

Why Predict Past FOMC Actions?

The daily effective federal funds rate contains noise—that is, departures from the target level established by the Federal Open Market Committee (FOMC) that reflect idiosyncratic conditions in the inter-bank loan market. Averaging the daily data across a month or quarter is one way to cancel most of this noise, and, for this reason, the monthly or quarterly average of the daily federal funds rate has become a widely used measure of monetary policy. The first chart on page 10 of this publication, for example, plots a quarterly average as the actual federal funds rate in a Taylor rule description of monetary policy. The monthly average is also the benchmark for payoffs in the federal funds futures market.

One often-neglected consequence of monthly averaging, however, is that any change in the target federal funds rate will affect the monthly average for two months. For example, if the FOMC raised the target by 50 basis points precisely halfway through this month, then the monthly average for this month will rise by 25 basis points relative to last month, and next month's average will also exceed this month's average by 25 basis points, all else equal. Similarly, if the FOMC raised the target by 50 basis points three-quarters of the way through this month, then the expected monthly average for the next month would rise by 37.5 basis points.

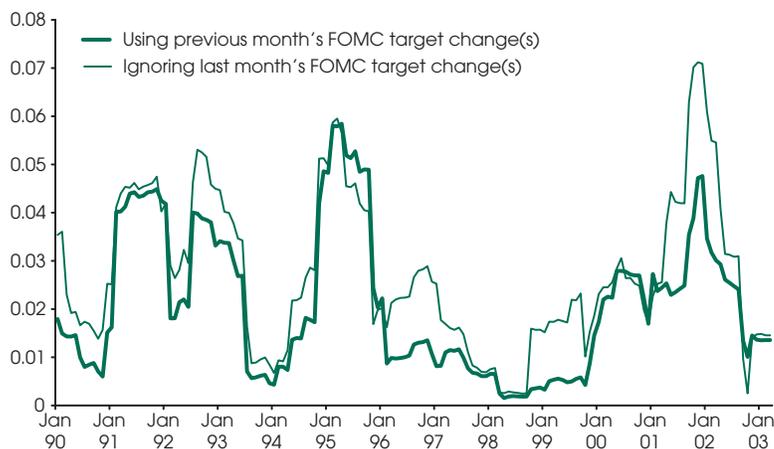
To gauge how strongly target changes in one month affect the change in the monthly average funds rate from that month to the next, I estimated two regressions of the change in the monthly average on its own lagged value. In one regression, I also included information about how the size and timing of any target change in the previous month would affect this month's average. The sample period covered January 1984 through March 2003. The accompanying chart plots the squared forecast errors from both regressions and shows

how the information on target changes improves the precision of the forecasts. It is striking that when the information on last month's target change is included, the adjusted R-squared measure of fit more than doubles, from 21 percent to 44 percent.

Furthermore, the lagged change in the monthly average becomes statistically insignificant, once the information regarding the previous month's target change is included in the regression. In fact, the coefficient on the target change variable is slightly greater than (though not significantly different from) 1.0. A coefficient greater than 1 would imply that a target change in one month tends to precede an additional target change in the same direction the next month. Such a prediction would be consistent with the view that the FOMC has active and passive periods and target changes tend to be in the same direction during each active period. The bottom line is that any forecasting model of the monthly average of the federal funds rate that does not take into account known, past FOMC target changes unnecessarily handicaps itself in forecast comparisons with the federal funds futures market, where profit-motivated traders follow FOMC policy actions closely.

—Michael Dueker

Squared Forecast Errors for Monthly Average of Federal Funds Rate
(12-Month Moving Average)



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Conventions used in this publication:

1. Unless otherwise indicated, data are monthly.
2. Except where otherwise noted, solid shading indicates recessions, as determined by the National Bureau of Economic Research. The NBER has not yet determined the end of the recession that began in March 2001; however, the hatched shading indicates this recession ended in November 2001, as determined by a statistical model for dating business cycle turning points developed by Marcelle Chauvet (“An Econometric Characterization of Business Cycle Dynamics with Factor Structure and Regime Switching,” *International Economic Review*, November 1998, pp. 969-96) and discussed by Marcelle Chauvet and Jeremy Piger (“Identifying Business Cycle Turning Points in Real Time,” *Federal Reserve Bank of St. Louis Review*, March/April 2003, pp. 47-62).
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: $[(x_t/x_{t-12})-1] \times 100$.

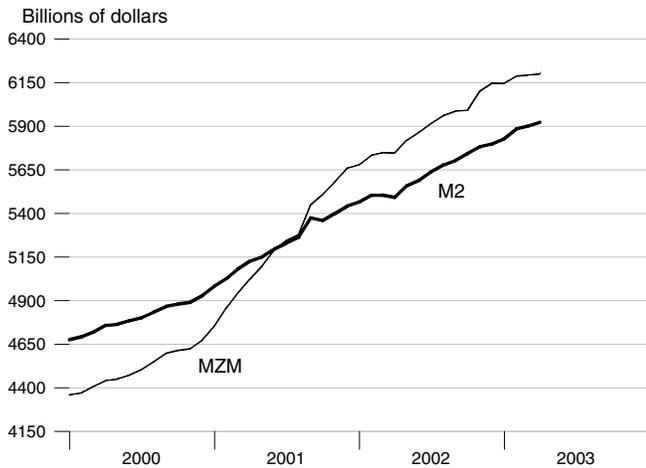
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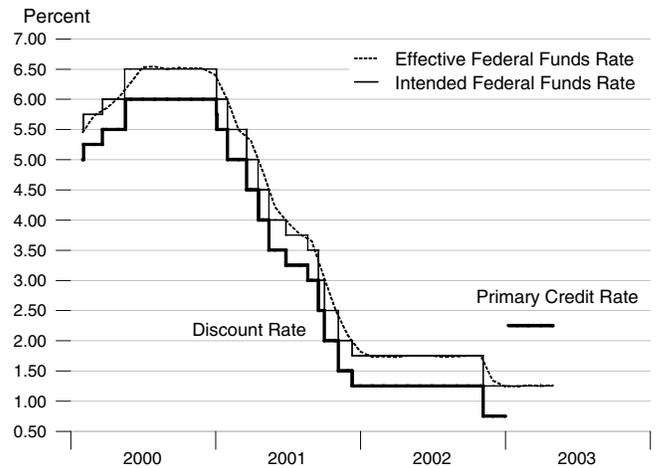
or to:

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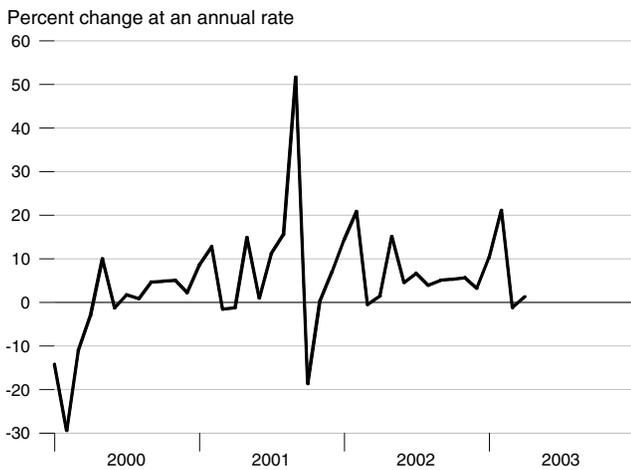
M2 and MZM



