Monetary Trends

August 2004

THE FEDERAL RESERVE BANK of ST. LOUIS

A Crude Crude Oil Calculation

A key macroeconomic development during 2003 and 2004 has been the higher price of crude oil. Analysts have attributed the higher price to several possible sources, including supply disruptions in key oil-producing countries, demand increases from a global economy performing better than expected, especially in Asia, and a risk premium associated with an uncertain security environment in the Middle East. Oil prices have a long and checkered history in U.S. and global macroeconomics, with some analysts going so far as to associate every postwar U.S. recession with sharp increases in oil prices. In this context, it is important to try to assess the impact of the present episode. Has the recent price behavior in this market changed significantly from what it was over the previous 15 years?

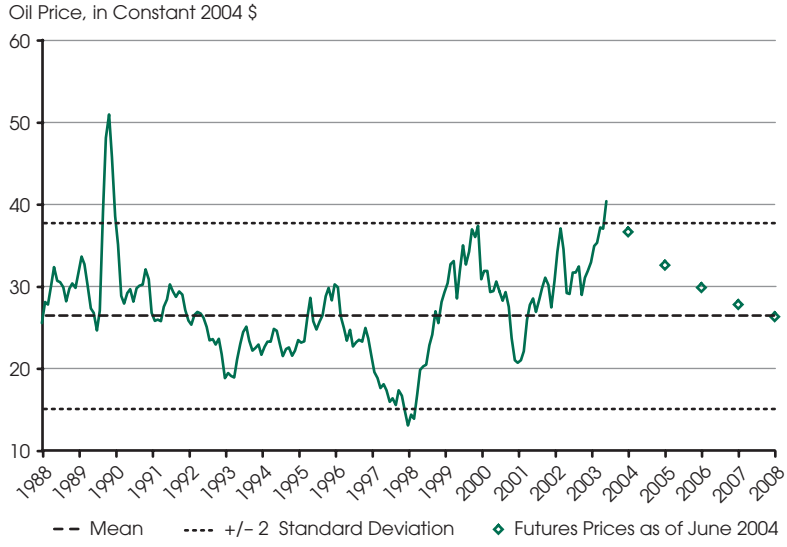
The chart shows the monthly average price of a barrel of West Texas intermediate crude oil from 1988 through June 2004, deflated by the U.S. consumer price index (CPI) to obtain the price in constant 2004 dollar terms. The mean plus and minus two raw standard deviations of these prices, calculated from 1988-2002, are indicated in the chart. The two-standard-deviation rule of thumb is one simple way to separate unusually large movements from ordinary fluctuations. Prices consistently outside the two-standard-deviation band might indicate that the market has undergone some type of structural shift and that the inflation-adjusted mean price might be substantially higher in the future.

The chart indicates that, as a first approximation, this market displayed a constant mean price of about $27 per barrel in 2004 dollars through the period 1988 to 2002. Since 2002, the real price has increased, recently moving outside the two-standard-deviation band. This price is higher than any observed since 1988, except for the brief period of $50-per-barrel oil during the run-up to the first Gulf War. So even taking normal volatility into account, today's prices are high. The question is, should we expect this price level to be sustained?

One way to answer this is to consider the futures market prices for this commodity. The December contracts for 2004 through 2008 stipulate an expected future price, which we can then convert into 2004 dollars by guessing an expected rate of CPI inflation in the U.S. over the life of the contract. The University of Michigan monthly survey of household expectations suggests this longer-run expected inflation rate is currently about 3.0 percent, and we will assume it is constant through December 2008. The diamonds in the chart indicate the real price of crude oil expected in futures markets according to this measure. The calculation suggests that the price of crude oil will return to its 1988-2002 mean gradually over the next several years. By this measure, the market does not foresee a substantially higher long-run real price of oil.

—James B. Bullard

Real Oil Prices
Monthly Average of Daily Data



NOTE: Mean and standard deviation are from 1988-2002.

Contents

Conventions used in this publication:

1. Unless otherwise indicated, data are monthly.
2. Shaded areas indicate recessions, as determined by the National Bureau of Economic Research.
3. *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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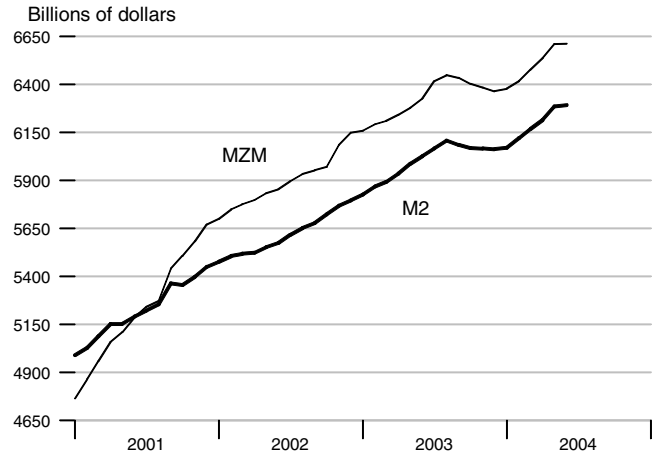
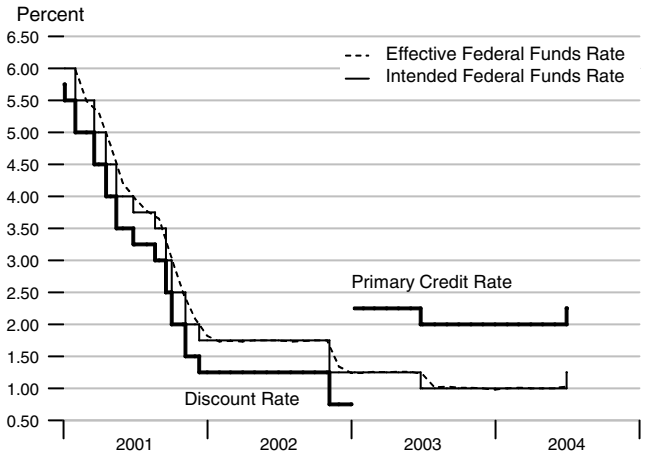
Monetary Trends is published monthly by the Research Division of the Federal Reserve Bank of St. Louis. Visit the Research Division's website at research.stlouisfed.org/publications/mt to download the current version of this publication or register for e-mail notification updates. For more information on data in the publication, please visit research.stlouisfed.org/fred2 or call (314) 444-8590.

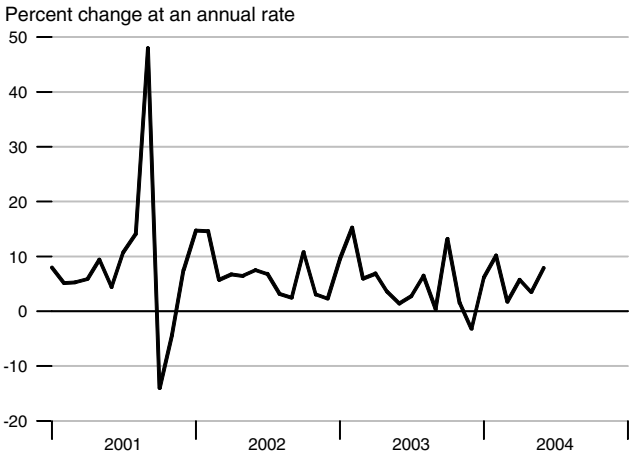
M2 and MZM



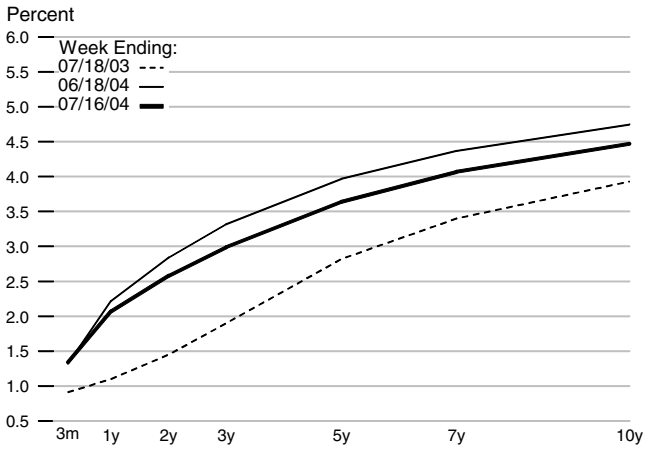
Reserve Market Rates



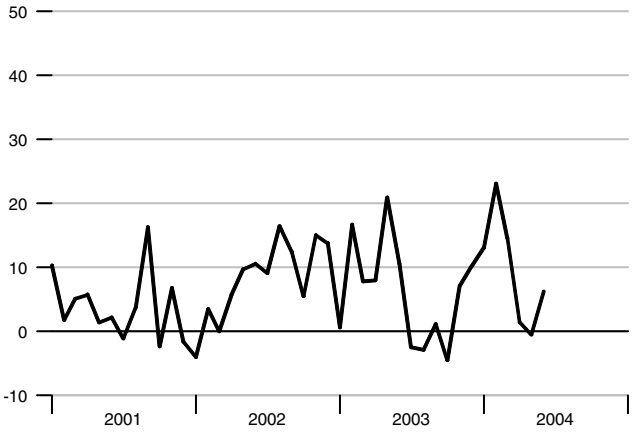
Adjusted Monetary Base



Treasury Yield Curve



Total Bank Credit



Interest Rates

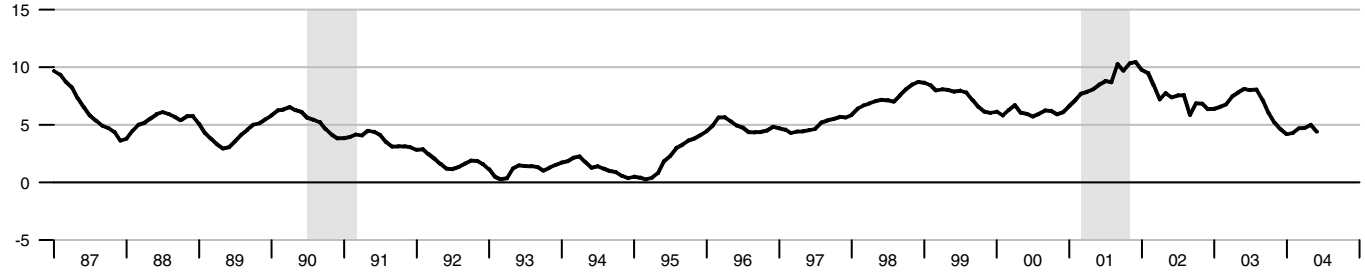
	Apr 04	May 04	Jun 04
Federal Funds Rate	1.00	1.00	1.03
Prime Rate	4.00	4.00	4.00
Primary Credit Rate	2.00	2.00	2.01
Conventional Mortgage Rate	5.83	6.27	6.29
Treasury Yields:			
3-Month Constant Maturity	0.96	1.04	1.29
6-Month Constant Maturity	1.11	1.33	1.64
1-Year Constant Maturity	1.43	1.78	2.12
3-Year Constant Maturity	2.57	3.10	3.26
5-Year Constant Maturity	3.39	3.85	3.93
10-Year Constant Maturity	4.35	4.72	4.73

