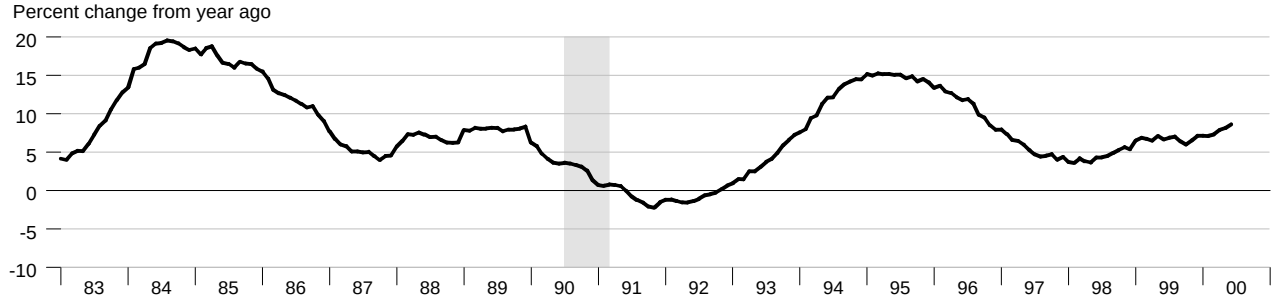
Excess Reserves plus RCB Contracts



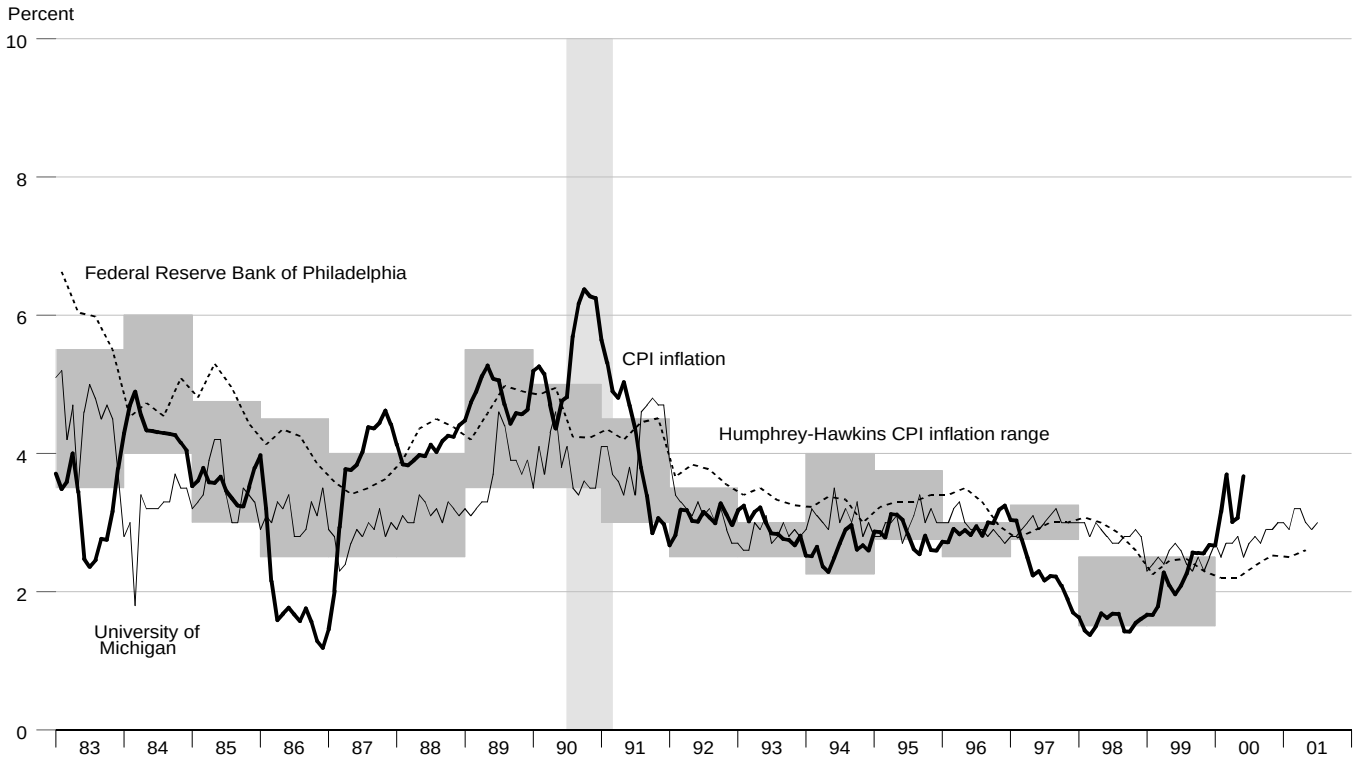
Nonfinancial Commercial Paper



Consumer Credit

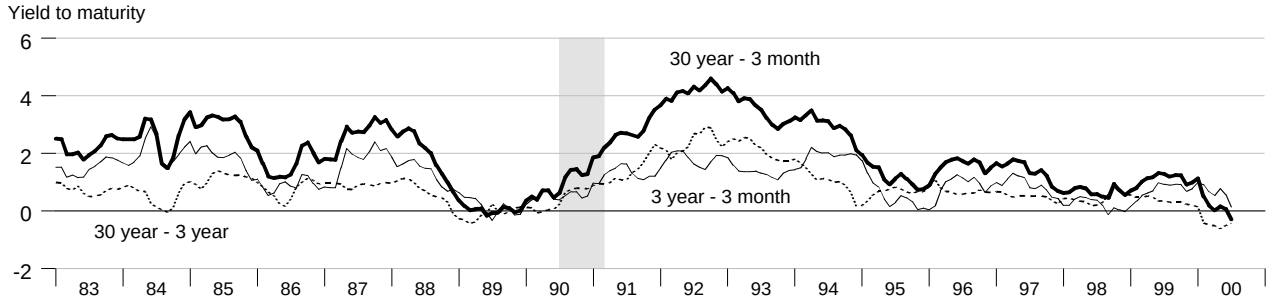


Inflation and Inflation Expectations

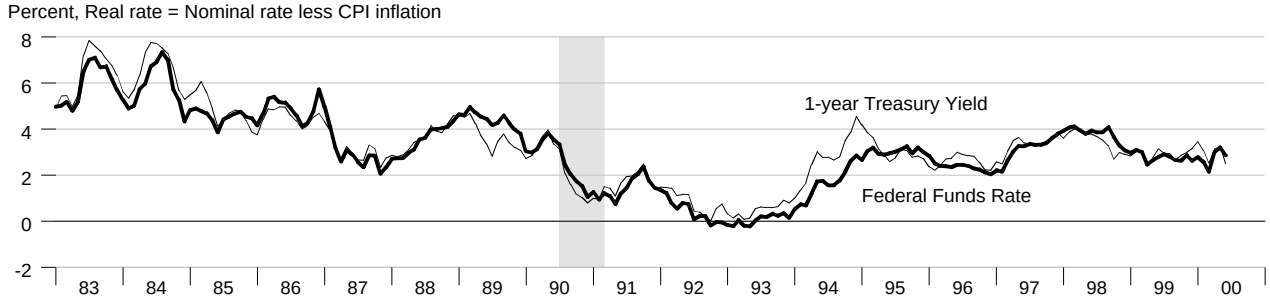


The shaded region shows the Humphrey-Hawkins CPI inflation range. Beginning in January 2000, the Humphrey-Hawkins inflation range was reported using the PCE price index and therefore is not shown on this graph . See page 19 for information.