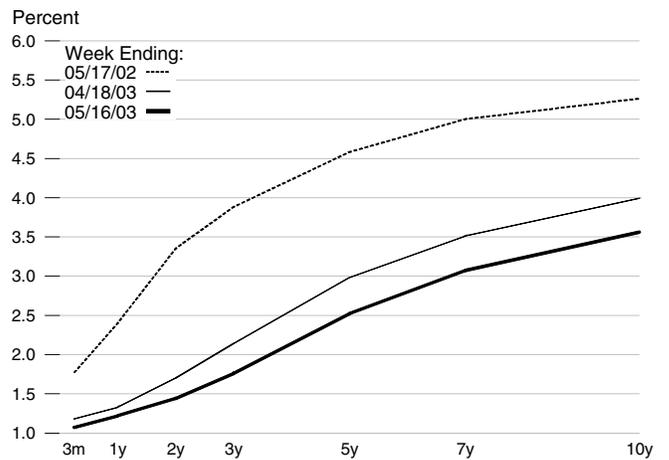
Reserve Market Rates



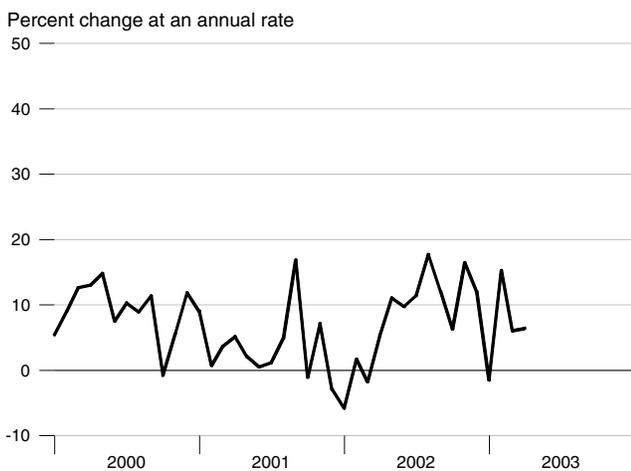
Adjusted Monetary Base



Treasury Yield Curve



Total Bank Credit

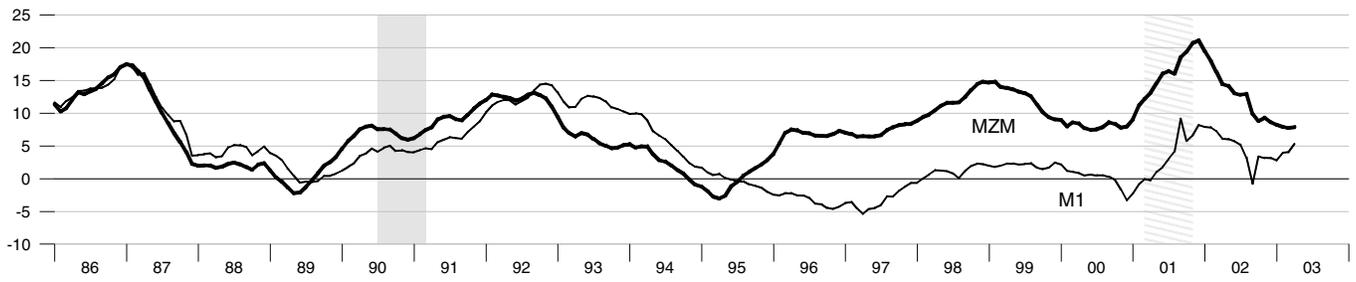


Interest Rates

	Feb 03	Mar 03	Apr 03
Federal Funds Rate	1.26	1.25	1.26
Prime Rate	4.25	4.25	4.25
Primary Credit Rate	2.25	2.25	2.25
Conventional Mortgage Rate	5.84	5.75	5.81
Treasury Yields:			
3-Month Constant Maturity	1.19	1.15	1.15
6-Month Constant Maturity	1.20	1.16	1.17
1-Year Constant Maturity	1.30	1.24	1.27
3-Year Constant Maturity	2.05	1.98	2.06
5-Year Constant Maturity	2.90	2.78	2.93
10-Year Constant Maturity	3.90	3.81	3.96