MZM and M1

Percent change from year ago

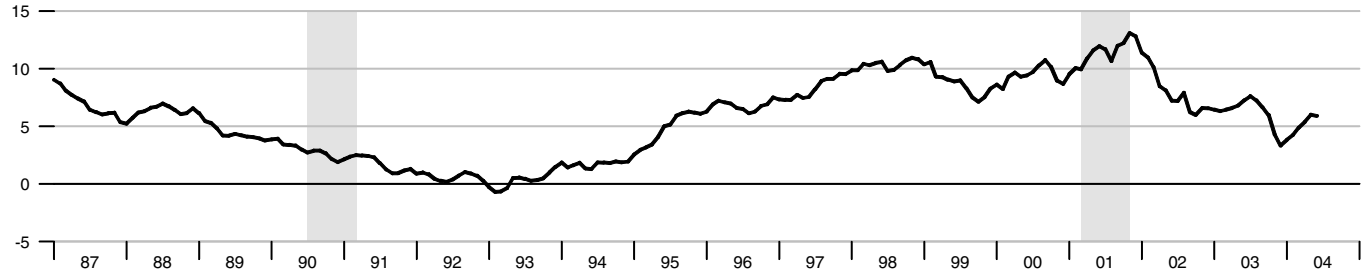
M2

Percent change from year ago



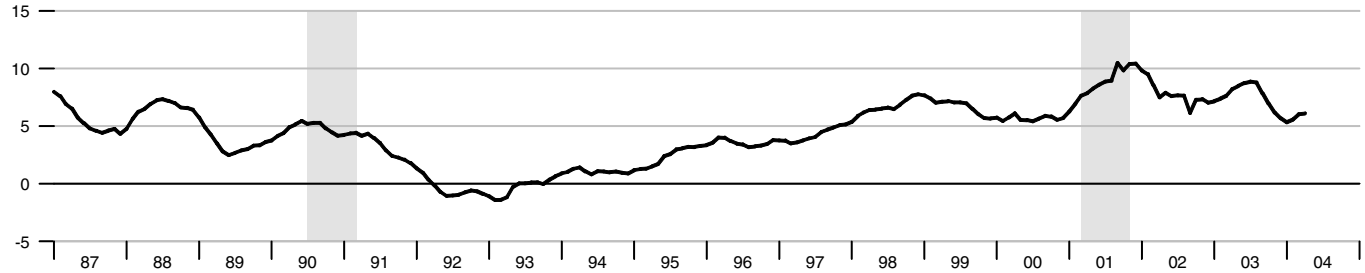
M3

Percent change from year ago



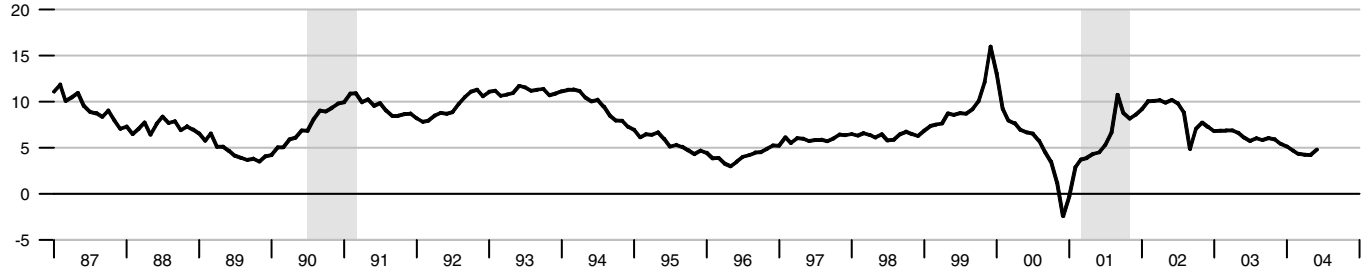
Monetary Services Index - M2

Percent change from year ago



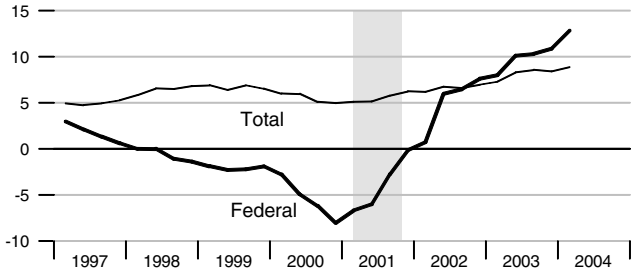
Adjusted Monetary Base

Percent change from year ago



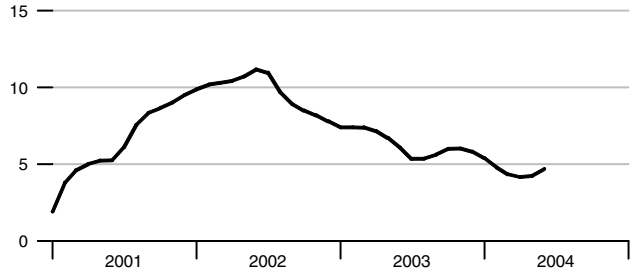
Domestic Nonfinancial Debt

Percent change from year ago



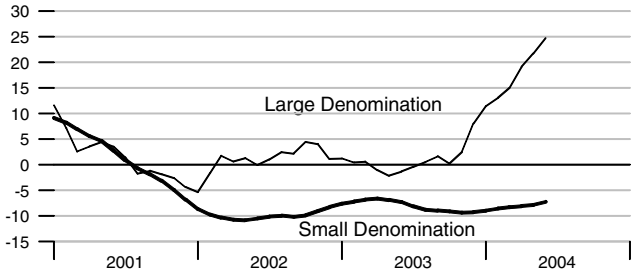
Currency Held by the Nonbank Public

Percent change from year ago



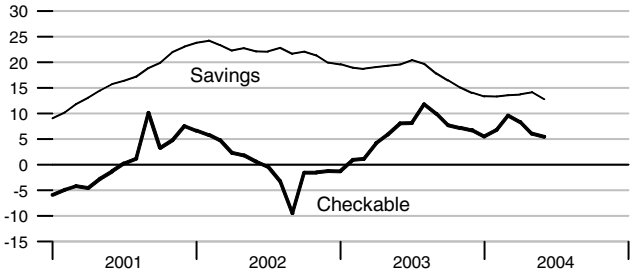
Time Deposits

Percent change from year ago



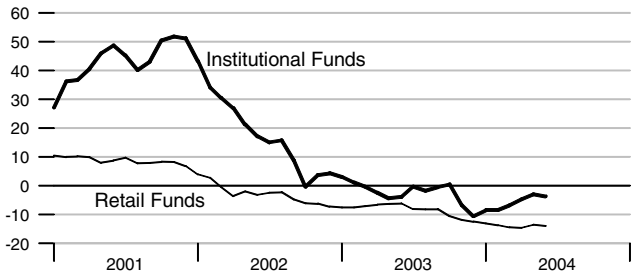
Checkable and Savings Deposits

Percent change from year ago

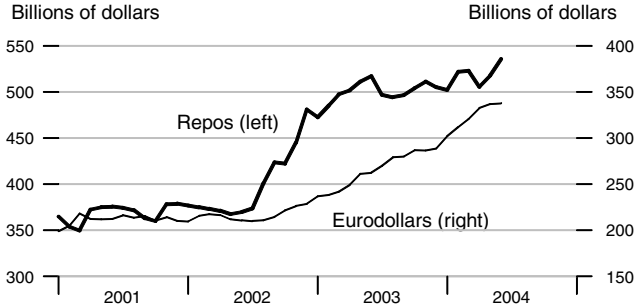


Money Market Mutual Fund Shares

Percent change from year ago

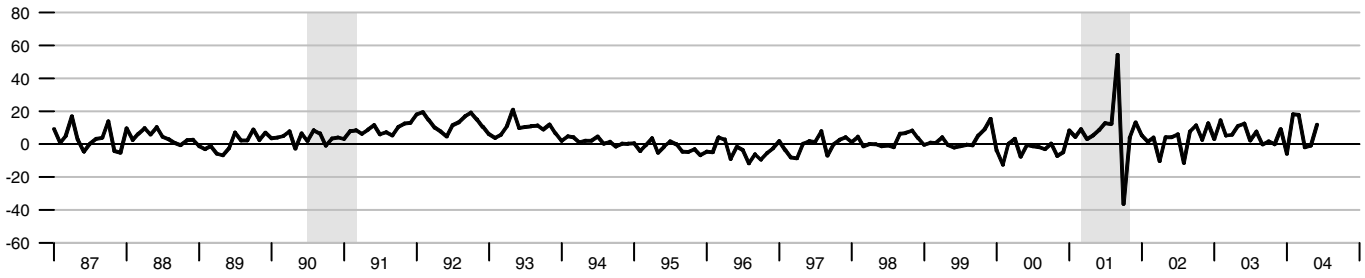


Repurchase Agreements and Eurodollars



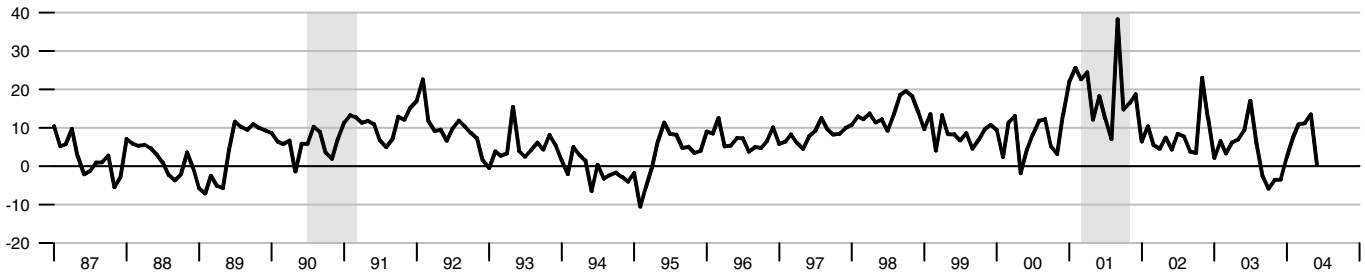
M1

Percent change at an annual rate



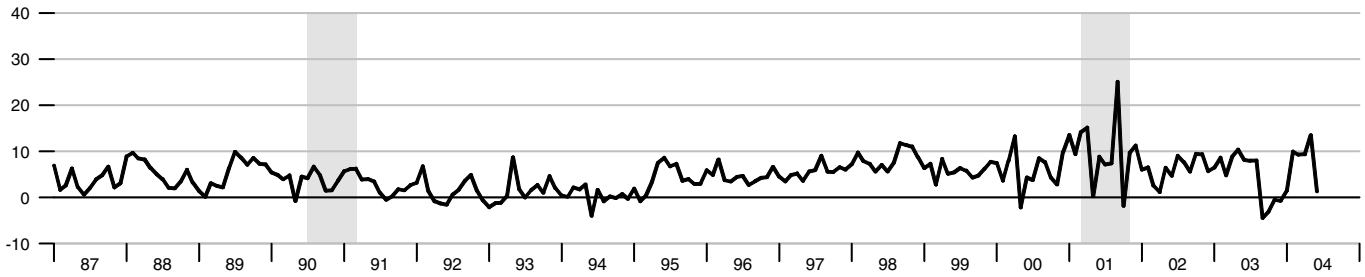
MZM

Percent change at an annual rate



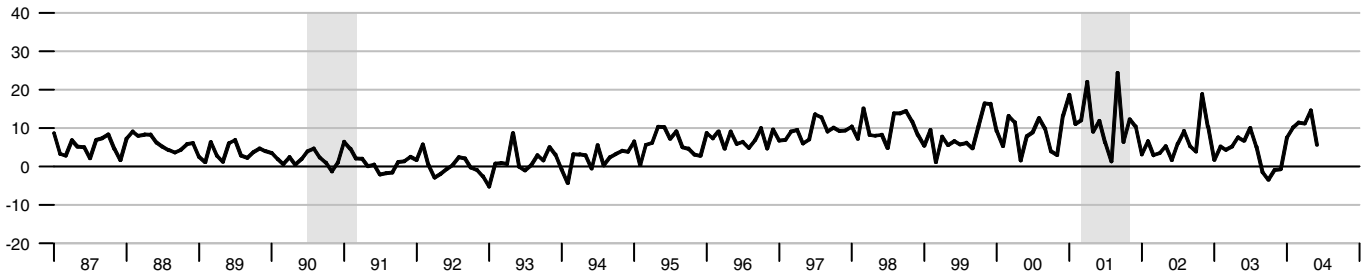
M2

Percent change at an annual rate



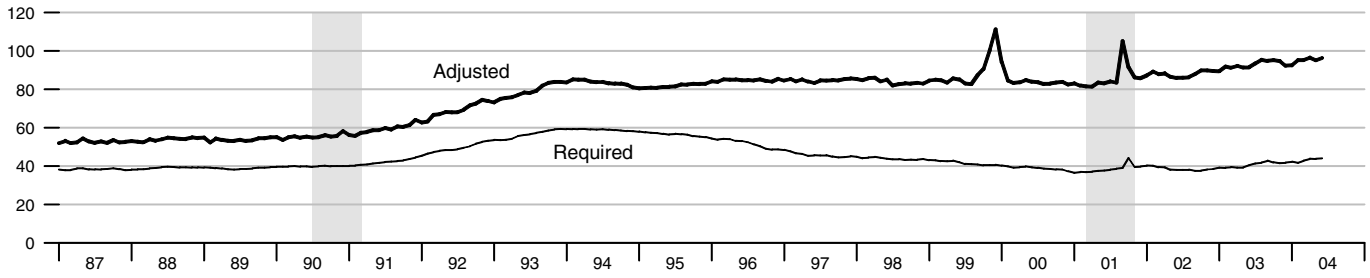
M3

Percent change at an annual rate



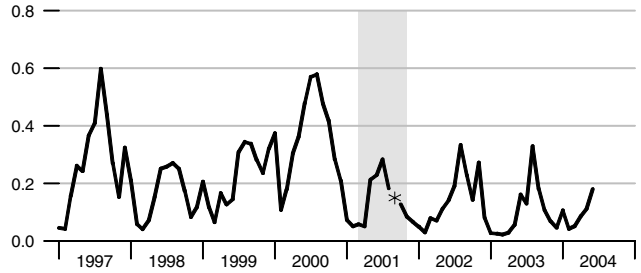
Adjusted and Required Reserves

Billions of dollars



Total Borrowings, nsa

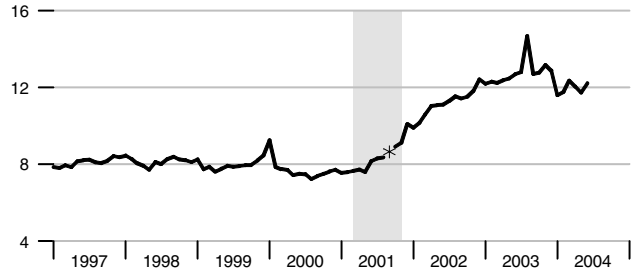
Billions of dollars



*Actual value for September 2001 is $3.4 billion.

Excess Reserves plus RCB Contracts

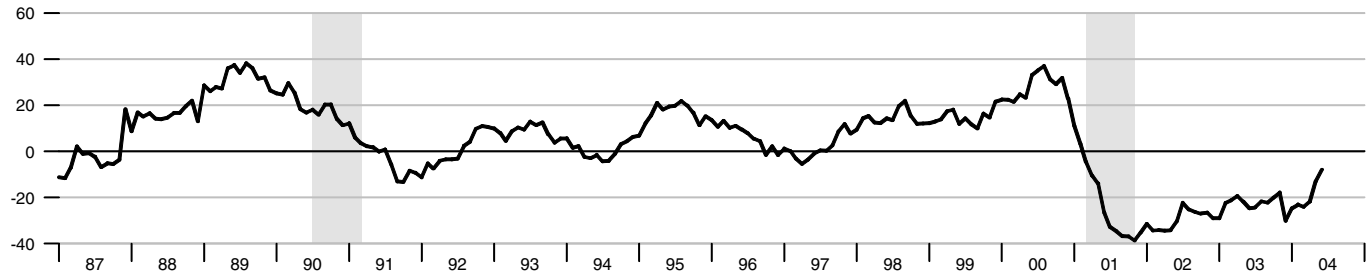
Billions of dollars



*Actual value for September 2001 is $26.43 billion.