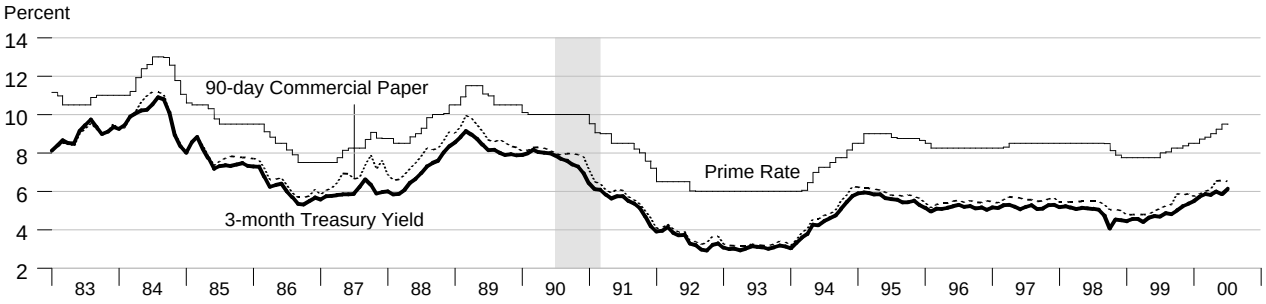
Treasury Security Yield Spreads



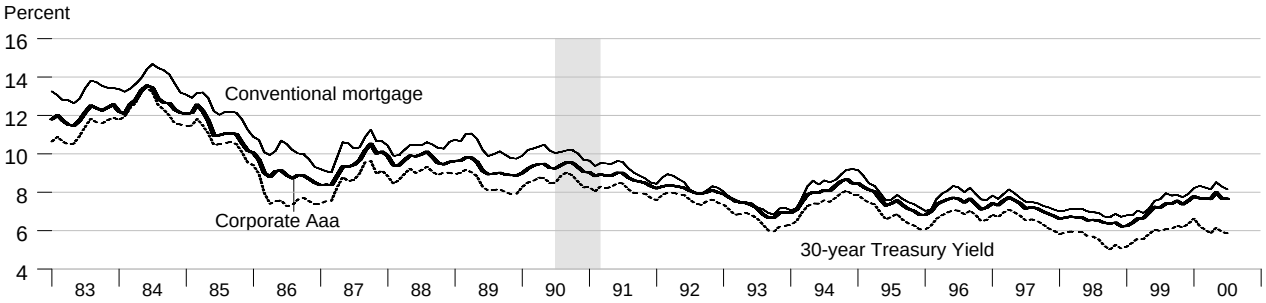
Real Interest Rates



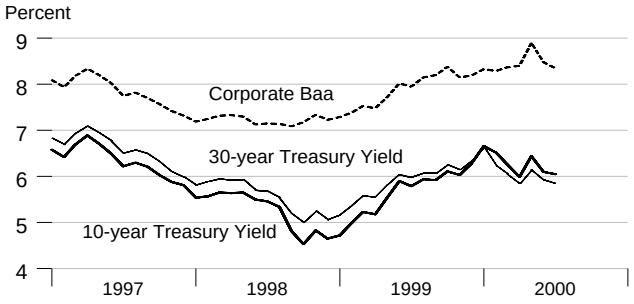
Short Term Interest Rates



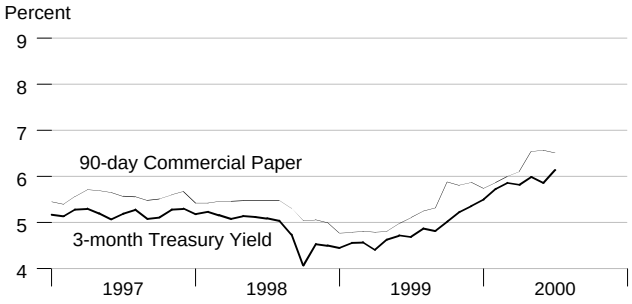
Long Term Interest Rates



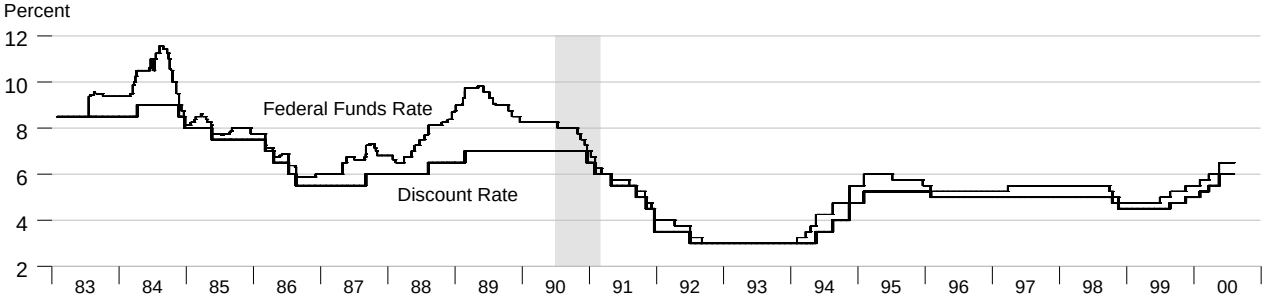
Long Term Interest Rates



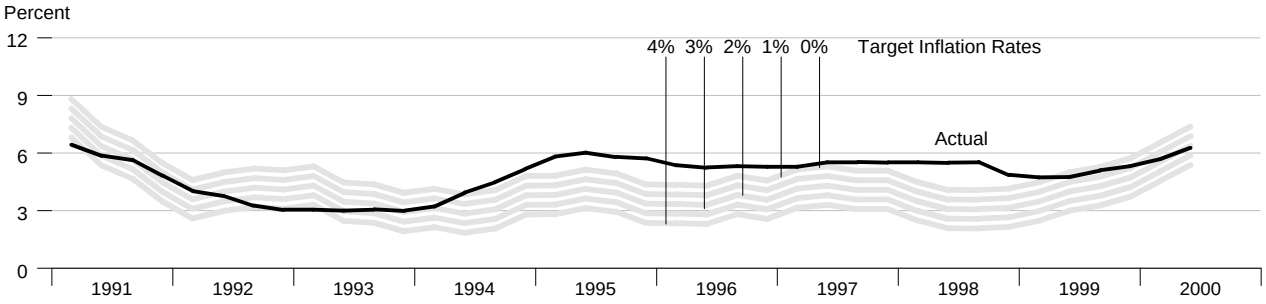
Short Term Interest Rates



FOMC Expected Federal Funds Rate and Discount Rate

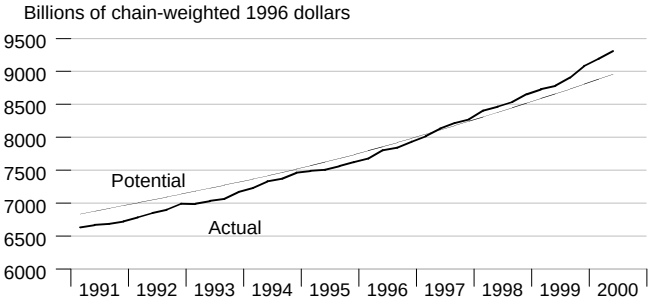