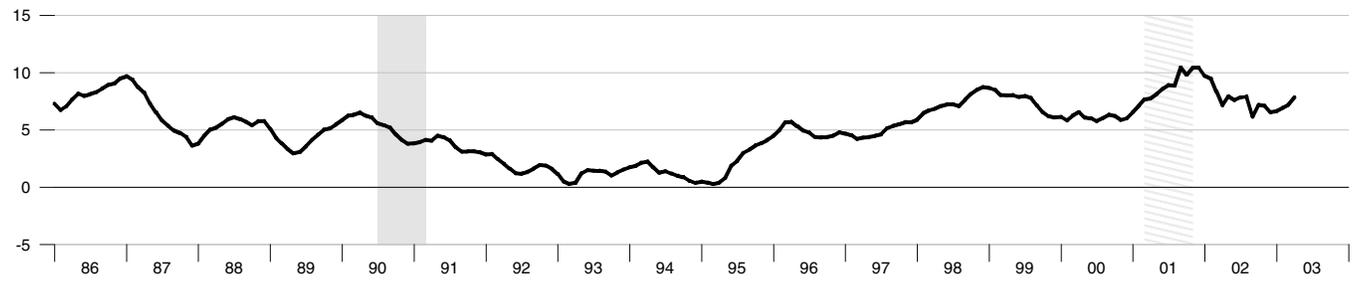
MZM and M1

Percent change from year ago



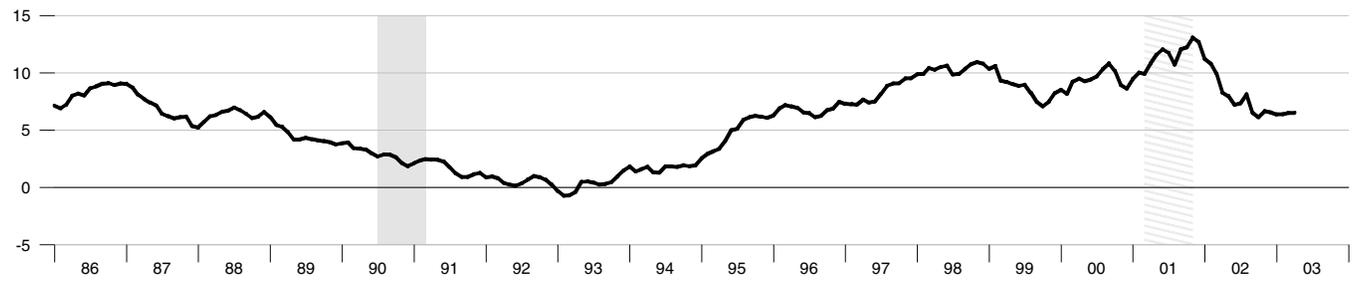
M2

Percent change from year ago



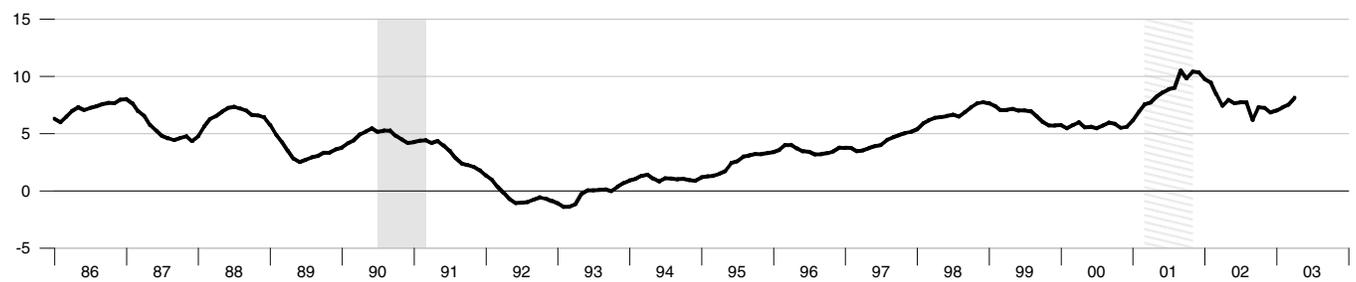
M3

Percent change from year ago



Monetary Services Index - M2

Percent change from year ago



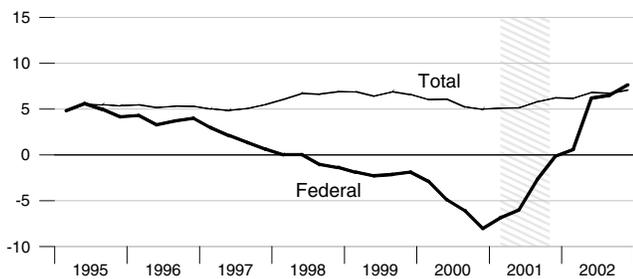
Adjusted Monetary Base

Percent change from year ago



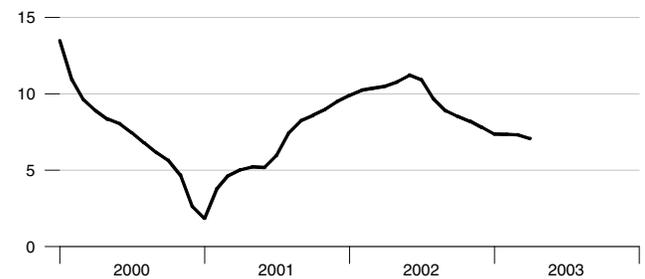
Domestic Nonfinancial Debt

Percent change from year ago



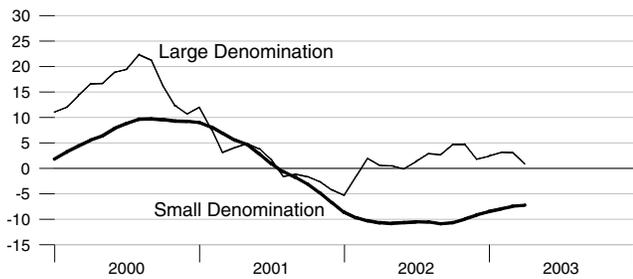
Currency Held by the Nonbank Public

Percent change from year ago



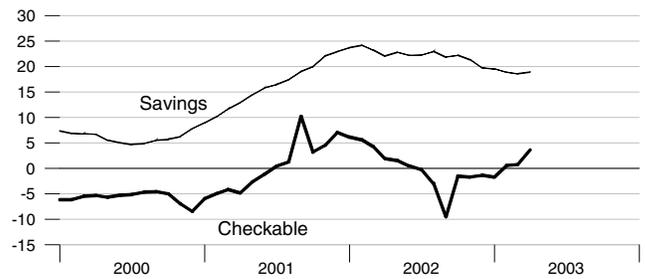