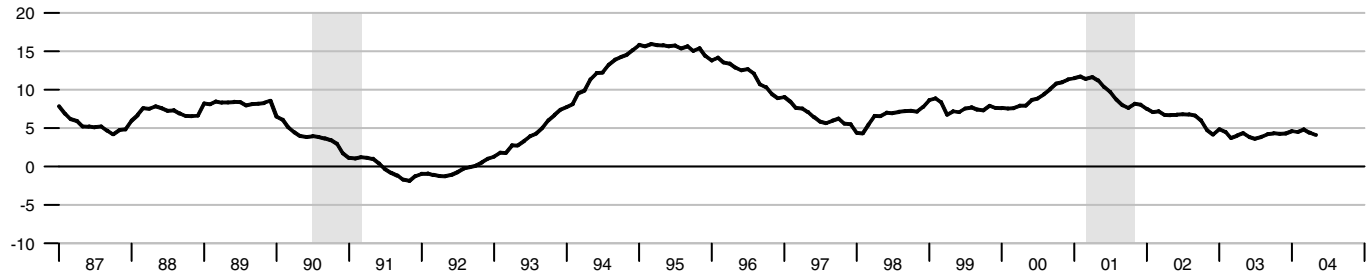
Nonfinancial Commercial Paper

Percent change from year ago

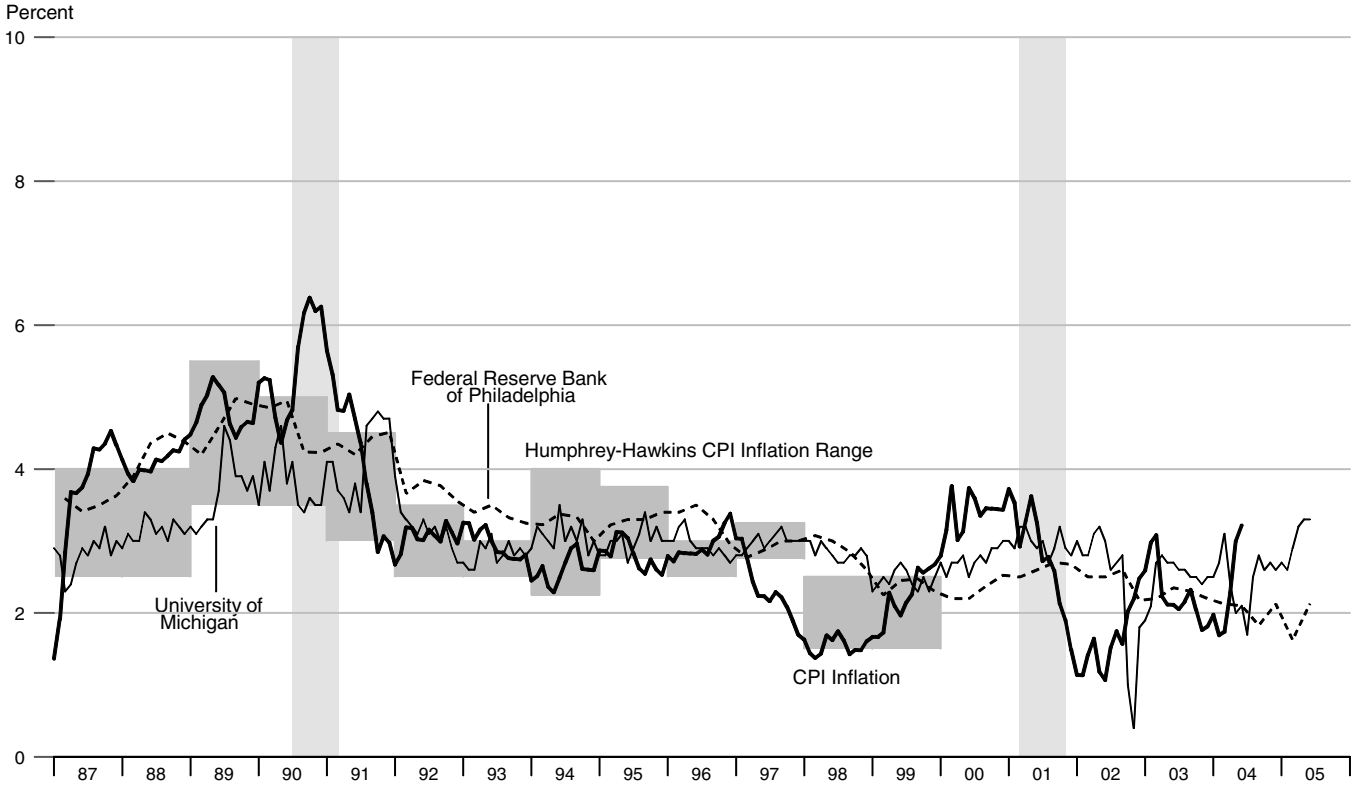


Consumer Credit

Percent change from year ago

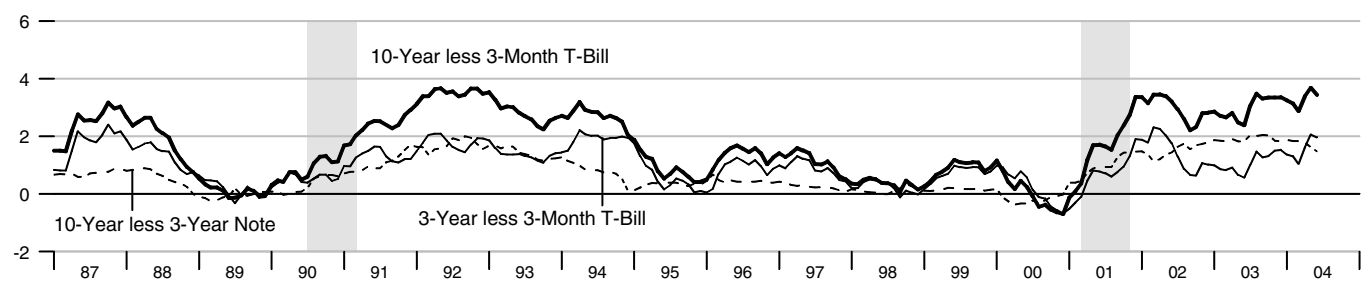


Inflation and Inflation Expectations

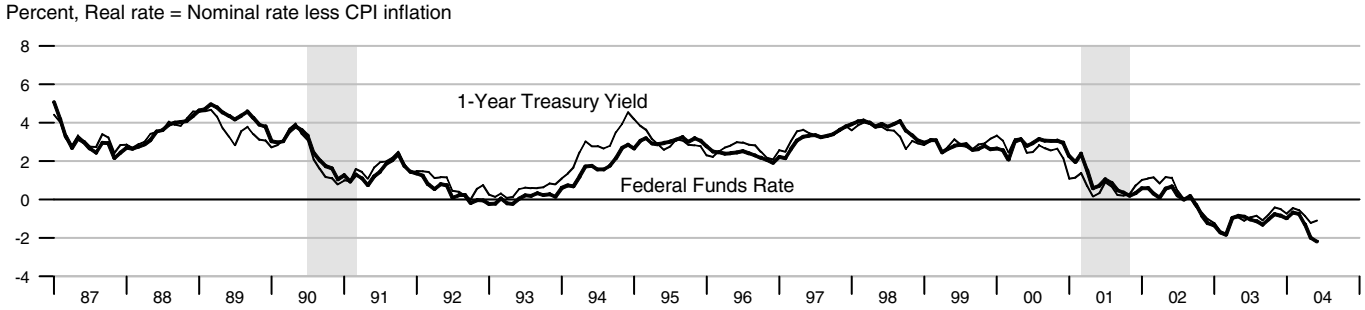


The shaded region shows the Humphrey-Hawkins CPI inflation range. Beginning in January 2000, the Humphrey-Hawkins inflation range was reported using the PCE price index and therefore is not shown on this graph. See notes on page 19.

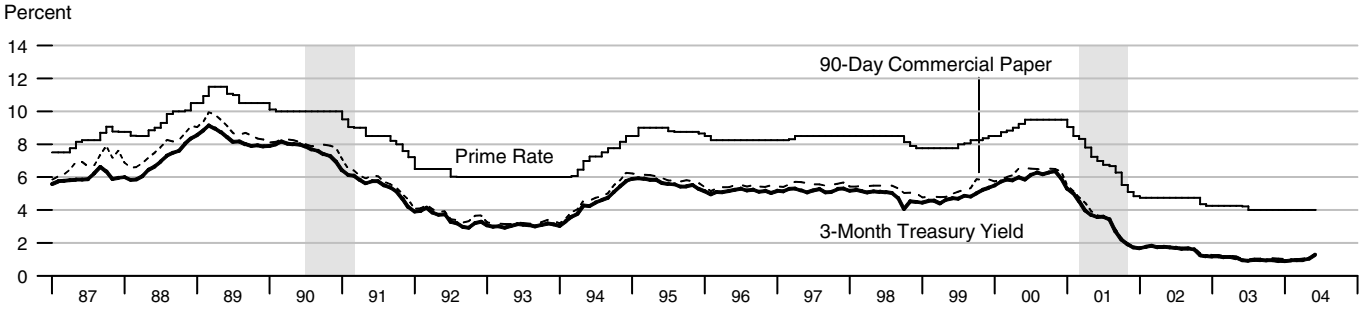
Treasury Security Yield Spreads