Federal Funds Rate and Inflation Targets

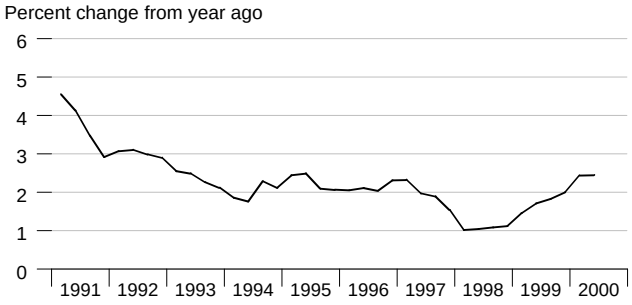


Calculated federal funds rate is based on Taylor's rule. See notes on page 19.

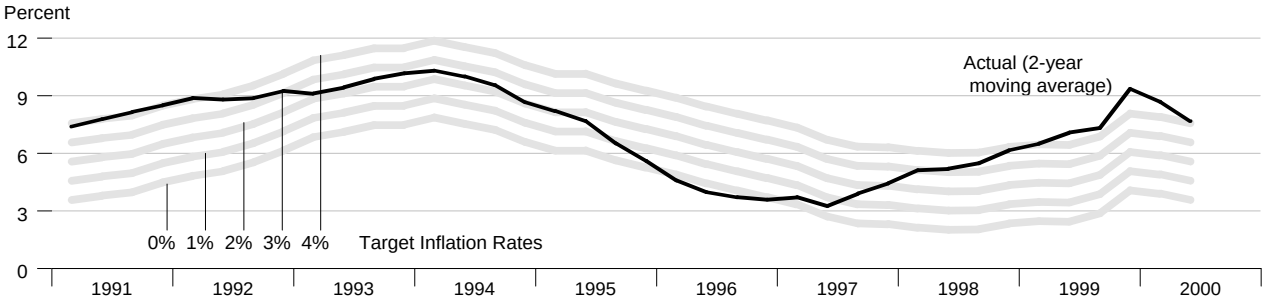
Actual and Potential Real GDP



PCE Inflation

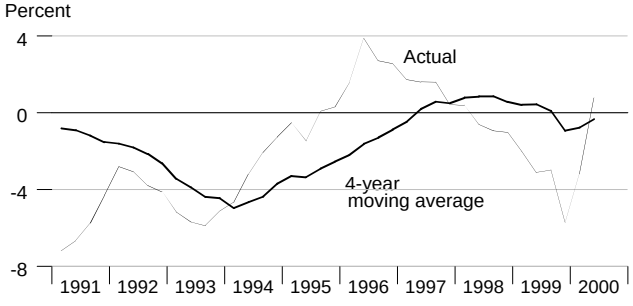


Monetary Base Growth* and Inflation Targets

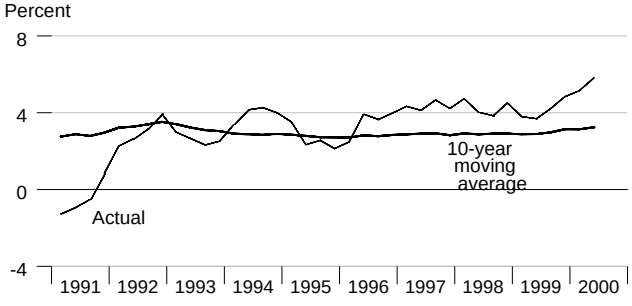


*Modified for the effects of sweeps programs on reserve demand.
Calculated base growth is based on McCallum's rule. See notes on page 19.