Time Deposits

Percent change from year ago



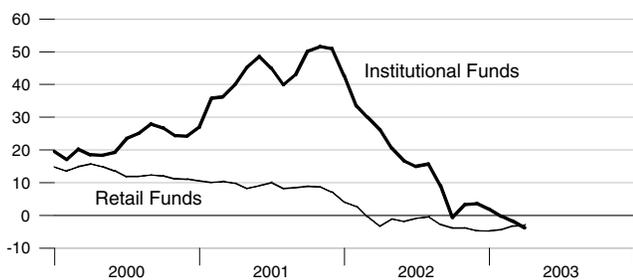
Checkable and Savings Deposits

Percent change from year ago



Money Market Mutual Fund Shares

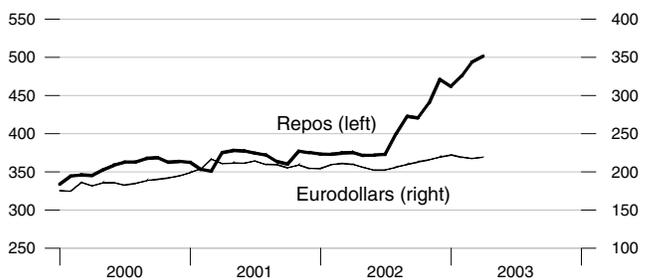
Percent change from year ago



Repurchase Agreements and Eurodollars

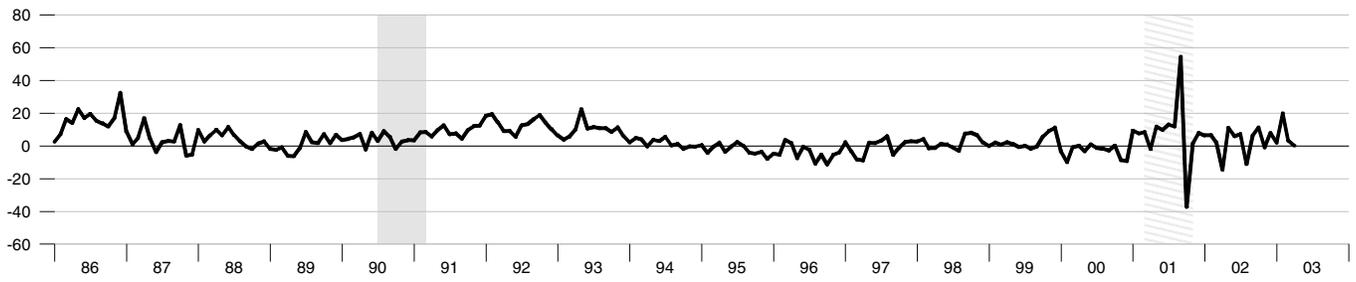
Billions of dollars

Billions of dollars



M1

Percent change at an annual rate



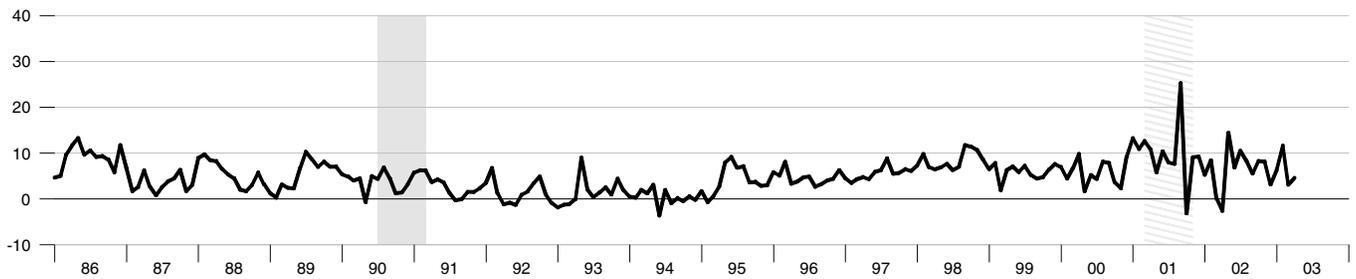
MZM

Percent change at an annual rate



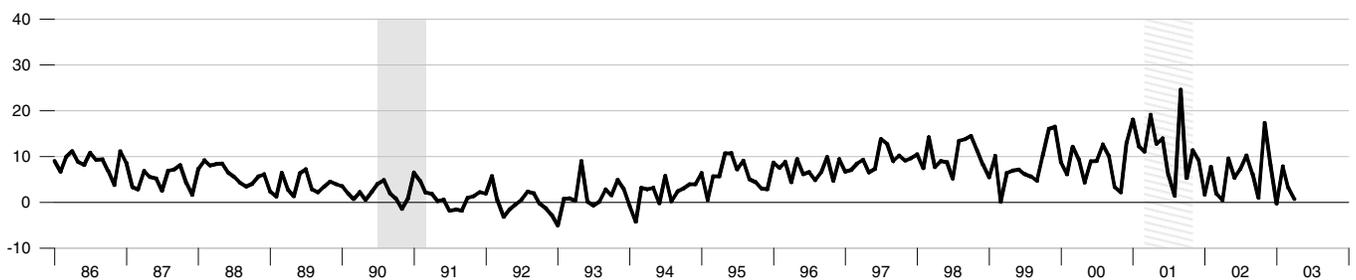
M2

Percent change at an annual rate



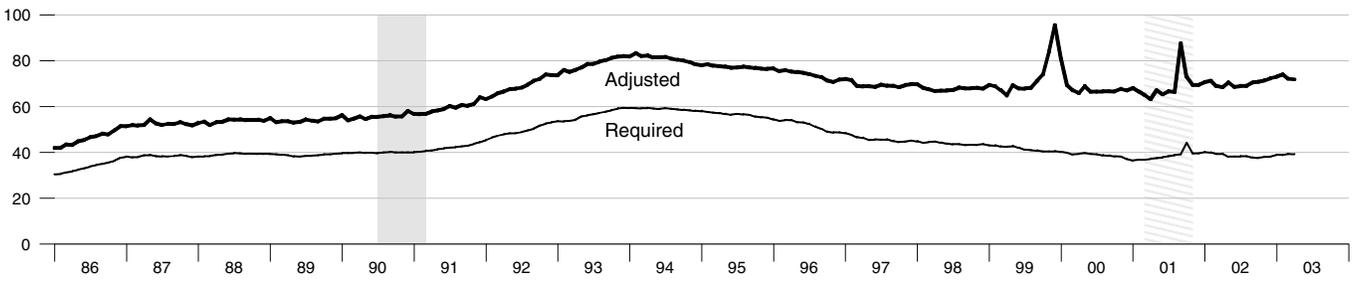
M3