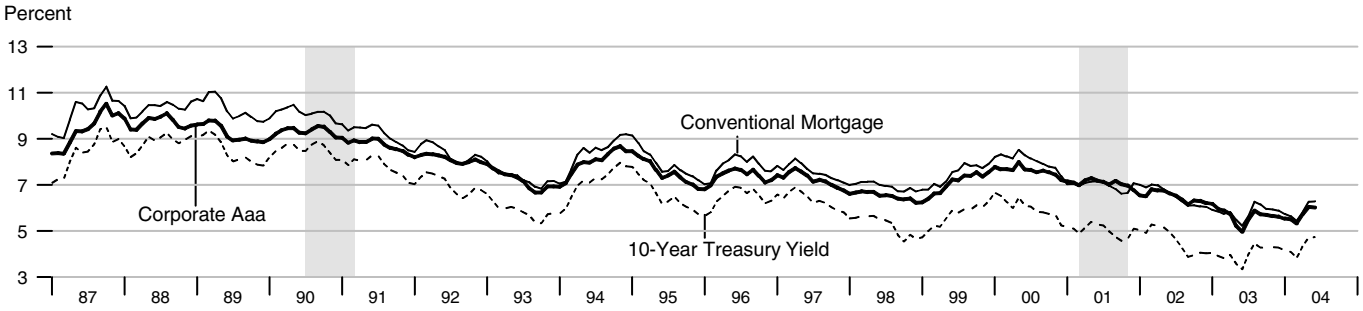
Real Interest Rates



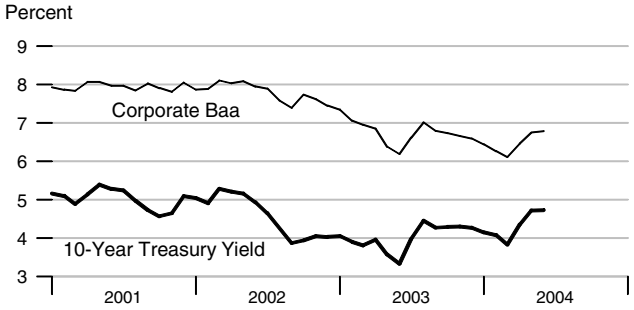
Short-Term Interest Rates



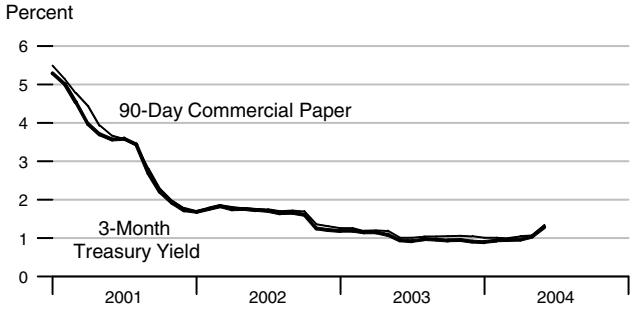
Long-Term Interest Rates



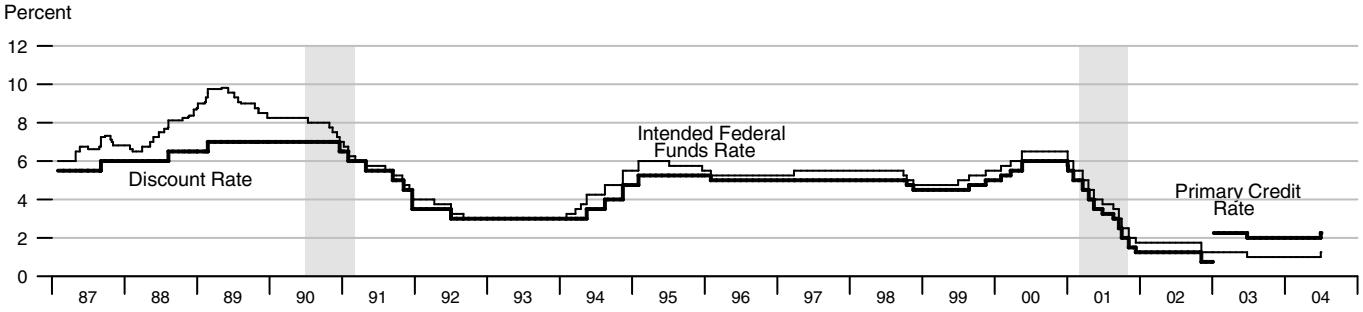
Long-Term Interest Rates



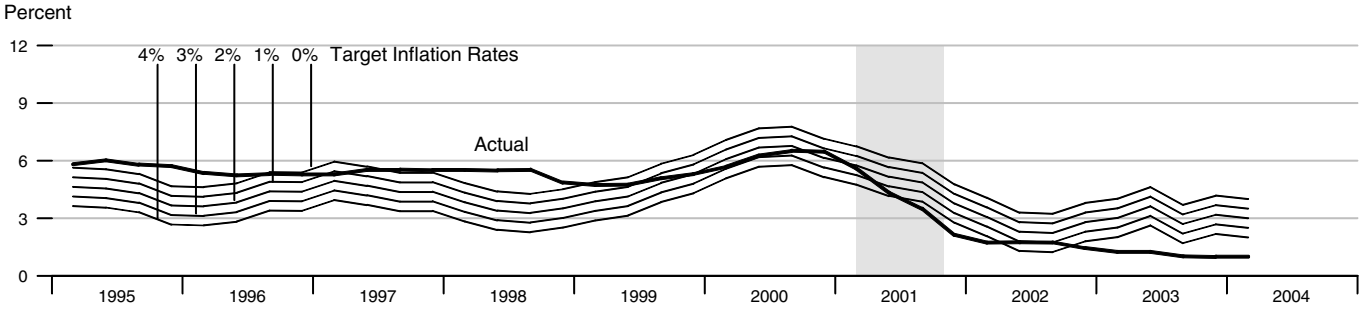
Short-Term Interest Rates



FOMC Intended Federal Funds Rate, Discount Rate, and Primary Credit Rate



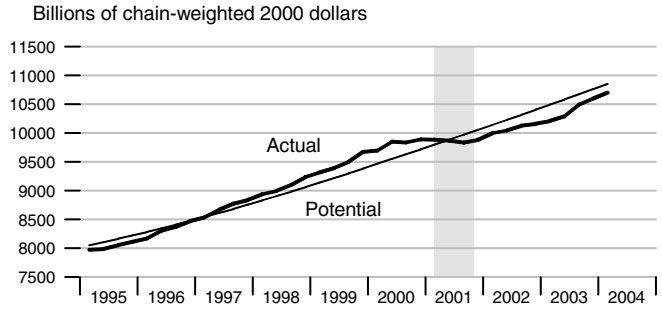
Federal Funds Rate and Inflation Targets



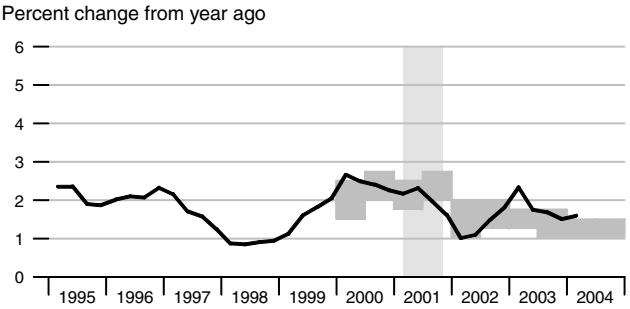
Calculated federal funds rate is based on Taylor's rule. See notes on page 19.