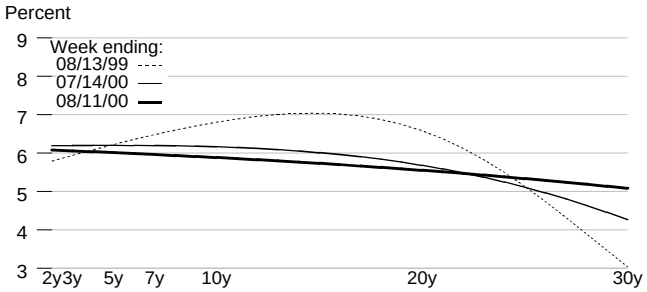
Monetary Base Velocity Growth



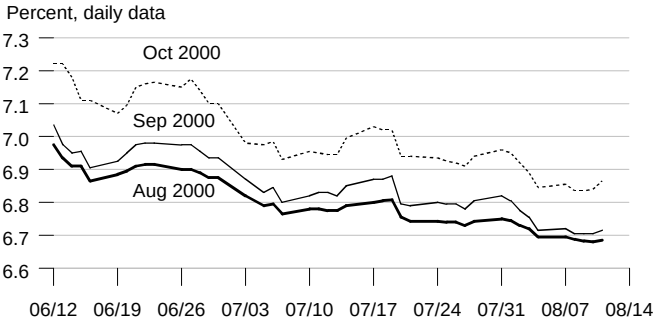
Real Output Growth



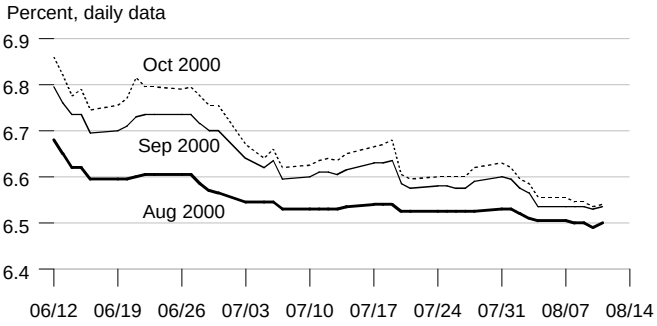
Implied One-Year Forward Rates



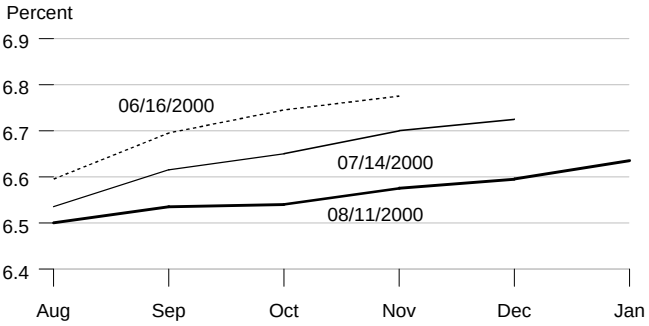
Rates on 3-Month Eurodollar Futures



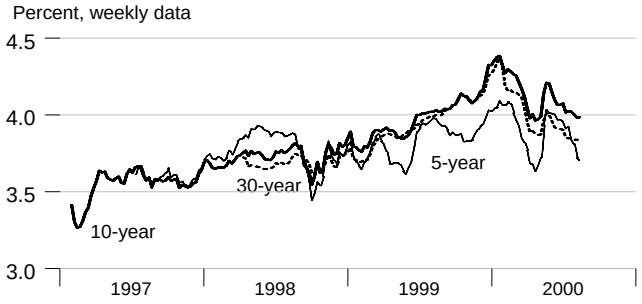
Rates on Selected Fed Funds Futures Contracts



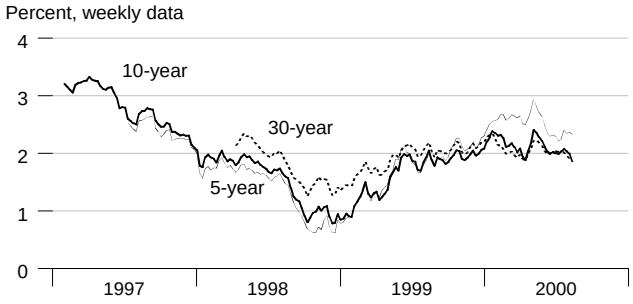
Implied Yields on Fed Funds Futures



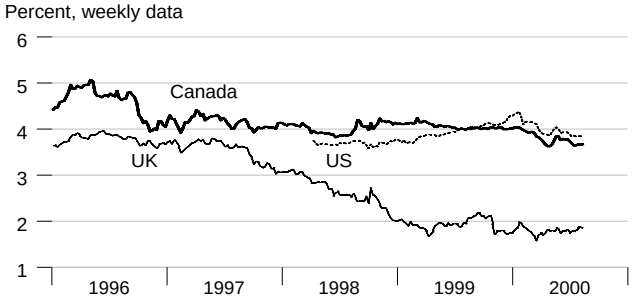
Inflation-Protected Treasury Yields



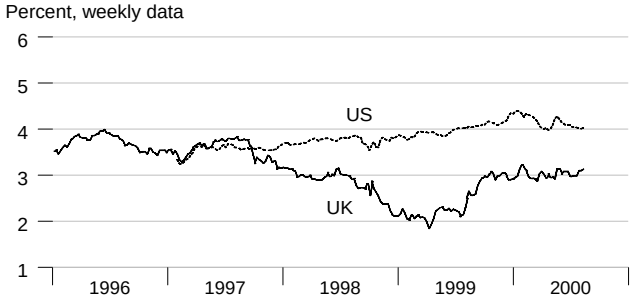
Inflation-Protected Treasury Yield Spreads