Percent change at an annual rate



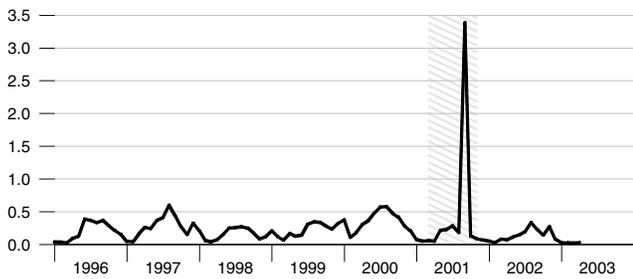
Adjusted and Required Reserves

Billions of dollars



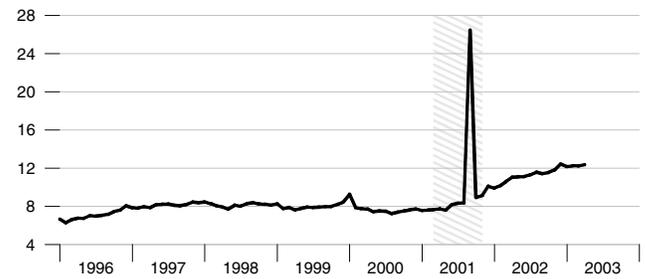
Total Borrowings, nsa

Billions of dollars



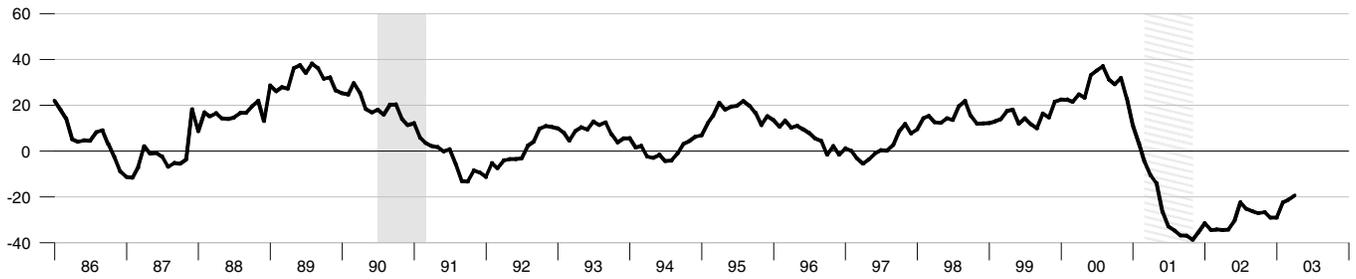
Excess Reserves plus RCB Contracts

Billions of dollars



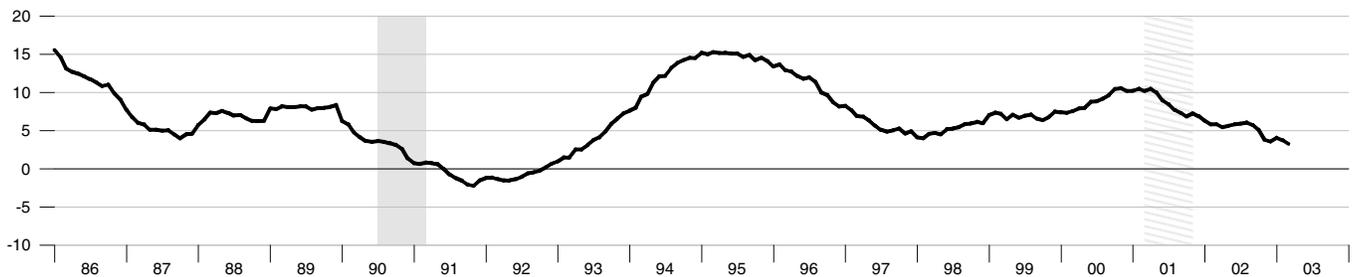
Nonfinancial Commercial Paper

Percent change from year ago

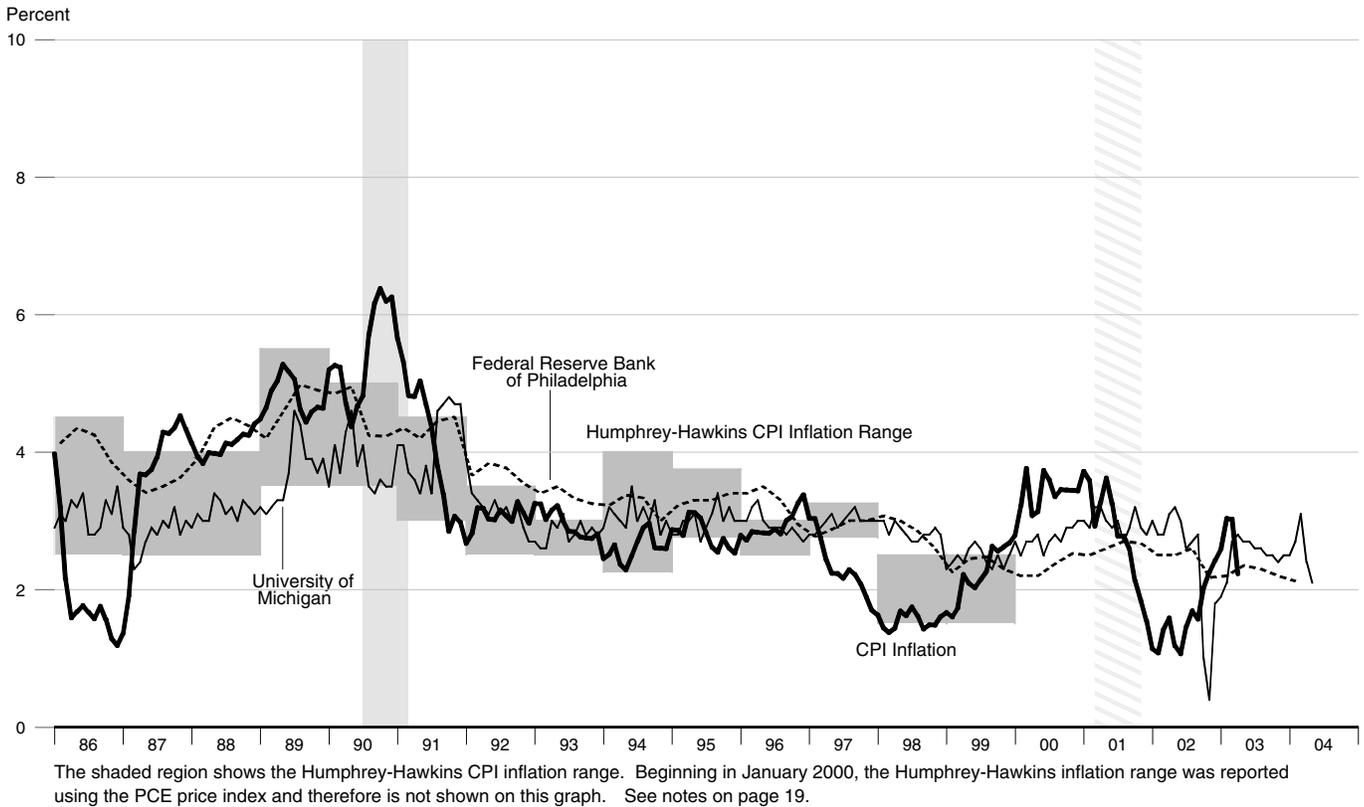


Consumer Credit

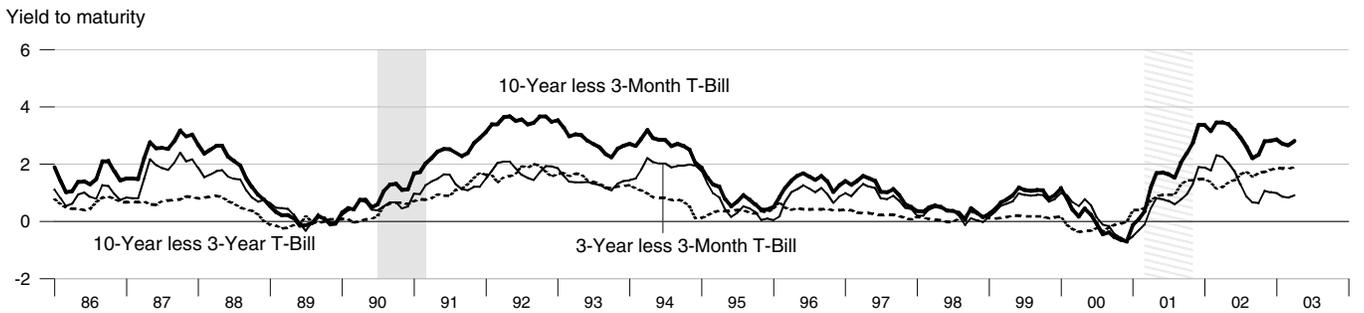
Percent change from year ago



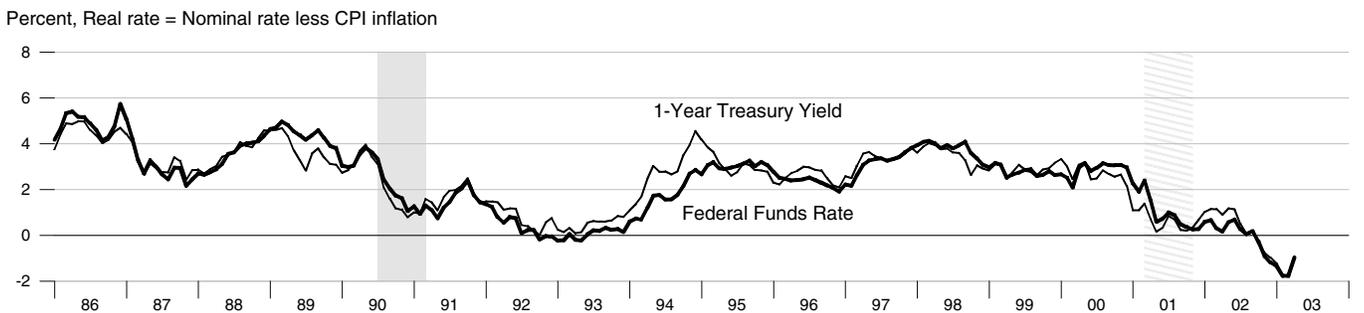
Inflation and Inflation Expectations



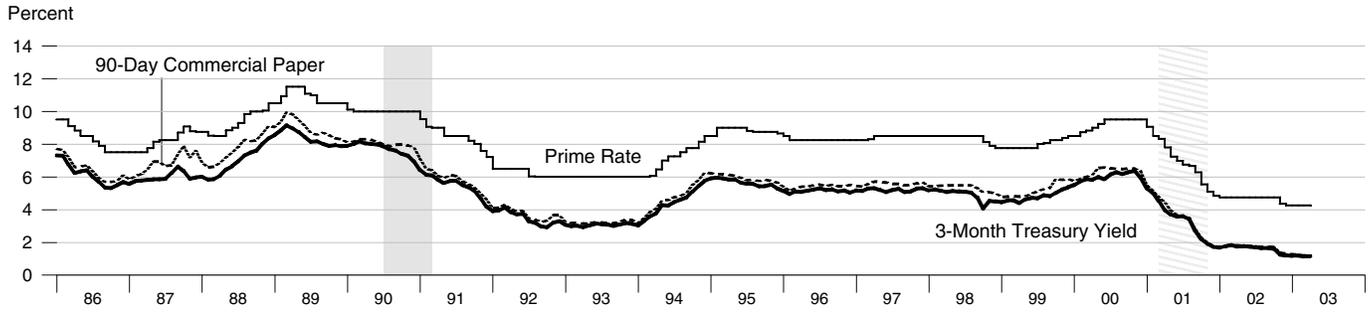