Components of Taylor's Rule

Actual and Potential Real GDP

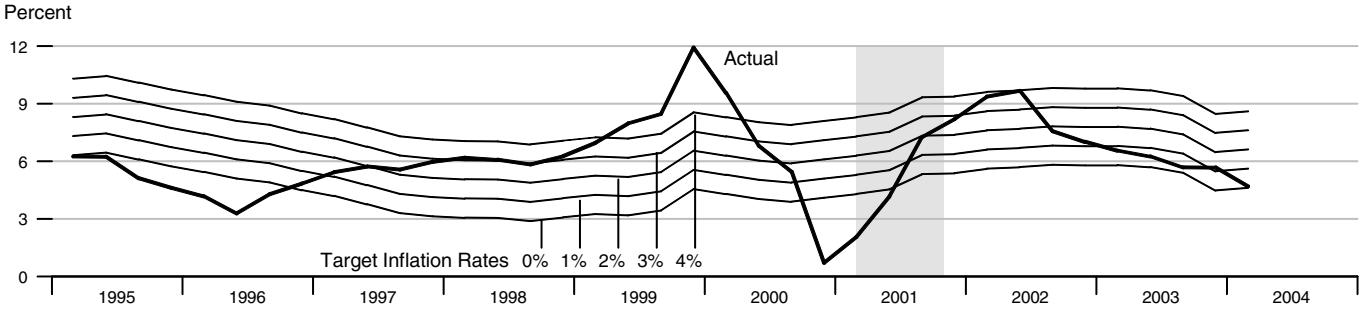


PCE Inflation and Projections



The shaded region shows the range of projections published in the Monetary Policy Report to the Congress.

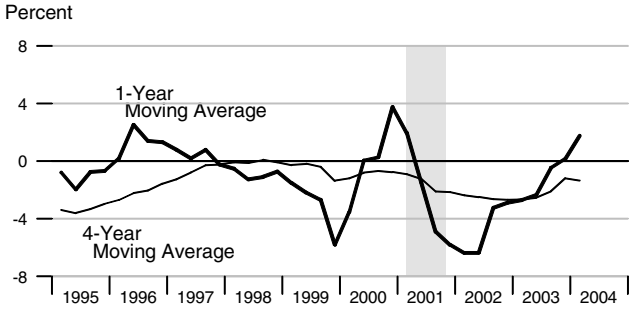
Monetary Base Growth* and Inflation Targets



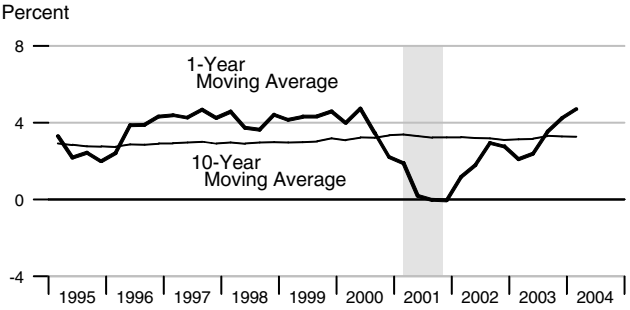
*Modified for the effects of sweeps programs on reserve demand.
Calculated base growth is based on McCallum's rule. Actual base growth is percent change from year ago. See notes on page 19.

Components of McCallum's Rule

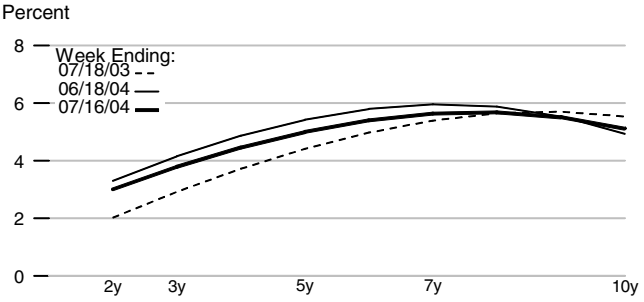
Monetary Base Velocity Growth



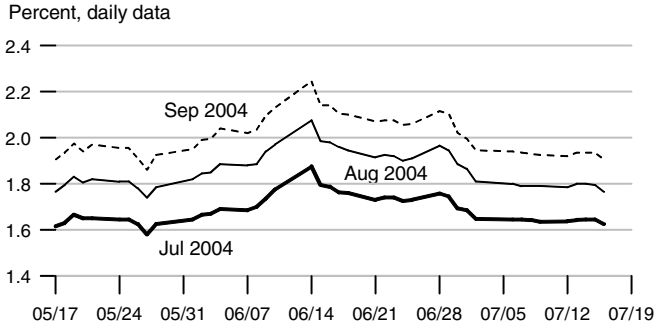
Real Output Growth



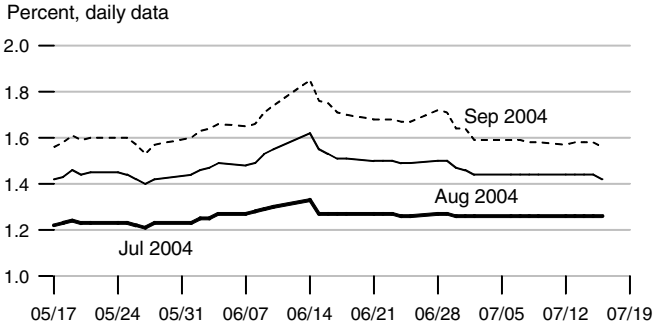
Implied One-Year Forward Rates



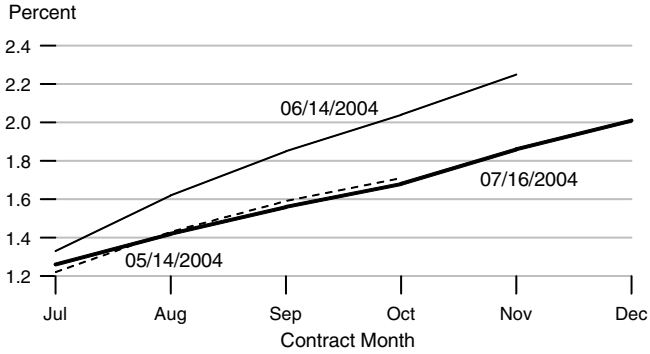
Rates on 3-Month Eurodollar Futures



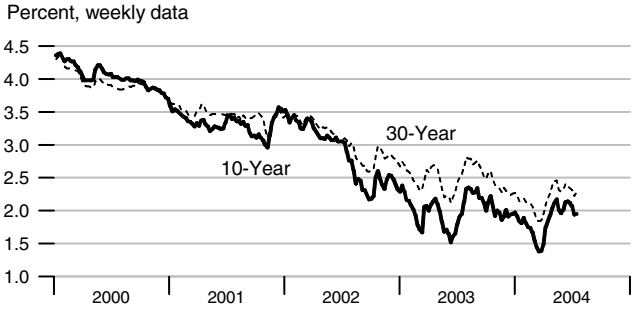
Rates on Selected Federal Funds Futures Contracts



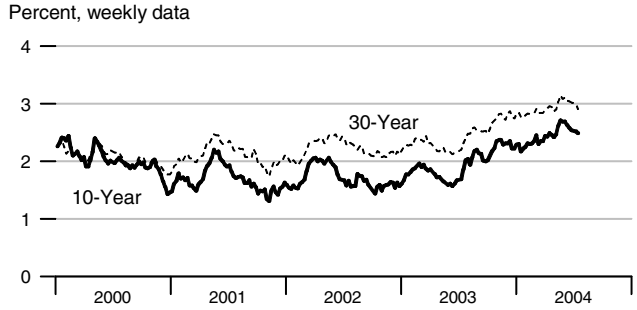
Rates on Federal Funds Futures on Selected Dates



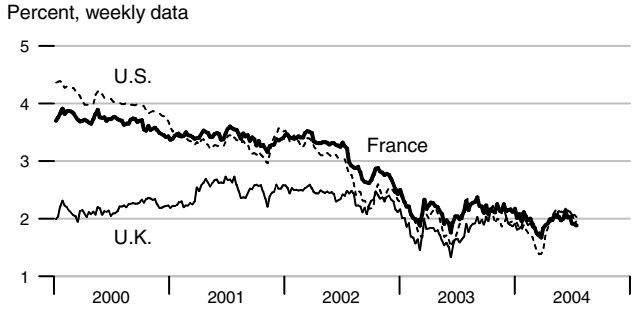
Inflation-Indexed Treasury Securities



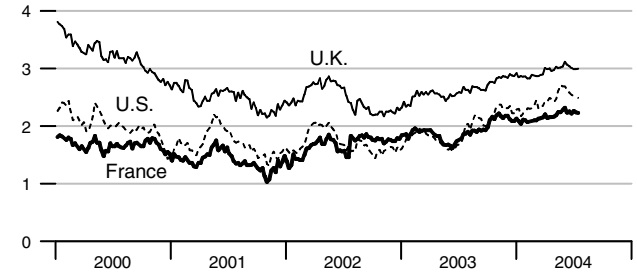
Inflation-Indexed Treasury Yield Spreads



Inflation-Indexed 10-Year Government Notes



Inflation-Indexed 10-Year Government Yield Spreads

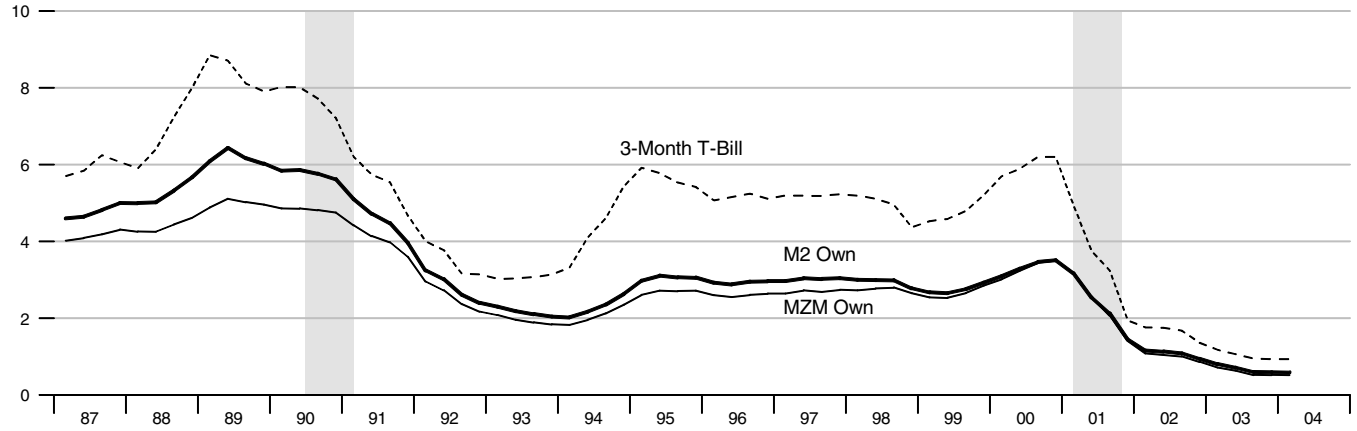


Velocity

Nominal GDP/MZM, Nominal GDP/M2 (Ratio Scale)