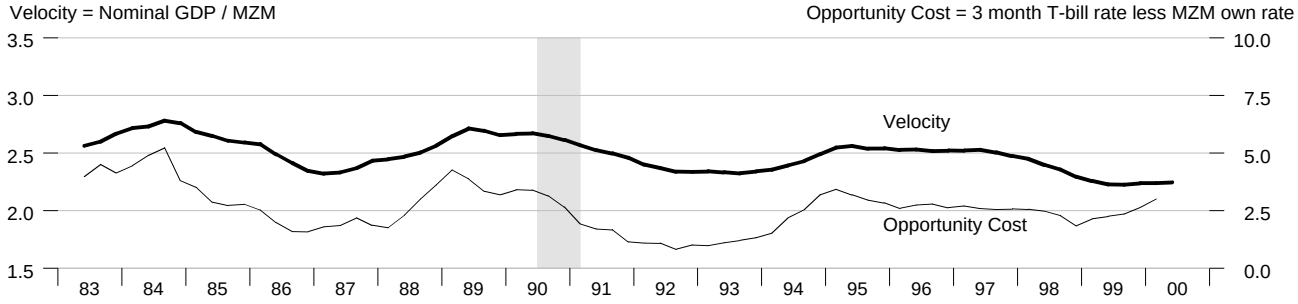
Inflation-Indexed 30-Year Bonds



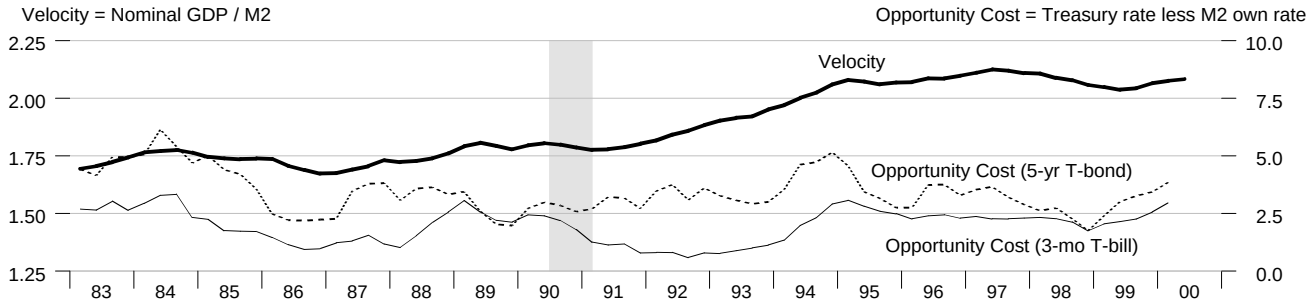
Inflation-Indexed 10-Year Bonds



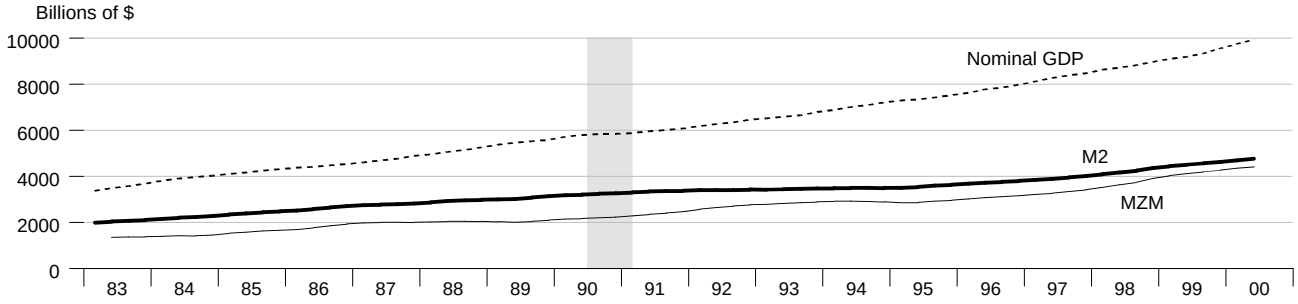
MZM Velocity and Opportunity Cost



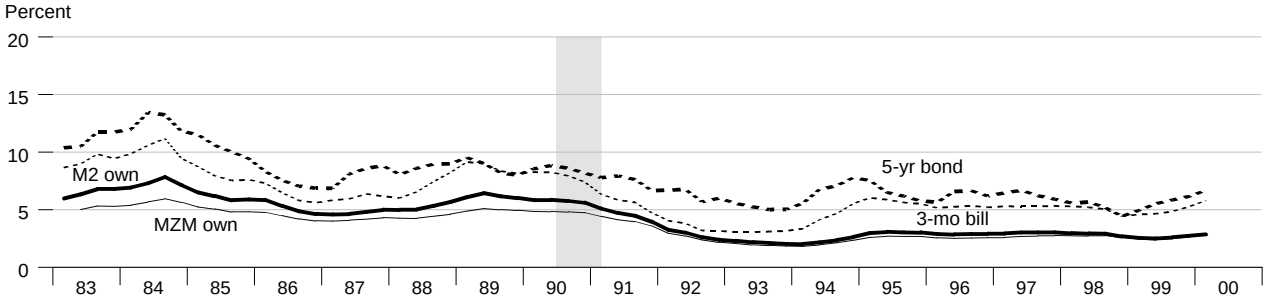
M2 Velocity and Opportunity Cost



M2, MZM and Nominal GDP

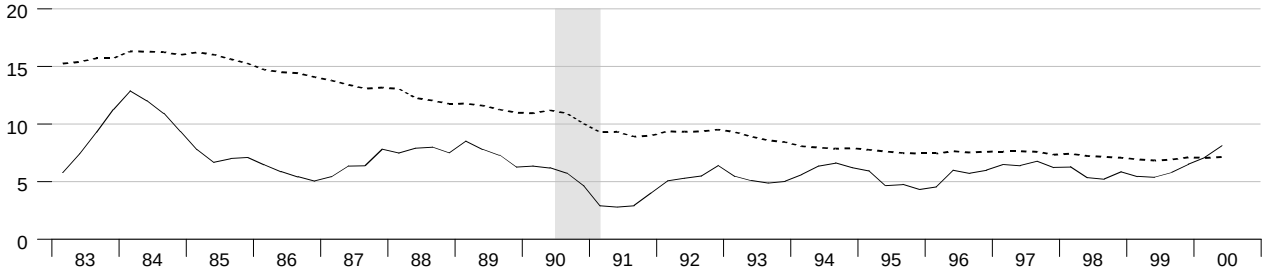


Interest Rates



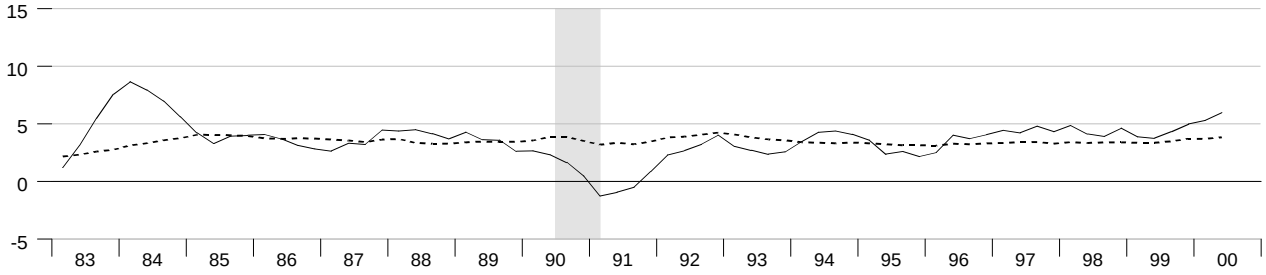
Gross Domestic Product

Percent change from year ago



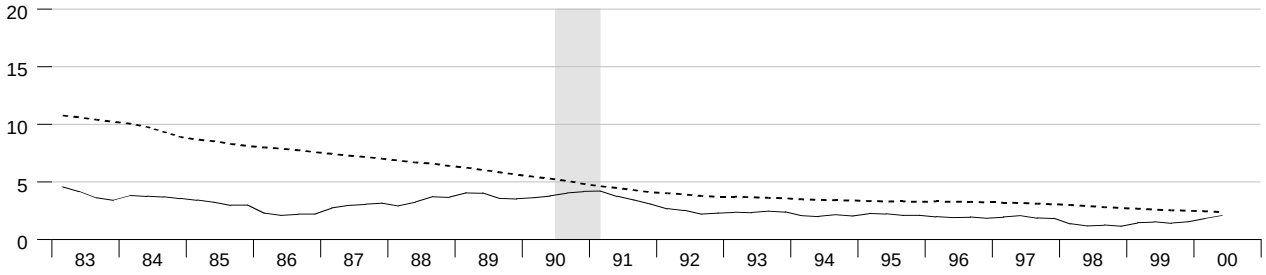
Real Gross Domestic Product