Treasury Security Yield Spreads



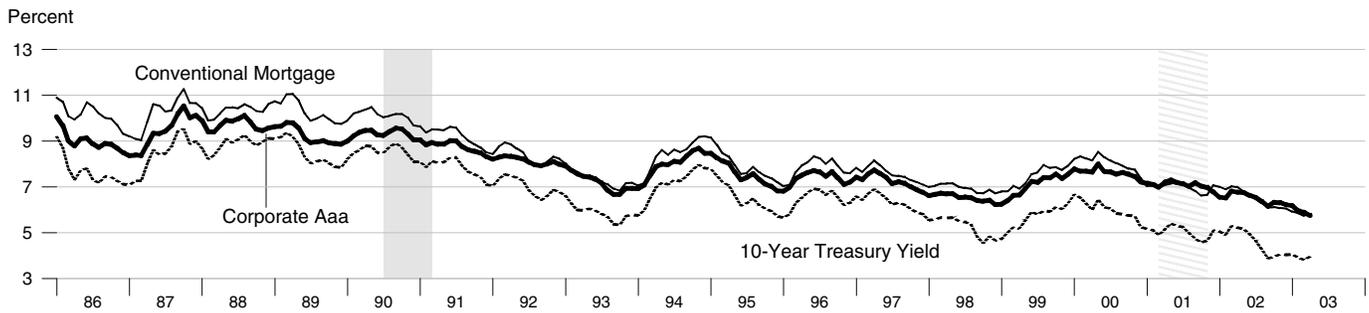
Real Interest Rates



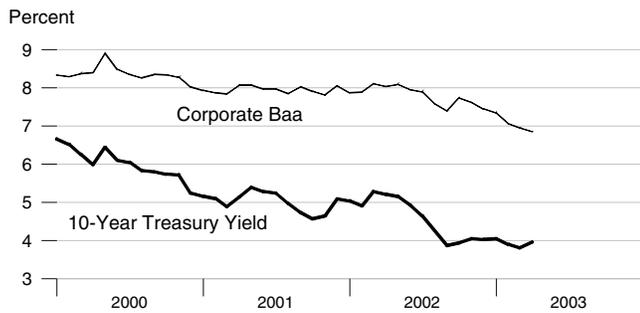
Short-Term Interest Rates



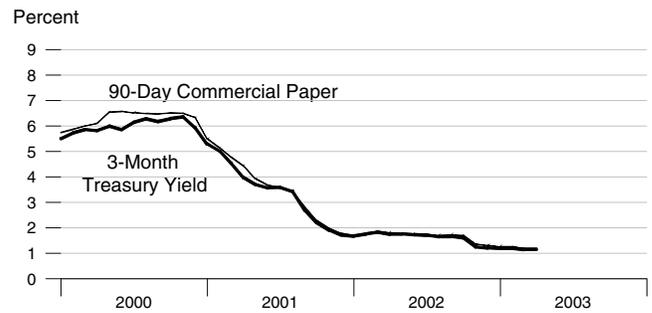
Long-Term Interest Rates



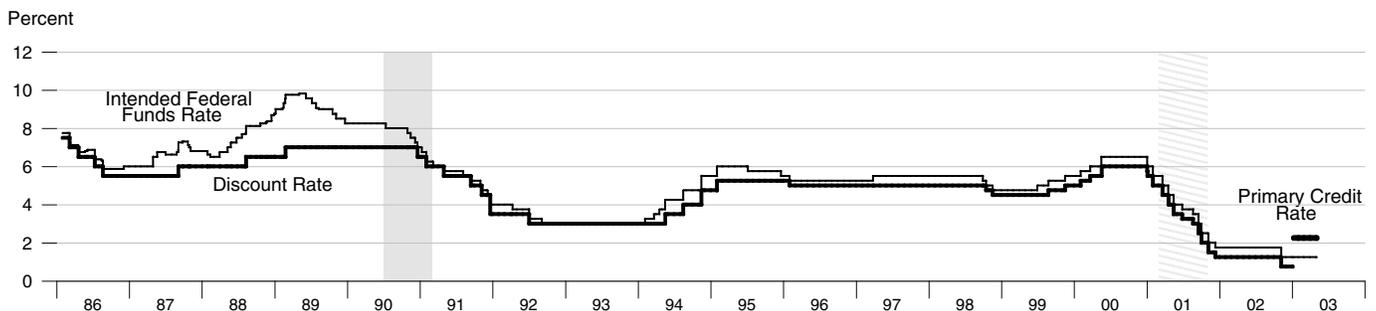
Long-Term Interest Rates



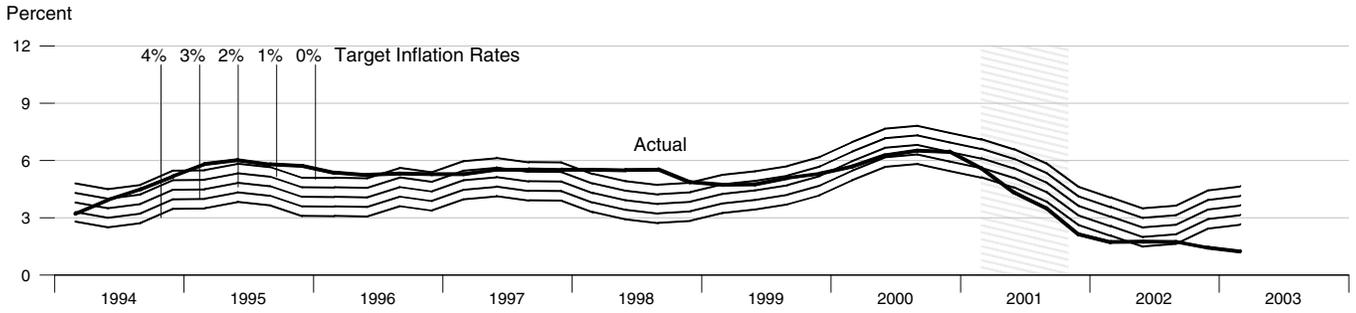
Short-Term Interest Rates



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



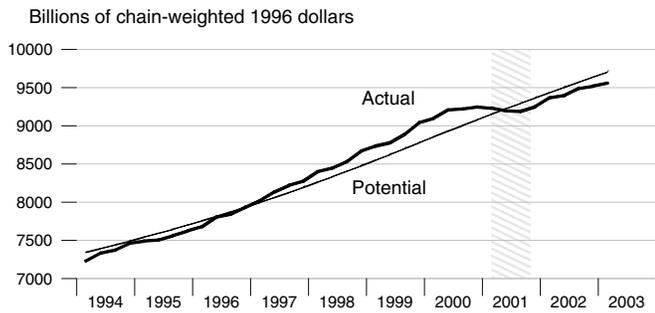
Federal Funds Rate and Inflation Targets



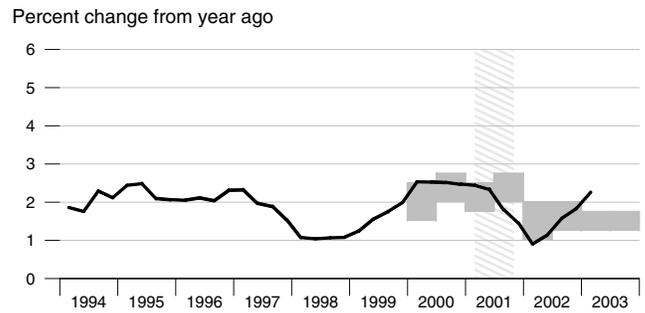
Calculated federal funds rate is based on Taylor's rule. See notes on page 19.