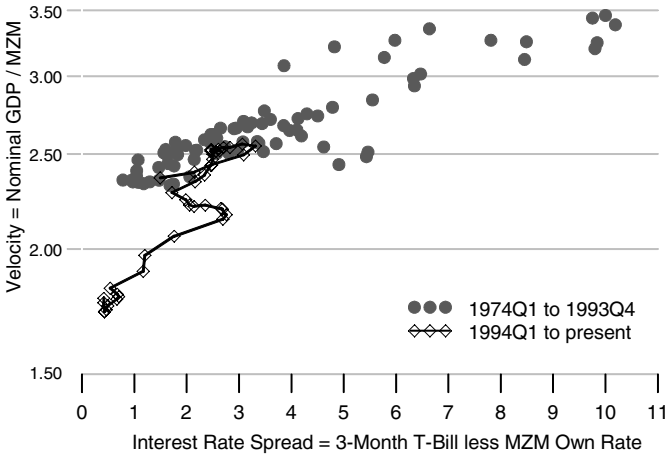
Interest Rates

Percent



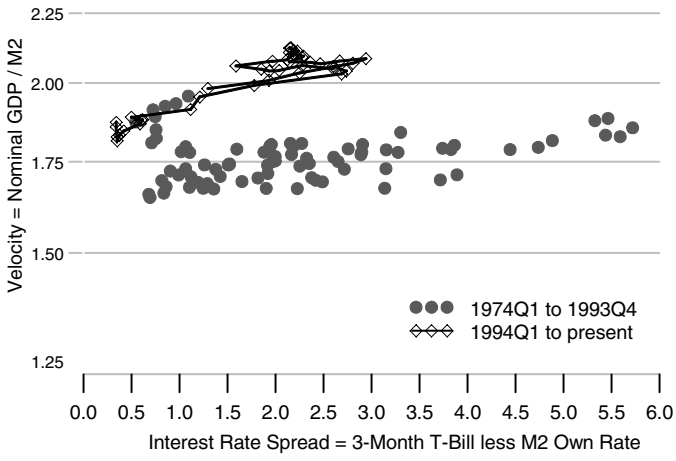
MZM Velocity and Interest Rate Spread

Ratio Scale



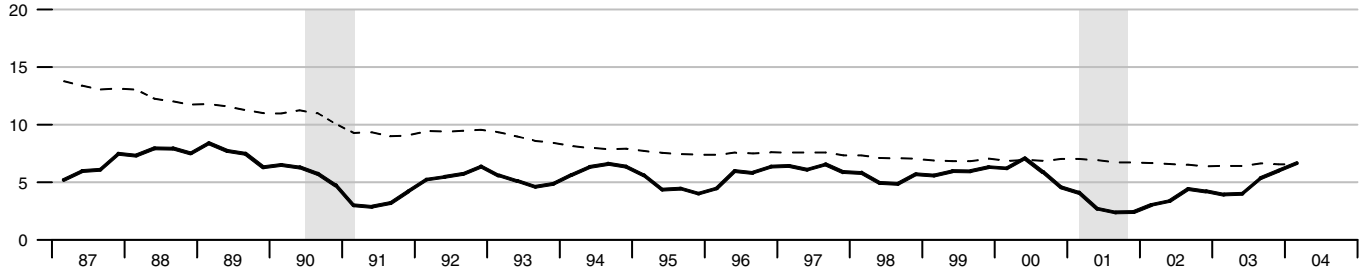
M2 Velocity and Interest Rate Spread

Ratio Scale



Gross Domestic Product

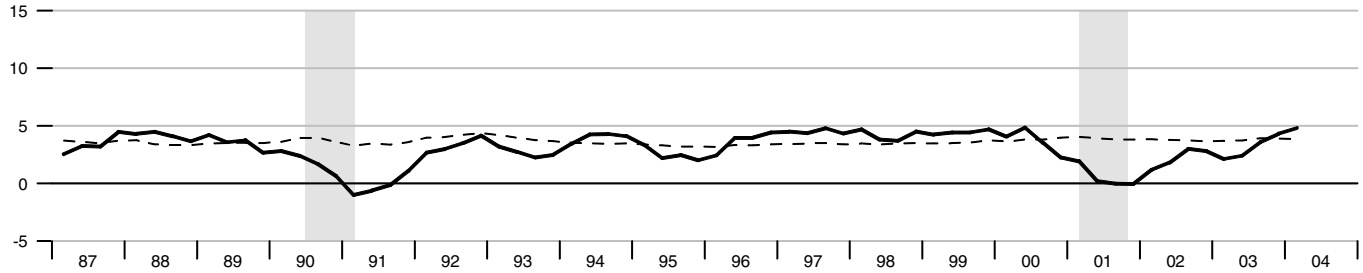
Percent change from year ago



Dashed lines indicate 10-year moving averages.

Real Gross Domestic Product

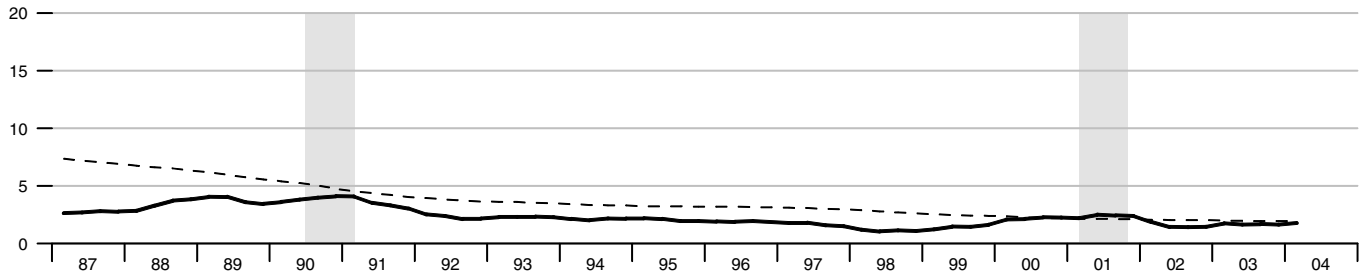
Percent change from year ago



Dashed lines indicate 10-year moving averages.

Gross Domestic Product Price Index

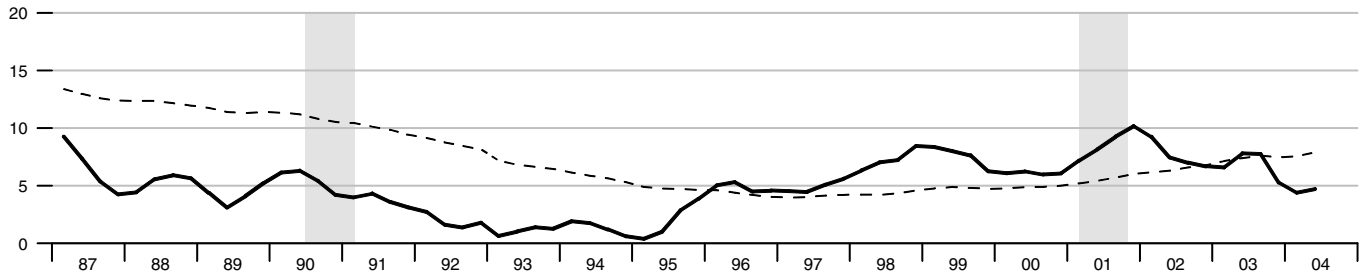
Percent change from year ago



Dashed lines indicate 10-year moving averages.

M2

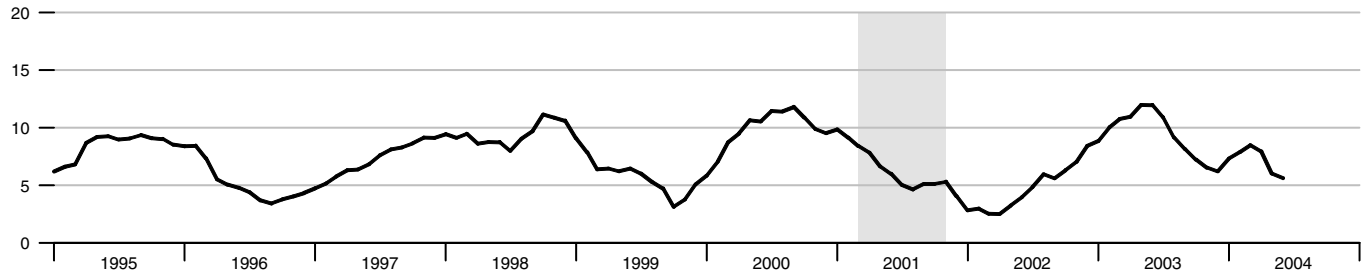
Percent change from year ago



Dashed lines indicate 10-year moving averages.

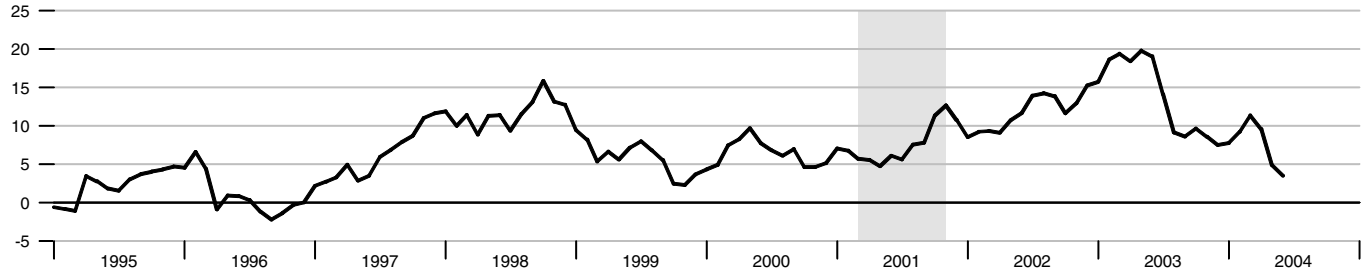
Bank Credit

Percent change from year ago



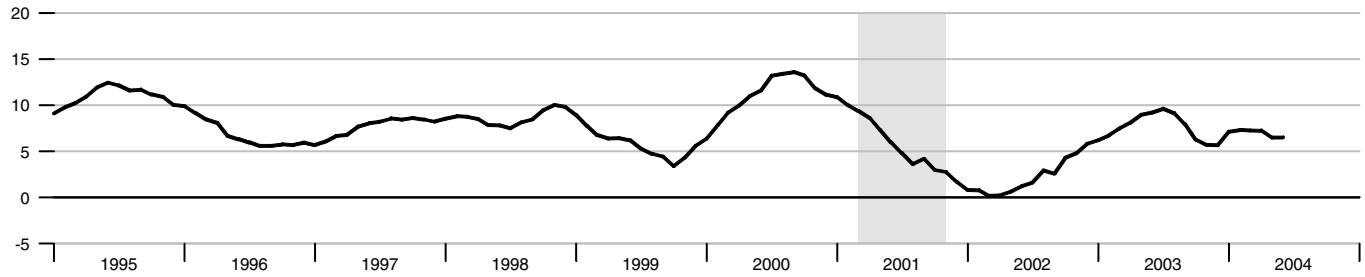
Investment Securities in Bank Credit at Commercial Banks