Percent change from year ago



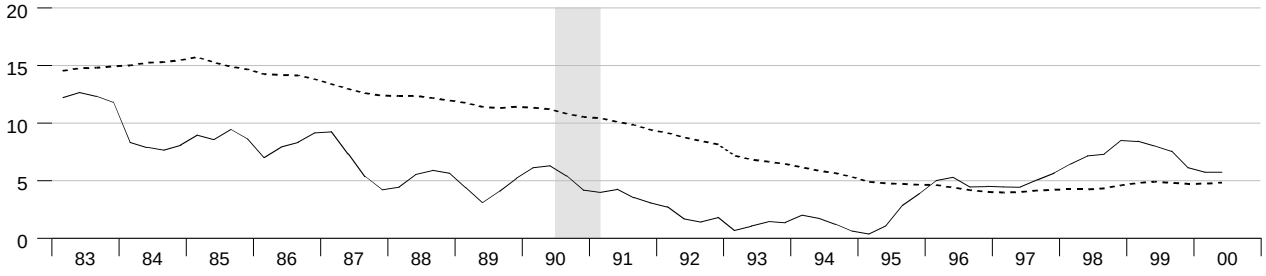
Gross Domestic Product Price Index

Percent change from year ago



M2

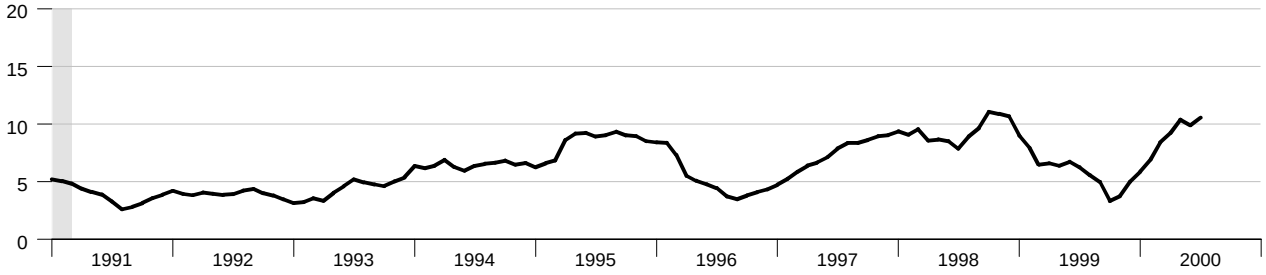
Percent change from year ago



Dashed lines indicate 10-year moving averages

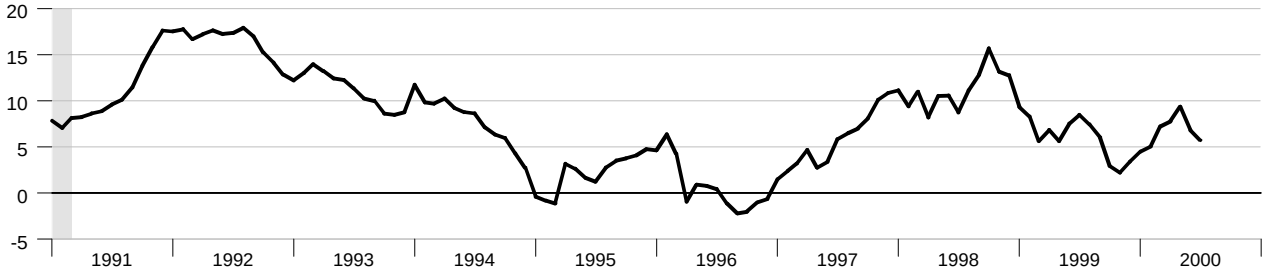
Bank Credit

Percent change from year ago



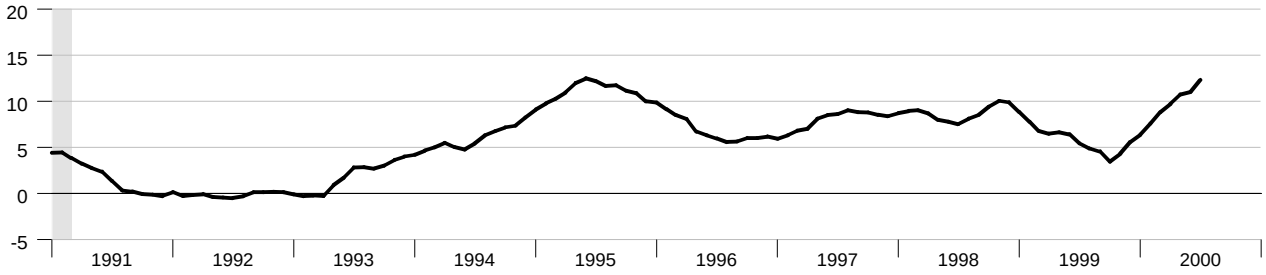
Investment Securities in Bank Credit at Commercial Banks

Percent change from year ago



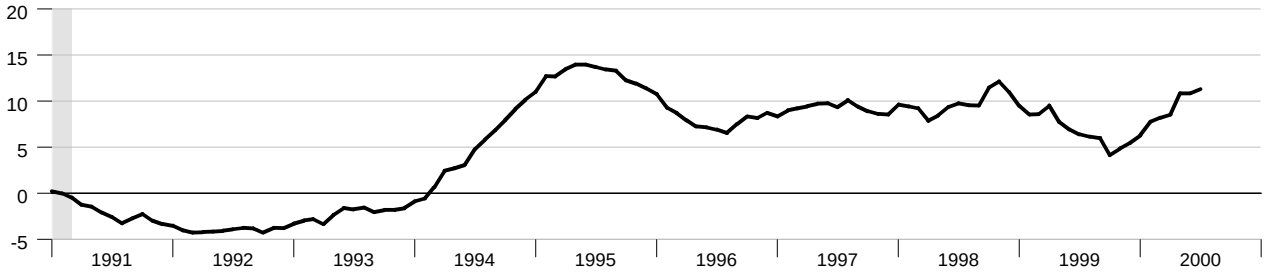
Total Loans and Leases in Bank Credit at Commercial Banks