Components of Taylor's Rule

Actual and Potential Real GDP

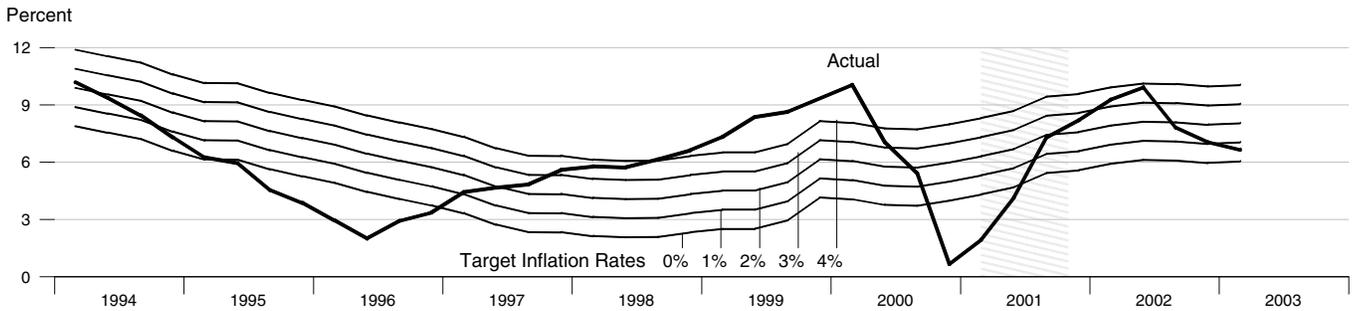


PCE Inflation and Projections



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

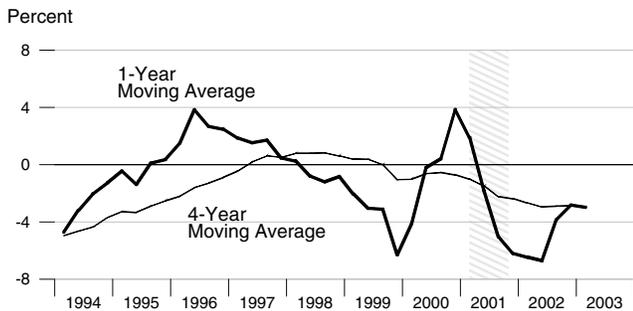
Monetary Base Growth* and Inflation Targets



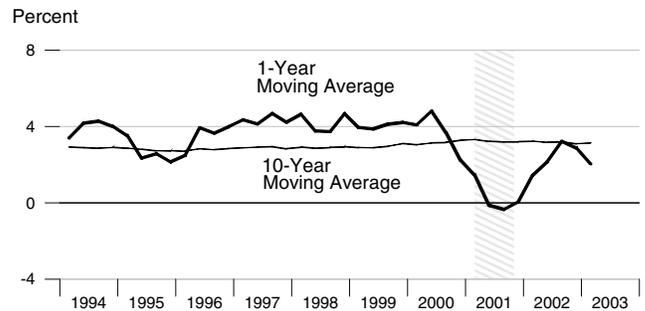
*Modified for the effects of sweeps programs on reserve demand. Calculated base growth is based on McCallum's rule. Actual base growth is percent change from year ago. See notes on page 19.

Components of McCallum's Rule

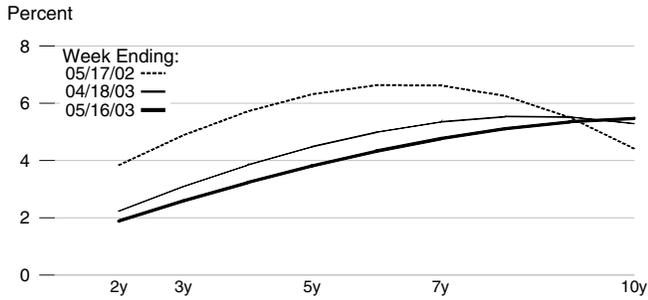
Monetary Base Velocity Growth



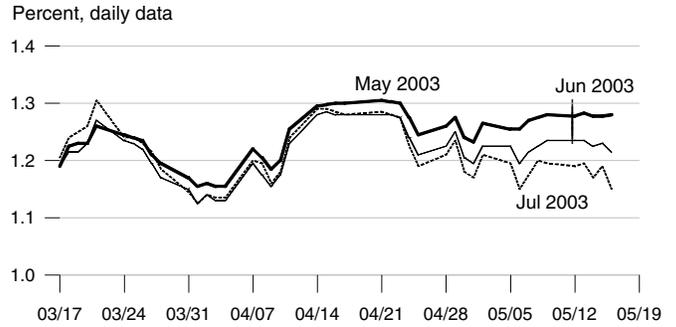
Real Output Growth



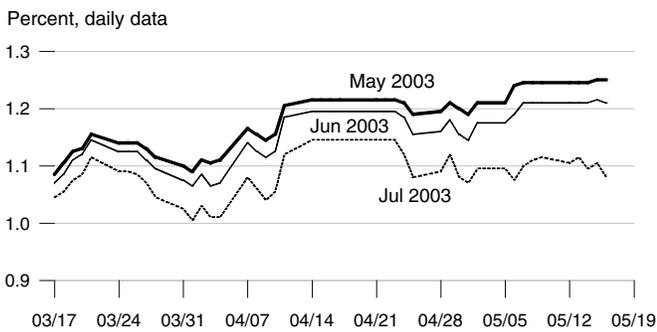
Implied One-Year Forward Rates



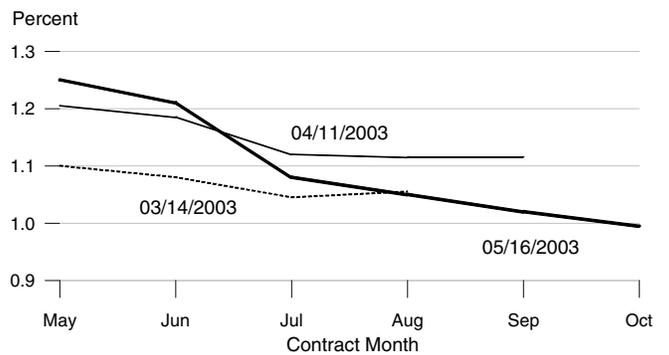
Rates on 3-Month Eurodollar Futures



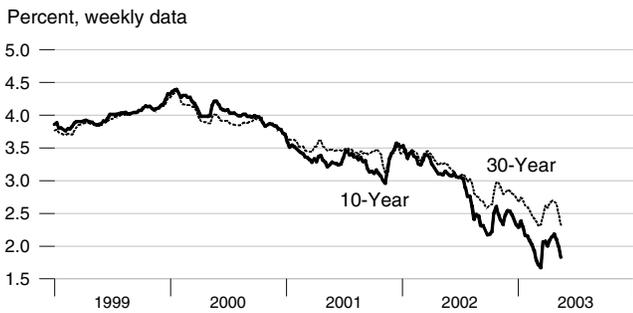
Rates on Selected Federal Funds Futures Contracts



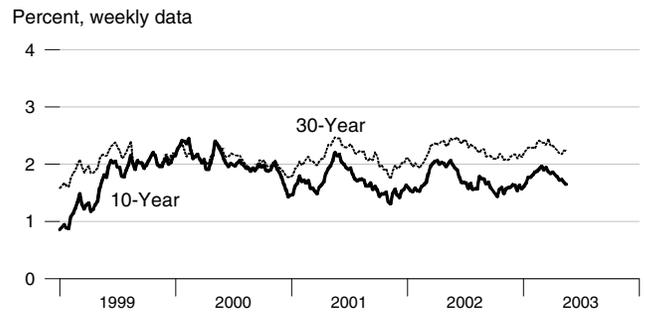
Rates on Federal Funds Futures on Selected Dates