Percent change from year ago



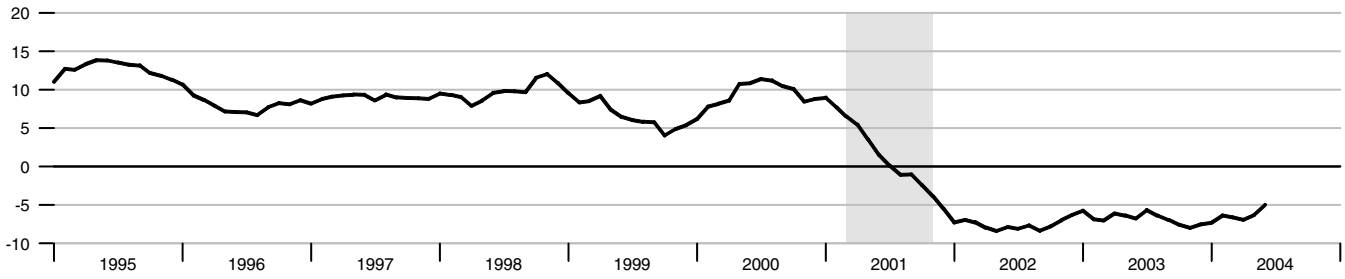
Total Loans and Leases in Bank Credit at Commercial Banks

Percent change from year ago

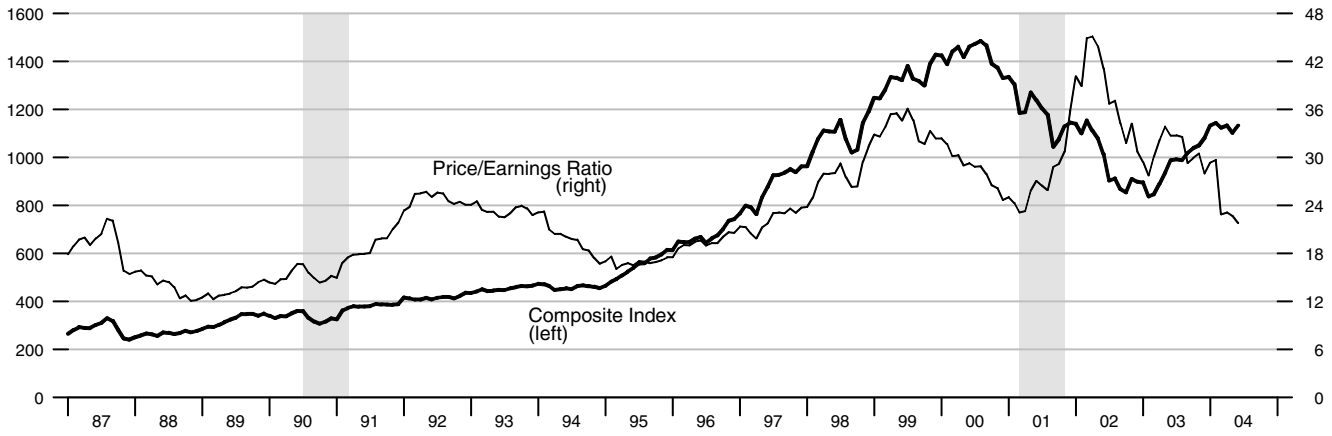


Commercial and Industrial Loans at Commercial Banks

Percent change from year ago



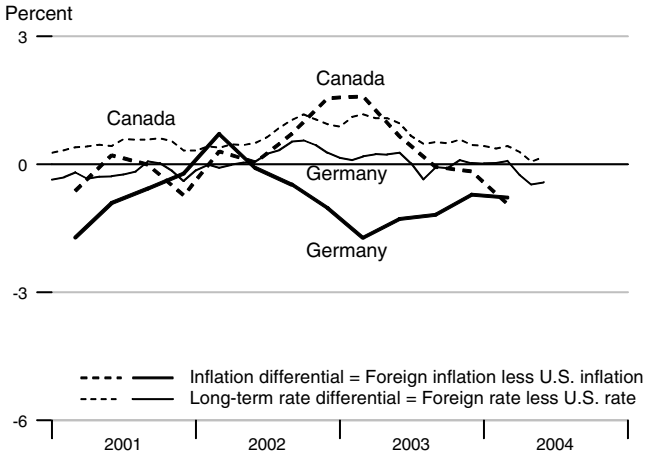
Standard & Poor's 500

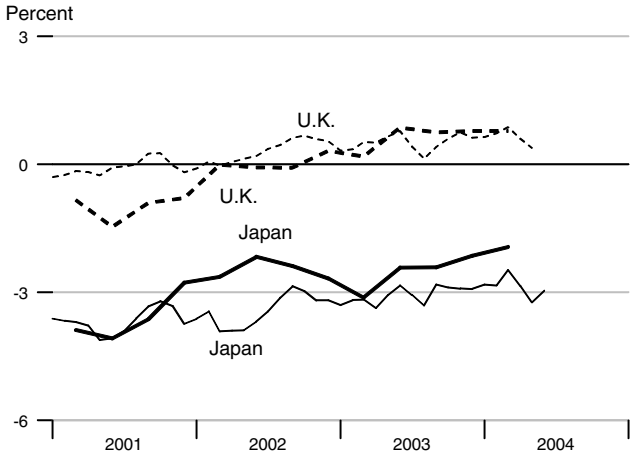


Recent Inflation and Long-Term Interest Rates

	Consumer Price Inflation Rates				Long-Term Government Bond Rates			
	Percent change from year ago				Percent			
	2003Q3	2003Q4	2004Q1	2004Q2	Mar04	Apr04	May04	Jun04
United States	2.18	1.87	1.80	2.84	3.83	4.35	4.72	4.73
Canada	2.11	1.71	0.87	.	4.26	4.64	4.78	4.91
France	1.95	2.19	1.80	.	3.98	4.19	4.34	.
Germany	1.00	1.16	1.02	.	3.91	4.10	4.25	4.31
Italy	2.74	2.53	2.29	2.33	4.17	4.35	4.49	4.54
Japan	-0.24	-0.27	-0.14	.	1.35	1.50	1.49	1.77
United Kingdom	2.93	2.65	2.58	.	4.70	4.95	5.10	.

Inflation and Long-Term Interest Rate Differentials





		Money Stock				Bank	Adjusted		
		M1	MZM	M2	M3	Credit	Monetary Base	Reserves	MSI M2
1999		1101.461	4170.473	4526.388	6261.627	4578.890	574.181	88.664	257.940
2000		1103.438	4509.032	4802.150	6852.095	5026.852	607.106	84.511	272.588
2001		1136.966	5221.161	5220.205	7633.058	5347.556	641.167	85.923	296.386
2002		1192.055	5891.395	5615.315	8244.884	5599.022	697.072	87.913	319.537
2003		1263.927	6321.960	5999.412	8758.812	6122.398	740.673	92.829	343.977
2002	1	1186.983	5741.758	5500.209	8082.164	5421.939	680.264	88.148	312.109
	2	1184.135	5828.732	5550.039	8161.300	5498.310	692.937	86.969	315.680
	3	1189.253	5927.616	5648.888	8275.966	5657.551	702.753	86.804	321.630
	4	1207.849	6067.474	5762.125	8460.106	5818.289	712.332	89.733	328.727
2003	1	1231.995	6187.228	5862.191	8599.888	5957.224	726.829	90.856	335.184
	2	1258.532	6282.483	5982.902	8723.623	6138.462	738.234	91.760	342.444
	3	1278.788	6433.561	6086.464	8869.119	6188.380	743.993	94.583	348.950
	4	1286.394	6384.568	6066.092	8842.617	6205.525	753.635	94.118	349.331
2004	1	1305.966	6424.718	6119.487	8971.210	6427.569	761.089	94.353	354.123
	2	1326.859	6586.989	6264.813	9226.940	6537.287	770.810	95.979	
2002	Jun	1188.327	5854.756	5574.376	8180.853	5545.130	697.068	85.989	317.229
	Jul	1194.262	5895.982	5616.246	8221.650	5587.157	701.032	86.085	319.473
	Aug	1182.926	5933.979	5652.025	8284.891	5663.518	702.878	86.366	321.742
	Sep	1190.570	5952.888	5678.393	8321.358	5721.979	704.350	87.962	323.676
	Oct	1201.852	5969.908	5723.222	8348.358	5748.127	710.667	89.804	326.419
	Nov	1204.503	6084.576	5767.888	8479.474	5819.944	712.476	89.819	329.035
	Dec	1217.191	6147.938	5795.264	8552.485	5886.797	713.854	89.576	330.728
2003	Jan	1220.411	6159.136	5826.487	8564.763	5889.794	719.532	89.450	332.918
	Feb	1235.090	6192.703	5868.295	8601.860	5971.513	728.669	91.828	335.492
	Mar	1240.483	6209.846	5891.791	8633.041	6010.364	732.287	91.291	337.141
	Apr	1246.495	6241.924	5935.192	8670.749	6050.303	736.488	92.280	339.764
	May	1258.015	6278.184	5986.425	8725.529	6155.568	738.672	91.435	342.635
	Jun	1271.085	6327.340	6027.088	8774.591	6209.515	739.543	91.566	344.933
	Jul	1273.463	6417.206	6067.065	8847.732	6196.480	741.242	93.486	347.770
	Aug	1281.526	6448.823	6107.525	8885.372	6181.484	745.242	95.383	350.029
	Sep	1281.376	6434.653	6084.803	8874.254	6187.177	745.496	94.879	349.052
	Oct	1283.190	6403.401	6069.100	8848.721	6163.801	753.679	95.238	349.139
	Nov	1283.145	6384.358	6066.444	8842.103	6200.211	754.613	94.757	349.356
	Dec	1292.846	6365.945	6062.733	8837.027	6252.563	752.614	92.358	349.499
2004	Jan	1286.585	6378.764	6070.227	8892.396	6320.526	756.454	92.544	350.682
	Feb	1305.992	6418.475	6120.445	8967.799	6442.055	762.851	95.218	354.232
	Mar	1325.321	6476.914	6167.790	9053.434	6520.127	763.962	95.296	357.455
	Apr	1323.163	6537.458	6215.945	9138.360	6527.909	767.621	96.473	360.519
	May	1322.205	6610.825	6285.805	9249.427	6525.146	769.878	95.143	
	Jun	1335.208	6612.684	6292.689	9293.033	6558.806	774.932	96.320	

*All values are given in billions of dollars.