Percent change from year ago

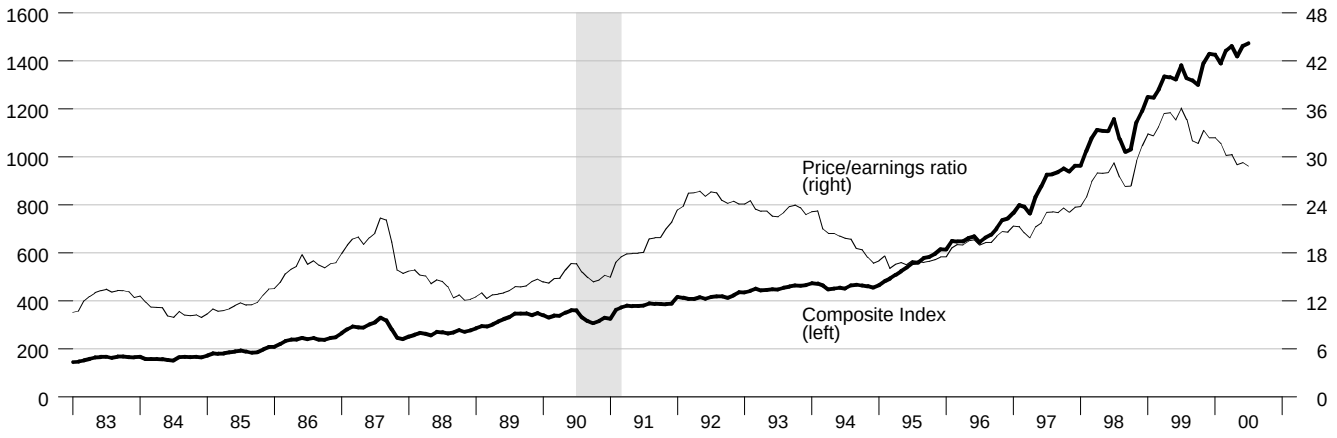


Commercial and Industrial Loans at Commercial Banks

Percent change from year ago



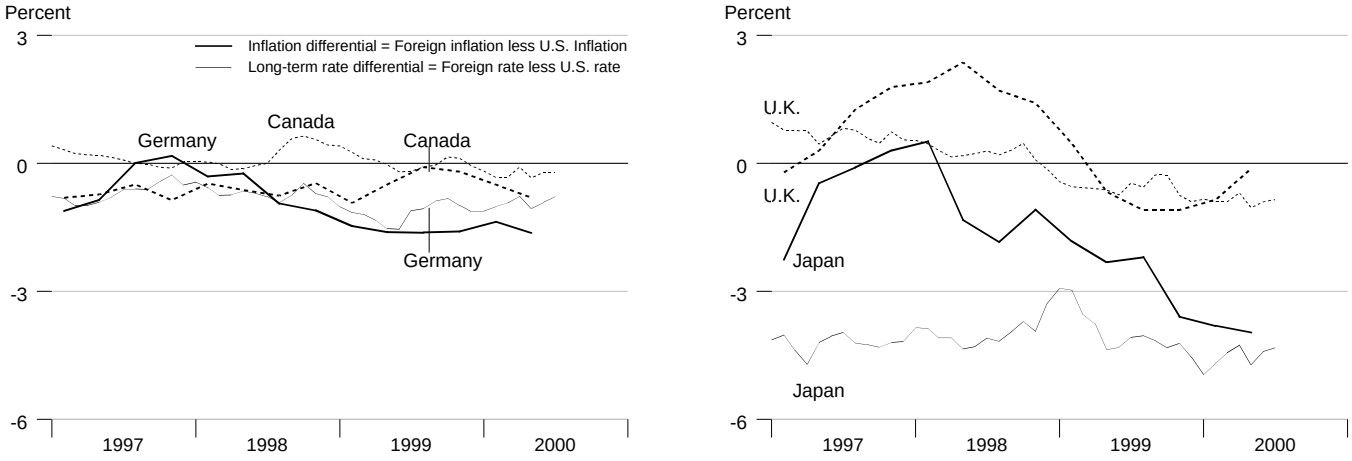
Standard and Poor's 500



Inflation and Long-Term Interest Rates

	Trend in Consumer Price Inflation Rates Percent change from year ago				Recent Long-Term Government Bond Rates Percent			
	1999Q3	1999Q4	2000Q1	2000Q2	Apr00	May00	Jun00	Jul00
United States	2.26	2.56	3.15	3.25	5.99	6.44	6.10	6.05
Canada	2.18	2.36	2.65	2.45	5.90	6.10	5.89	5.84
France	0.53	1.00	1.50	1.49	5.84	5.92	5.94	.
Germany	0.64	0.96	1.78	1.62	5.22	5.38	5.19	5.27
Italy	1.72	2.06	2.36	2.50	5.51	5.71	5.52	5.60
Japan	0.07	-1.04	-0.65	-0.72	1.73	1.72	1.69	1.73
United Kingdom	1.17	1.47	2.30	3.13	5.30	5.40	5.20	5.20

Inflation and Long-Term Interest Rates Differentials



		Money Stock				Bank			
		M1	MZM	M2	M3	Credit	Monetary Base	Reserves	MSI M2
	1995	1143.038	2906.094	3575.435	4500.289	3500.564	443.499	76.838	210.451
	1996	1106.430	3096.352	3747.400	4796.868	3683.584	455.572	73.401	217.848
	1997	1069.929	3318.532	3931.853	5179.493	3951.699	478.708	68.873	227.067
	1998	1080.846	3705.324	4221.724	5711.132	4323.399	508.942	66.925	242.237
	1999	1102.371	4158.377	4539.239	6210.470	4580.632	557.864	71.674	258.556
1998	1	1076.722	3524.589	4098.635	5499.270	4185.142	498.320	67.645	235.943
	2	1078.669	3637.500	4176.265	5638.731	4247.795	502.020	66.044	239.950
	3	1076.068	3746.138	4249.273	5763.404	4348.164	511.546	66.905	243.733
	4	1091.926	3913.071	4362.724	5943.121	4512.493	523.881	67.105	249.320
1999	1	1097.202	4033.398	4444.411	6064.720	4510.959	536.335	67.691	253.370
	2	1102.976	4127.445	4511.462	6155.761	4526.561	545.912	66.526	257.003
	3	1098.082	4199.240	4571.141	6232.001	4591.176	557.968	68.111	260.280
	4	1111.222	4273.426	4629.940	6389.398	4693.833	591.241	84.366	263.570
2000	1	1112.518	4358.590	4699.593	6557.441	4829.366	593.096	71.405	267.157
	2	1108.292	4424.744	4770.498	6686.496	4971.414	585.972	65.826	270.860
1998	Jul	1076.867	3700.743	4219.007	5703.630	4295.259	507.618	66.307	242.270
	Aug	1073.126	3739.477	4243.024	5762.236	4350.743	511.031	67.371	243.440
	Sep	1078.211	3798.193	4285.789	5824.347	4398.490	515.990	67.036	245.490
	Oct	1084.673	3860.023	4327.205	5887.674	4484.142	520.806	67.058	247.530
	Nov	1093.735	3915.678	4364.176	5944.992	4517.211	524.379	67.182	249.420
	Dec	1097.371	3963.511	4396.791	5996.698	4536.127	526.458	67.074	251.010
1999	Jan	1095.975	3998.522	4422.168	6028.560	4524.279	531.761	68.517	252.260
	Feb	1094.273	4039.664	4447.589	6077.897	4514.475	538.190	68.067	253.460
	Mar	1101.359	4062.007	4463.477	6087.704	4494.122	539.053	66.488	254.390
	Apr	1107.196	4099.645	4490.418	6123.751	4503.956	539.608	64.109	255.900
	May	1101.658	4129.287	4513.045	6156.254	4515.973	548.331	68.423	257.070
	Jun	1100.074	4153.404	4530.922	6187.277	4559.754	549.796	67.045	258.040
	Jul	1099.464	4177.427	4552.829	6211.009	4563.598	553.060	66.880	259.220
	Aug	1098.683	4200.873	4570.461	6229.093	4592.926	556.711	67.248	260.240
	Sep	1096.099	4219.420	4590.134	6255.902	4617.004	564.134	70.206	261.380
	Oct	1101.271	4242.473	4607.091	6306.524	4632.694	572.989	73.419	262.320
	Nov	1109.451	4270.167	4627.284	6384.709	4686.564	588.668	83.916	263.420
	Dec	1122.945	4307.638	4655.445	6476.961	4762.242	612.067	95.764	264.970
2000	Jan	1119.409	4340.935	4679.276	6521.216	4790.015	604.790	80.626	266.190
	Feb	1105.815	4340.647	4691.261	6538.977	4827.008	589.978	68.224	266.760
	Mar	1112.331	4394.189	4728.241	6612.131	4871.075	584.519	65.364	268.520
	Apr	1116.646	4425.002	4768.879	6658.659	4918.901	583.045	64.326	270.670
	May	1105.495	4421.088	4765.170	6681.515	4984.354	587.855	67.565	270.510
	Jun	1102.735	4428.143	4777.445	6719.315	5010.986	587.015	65.587	271.400
	Jul	1103.542	4459.871	4790.301	6767.921	5044.995	587.613	65.636	