		Federal Funds	Discount Rate	Primary Credit Rate	Prime Rate	3-mo CDs	Treasury Yields 3-mo	3-yr	10-yr	Corporate Aaa Bonds	S & L Aaa Bonds	Conventional Mortgage
1999		4.97	4.62		7.99	5.33	4.78	5.49	5.64	7.04	5.28	7.43
2000		6.24	5.73		9.23	6.46	6.00	6.22	6.03	7.62	5.58	8.06
2001		3.89	3.41		6.92	3.69	3.47	4.08	5.02	7.08	5.01	6.97
2002		1.67	1.17		4.68	1.73	1.63	3.10	4.61	6.49	4.87	6.54
2003		1.13		2.11	4.12	1.15	1.03	2.11	4.02	5.67	4.52	5.82
2002	1	1.73	1.25		4.75	1.82	1.76	3.75	5.08	6.62	5.02	6.97
	2	1.75	1.25		4.75	1.83	1.75	3.77	5.10	6.71	5.01	6.81
	3	1.74	1.25		4.75	1.76	1.67	2.62	4.26	6.35	4.72	6.29
	4	1.44	0.94		4.45	1.49	1.36	2.27	4.01	6.28	4.71	6.08
2003	1	1.25		2.25	4.25	1.26	1.18	2.07	3.92	6.00	4.60	5.83
	2	1.25		2.23	4.24	1.17	1.06	1.77	3.62	5.31	4.28	5.51
	3	1.02		2.00	4.00	1.07	0.95	2.20	4.23	5.70	4.68	6.01
	4	1.00		2.00	4.00	1.10	0.93	2.38	4.29	5.66	4.52	5.92
2004	1	1.00		2.00	4.00	1.05	0.93	2.17	4.02	5.45	4.26	5.61
	2	1.01		2.00	4.00	1.25	1.10	2.98	4.60	5.93	4.82	6.13
2002	Jun	1.75	1.25		4.75	1.81	1.73	3.49	4.93	6.63	4.92	6.65
	Jul	1.73	1.25		4.75	1.79	1.71	3.01	4.65	6.53	4.81	6.49
	Aug	1.74	1.25		4.75	1.73	1.65	2.52	4.26	6.37	4.78	6.29
	Sep	1.75	1.25		4.75	1.76	1.66	2.32	3.87	6.15	4.58	6.09
	Oct	1.75	1.25		4.75	1.73	1.61	2.25	3.94	6.32	4.66	6.11
	Nov	1.34	0.83		4.35	1.39	1.25	2.32	4.05	6.31	4.77	6.07
	Dec	1.24	0.75		4.25	1.34	1.21	2.23	4.03	6.21	4.70	6.05
2003	Jan	1.24			4.25	1.29	1.19	2.18	4.05	6.17	4.72	5.92
	Feb	1.26		2.25	4.25	1.27	1.19	2.05	3.90	5.95	4.57	5.84
	Mar	1.25		2.25	4.25	1.23	1.15	1.98	3.81	5.89	4.51	5.75
	Apr	1.26		2.25	4.25	1.24	1.15	2.06	3.96	5.74	4.60	5.81
	May	1.26		2.25	4.25	1.22	1.09	1.75	3.57	5.22	4.16	5.48
	Jun	1.22		2.20	4.22	1.04	0.94	1.51	3.33	4.97	4.07	5.23
	Jul	1.01		2.00	4.00	1.05	0.92	1.93	3.98	5.49	4.59	5.63
	Aug	1.03		2.00	4.00	1.08	0.97	2.44	4.45	5.88	4.82	6.26
	Sep	1.01		2.00	4.00	1.08	0.96	2.23	4.27	5.72	4.63	6.15
	Oct	1.01		2.00	4.00	1.10	0.94	2.26	4.29	5.70	4.64	5.95
	Nov	1.00		2.00	4.00	1.11	0.95	2.45	4.30	5.65	4.50	5.93
	Dec	0.98		2.00	4.00	1.10	0.91	2.44	4.27	5.62	4.41	5.88
2004	Jan	1.00		2.00	4.00	1.06	0.90	2.27	4.15	5.54	4.42	5.74
	Feb	1.01		2.00	4.00	1.05	0.94	2.25	4.08	5.50	4.26	5.64
	Mar	1.00		2.00	4.00	1.05	0.95	2.00	3.83	5.33	4.11	5.45
	Apr	1.00		2.00	4.00	1.08	0.96	2.57	4.35	5.73	4.69	5.83
	May	1.00		2.00	4.00	1.20	1.04	3.10	4.72	6.04	4.93	6.27
	Jun	1.03		2.01	4.00	1.46	1.29	3.26	4.73	6.01	4.85	6.29

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

		M1	MZM	M2	M3
Percent change at an annual rate					
	1999	2.00	12.41	7.54	8.75
	2000	0.18	8.12	6.09	9.43
	2001	3.04	15.79	8.71	11.40
	2002	4.85	12.84	7.57	8.02
	2003	6.03	7.31	6.84	6.23
2002	1	5.94	11.13	7.34	6.54
	2	-0.96	6.06	3.62	3.92
	3	1.73	6.79	7.12	5.62
	4	6.25	9.44	8.02	8.90
2003	1	8.00	7.89	6.95	6.61
	2	8.62	6.16	8.24	5.76
	3	6.44	9.62	6.92	6.67
	4	2.38	-3.05	-1.34	-1.20
2004	1	6.09	2.52	3.52	5.82
	2	6.40	10.10	9.50	11.40
2002	Jun	4.28	4.35	4.70	1.68
	Jul	5.99	8.45	9.01	5.98
	Aug	-11.39	7.73	7.64	9.23
	Sep	7.75	3.82	5.60	5.28
	Oct	11.37	3.43	9.47	3.89
	Nov	2.65	23.05	9.37	18.85
	Dec	12.64	12.50	5.70	10.33
2003	Jan	3.17	2.19	6.47	1.72
	Feb	14.43	6.54	8.61	5.20
	Mar	5.24	3.32	4.80	4.35
	Apr	5.82	6.20	8.84	5.24
	May	11.09	6.97	10.36	7.58
	Jun	12.47	9.40	8.15	6.75
	Jul	2.25	17.04	7.96	10.00
	Aug	7.60	5.91	8.00	5.11
	Sep	-0.14	-2.64	-4.46	-1.50
	Oct	1.70	-5.83	-3.10	-3.45
	Nov	-0.04	-3.57	-0.53	-0.90
	Dec	9.07	-3.46	-0.73	-0.69
2004	Jan	-5.81	2.42	1.48	7.52
	Feb	18.10	7.47	9.93	10.18
	Mar	17.76	10.93	9.28	11.46
	Apr	-1.95	11.22	9.37	11.26
	May	-0.87	13.47	13.49	14.58
	Jun	11.80	0.34	1.31	5.66

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 (money, zero maturity): M2 minus small-denomination time deposits, plus institutional money market mutual funds (that is, those included in M3 but excluded from M2). The label MZM was coined by William Poole (1991); the aggregate itself was proposed earlier by Motley (1988).

M2: M1 plus savings deposits (including money market deposit accounts) and small-denomination (under $100,000) time deposits issued by financial institutions; and shares in retail money market mutual funds (funds with initial investments under $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 nonfinancial firms. End-of-period basis.

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, 2001, 2003).

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 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, 2001, 2003).

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, with additional data at research.stlouisfed.org/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 *Statistical Supplement to the 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: 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 research.stlouisfed.org/aggreg/swdata.html. **Primary Credit Rate**, **Discount Rate,** and **Intended 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 for securities with 3 months and 1, 2, 3, 5, 7, and 10 years to maturity. Daily data and descriptions are available at research.stlouisfed.org/fred2/. See also *Statistical Supplement to the Federal Reserve Bulletin*, table 1.35. The 30-year constant maturity series was discontinued by the Treasury as of February 18, 2002.

Page 5: **Checkable Deposits** is the sum of demand and other checkable deposits. **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 *Statistical Supplement to the 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 (FOMC) 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 consumer price index for all urban consumers. **Real Interest Rates** are ex post measures, equal to nominal rates minus CPI inflation.

Page 9: **FOMC Intended Federal Funds Rate** is the level (or midpoint of the range, if applicable) of the federal funds rate that the staff of the FOMC expected to be consistent with the desired degree of pressure on bank reserve positions. In recent years, the FOMC has set an explicit target for the federal funds rate.

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 gross domestic product (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 $((y_t - y_{t-40})/40) \times 400$, where y_t is the log of real GDP. The 4-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 found at research.stlouisfed.org/aggreg/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 $m = 1,\ldots,$ 10 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 Federal Funds Futures Contracts** trace through time the yield on three specific contracts. **Rates on Federal Funds Futures on Selected Dates** displays a single day's snapshot of yields for contracts expiring in the months shown on the horizontal axis. **Inflation-Indexed Treasury Securities** are yields on the most recently issued inflation-indexed securities of 10- and 30-year original maturities. **Inflation-Indexed 10-Year Government Notes** shows the yield of an inflation-indexed note that is scheduled to mature in approximately (but not greater than) 10 years. The current French note has a maturity date of 7/25/2013, the current U.K. note has a maturity date of 8/16/2013, and the current U.S. note has a maturity date of 1/15/2014. **Inflation-Indexed Treasury Yield Spreads** and **Inflation-Indexed 10-Year Government Yield Spreads** equal the difference between the yields on the most recently issued inflation-indexed securities and the unadjusted security yields of similar maturity.

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. Prior to 1982, the 3-month T-bill rates are secondary market yields. From 1982 forward, rates are 3-month constant maturity yields.

Page 13: **Real Gross Domestic Product** is GDP as measured in chained 2000 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 2000 dollars.

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

Page 15: **Inflation Rate Differentials** are the differences between the foreign consumer price inflation rates and year-over-year changes in the U.S. all-items Consumer Price Index.

Page 17: **Treasury Yields** are Treasury constant maturities as reported in the Board of Governors of the Federal Reserve System's H.15 release.

Sources

Agence France Trésor: French note yields.

Bank of Canada: Canadian note yields.

Bank of England: U.K. note yields.

Board of Governors of the Federal Reserve System: Monetary aggregates and components: 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 website. Nonfinancial debt: Z.1 release. M2 own rate.

Bureau of Economic Analysis: GDP.

Bureau of Labor Statistics: CPI.

Chicago Board of Trade: Federal funds futures contract.

Chicago Mercantile Exchange: Eurodollar futures.

Congressional Budget Office: Potential real GDP.

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

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

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

Standard & Poor's: Stock price-earnings ratio, stock price composite index.

University of Michigan Survey Research Center: Median expected price change.

U.S. Department of the Treasury: U.S. 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, *78*(2), 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, *78*(6), pp. 3-37.*

____ and ____(2001). "Retail Sweep Programs and Bank Reserves, 1994-1999," Federal Reserve Bank of St. Louis *Review*, January/February, *83*(1), pp. 51-72.*

____ and ____ , with Jeffrey Loesel (2003). "A Reconstruction of the Federal Reserve Bank of St. Louis Adjusted Monetary Base and Reserves," Federal Reserve Bank of St. Louis *Review*, September/October, *85*(5), pp. 39-70.*

____ , 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, *79*(1), 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: *Available on the Internet at research.stlouisfed.org/publications/review/.