*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
	1995	5.84	5.21	8.83	5.92	5.66	6.26	6.88	7.59	5.80	7.95
	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
1998	1	5.52	5.00	8.50	5.55	5.19	5.46	5.88	6.67	4.94	7.05
	2	5.50	5.00	8.50	5.59	5.11	5.57	5.85	6.64	5.00	7.09
	3	5.53	5.00	8.50	5.53	4.96	5.11	5.47	6.49	4.95	6.87
	4	4.86	4.66	7.92	5.20	4.37	4.41	5.11	6.33	4.82	6.76
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
1998	Jul	5.54	5.00	8.50	5.59	5.09	5.47	5.68	6.55	5.01	6.95
	Aug	5.55	5.00	8.50	5.58	5.04	5.24	5.54	6.52	5.01	6.92
	Sep	5.51	5.00	8.49	5.41	4.74	4.62	5.20	6.40	4.84	6.72
	Oct	5.07	4.86	8.12	5.21	4.07	4.18	5.01	6.37	4.76	6.71
	Nov	4.83	4.63	7.89	5.24	4.53	4.57	5.25	6.41	4.87	6.87
	Dec	4.68	4.50	7.75	5.14	4.50	4.48	5.06	6.22	4.83	6.72
1999	Jan	4.63	4.50	7.75	4.89	4.45	4.61	5.16	6.24	4.85	6.79
	Feb	4.76	4.50	7.75	4.90	4.56	4.90	5.37	6.40	4.80	6.81
	Mar	4.81	4.50	7.75	4.91	4.57	5.11	5.58	6.62	4.96	7.04
	Apr	4.74	4.50	7.75	4.88	4.41	5.03	5.55	6.64	4.89	6.92
	May	4.74	4.50	7.75	4.92	4.63	5.33	5.81	6.93	5.05	7.15
	Jun	4.76	4.50	7.75	5.13	4.72	5.70	6.04	7.23	5.22	7.55
	Jul	4.99	4.50	8.00	5.24	4.69	5.62	5.98	7.19	5.24	7.63
	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	5.45	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

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

		M1	MZM	M2	M3
Percent change from previous period					
	1995	-0.21	-0.46	2.06	4.56
	1996	-3.20	6.55	4.81	6.59
	1997	-3.30	7.18	4.92	7.98
	1998	1.02	11.66	7.37	10.26
	1999	1.99	12.23	7.52	8.74
1998	1	0.73	2.84	1.93	2.65
	2	0.18	3.20	1.89	2.54
	3	-0.24	2.99	1.75	2.21
	4	1.47	4.46	2.67	3.12
1999	1	0.48	3.08	1.87	2.05
	2	0.53	2.33	1.51	1.50
	3	-0.44	1.74	1.32	1.24
	4	1.20	1.77	1.29	2.53
2000	1	0.12	1.99	1.50	2.63
	2	-0.38	1.52	1.51	1.97
1998	Jul	-0.09	0.75	0.44	0.37
	Aug	-0.35	1.05	0.57	1.03
	Sep	0.47	1.57	1.01	1.08
	Oct	0.60	1.63	0.97	1.09
	Nov	0.84	1.44	0.85	0.97
	Dec	0.33	1.22	0.75	0.87
1999	Jan	-0.13	0.88	0.58	0.53
	Feb	-0.16	1.03	0.57	0.82
	Mar	0.65	0.55	0.36	0.16
	Apr	0.53	0.93	0.60	0.59
	May	-0.50	0.72	0.50	0.53
	Jun	-0.14	0.58	0.40	0.50
	Jul	-0.06	0.58	0.48	0.38
	Aug	-0.07	0.56	0.39	0.29
	Sep	-0.24	0.44	0.43	0.43
	Oct	0.47	0.55	0.37	0.81
	Nov	0.74	0.65	0.44	1.24
	Dec	1.22	0.88	0.61	1.44
2000	Jan	-0.31	0.77	0.51	0.68
	Feb	-1.21	-0.01	0.26	0.27
	Mar	0.59	1.23	0.79	1.12
	Apr	0.39	0.70	0.86	0.70
	May	-1.00	-0.09	-0.08	0.34
	Jun	-0.25	0.16	0.26	0.57
	Jul	0.07	0.72	0.27	0.72

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). Due to distortions caused by regulatory changes, the largest of which the introduction of money market accounts, data for MZM begin March 1983 in this publication.

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 http://www.stls.frb.org/research/newbase.html.

Monetary Services Index: an index which 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 http://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 http://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. **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 a description are available at http://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 (MMDA), 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), 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 output** 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

http://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)

$$f(m) = [D(m)R(m) - D(m\text{-}1)] / [D(m) - D(m\text{-}1)]$$

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. 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 Yield Spreads** equal, for 5, 10, and 30 year maturities, the difference between the Treasury constant maturity yield and the yield on the most recently issued inflation-protected security. **Inflation-Indexed Bonds** for Canada are 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 1992 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 1992 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 and G.13 releases; nonfinancial commercial paper: Board of Governors web site; M2 and MZM own rates.

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, 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.

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