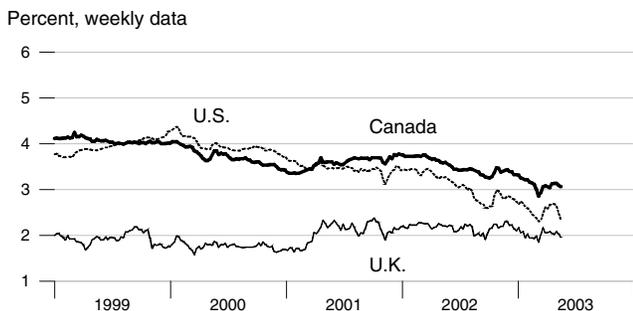
Inflation-Indexed Treasury Bonds



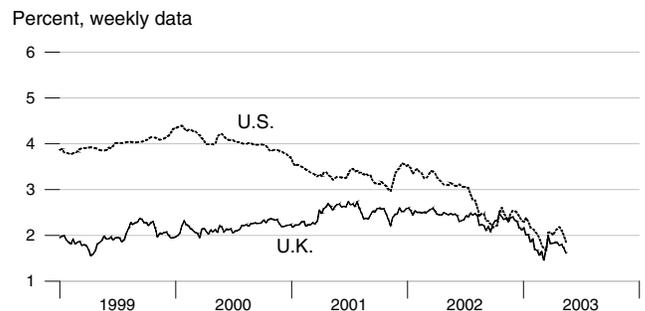
Inflation-Indexed Treasury Yield Spreads



Inflation-Indexed 30-Year Government Bonds

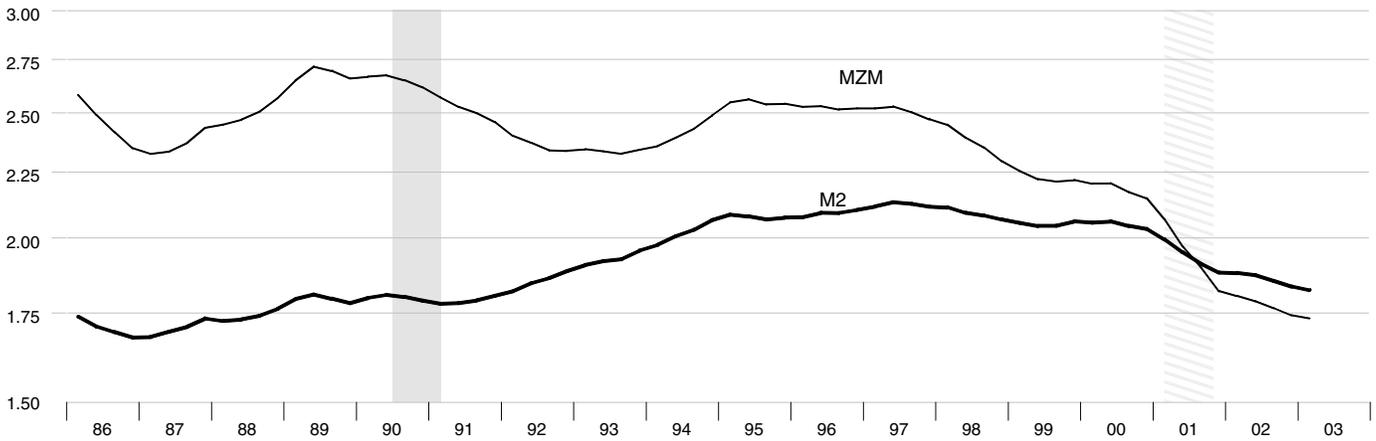


Inflation-Indexed 10-Year Government Bonds



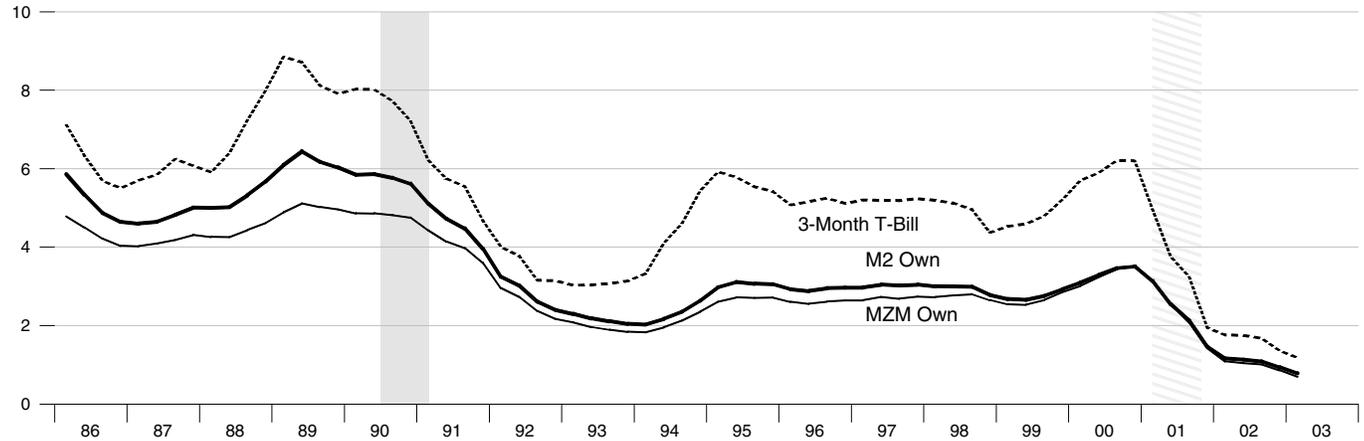
Velocity

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



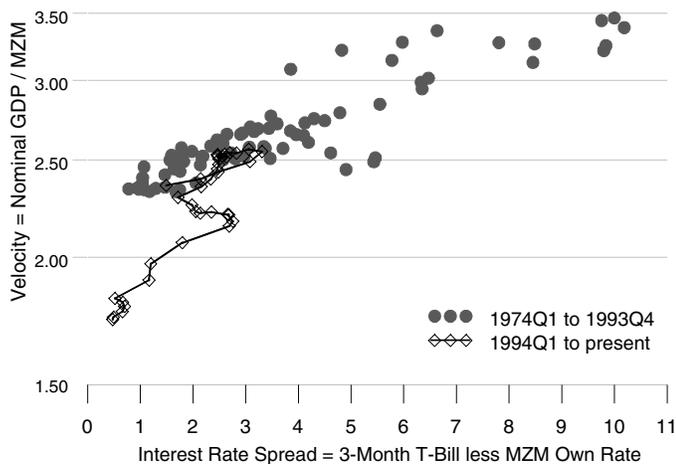
Interest Rates

Percent



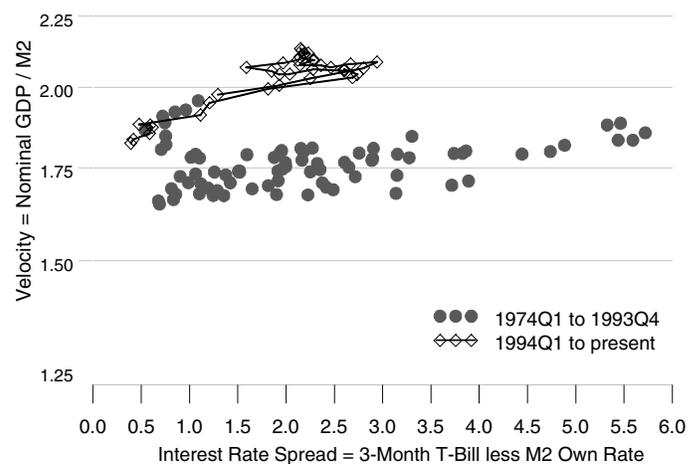
MZM Velocity and Interest Rate Spread

Ratio Scale



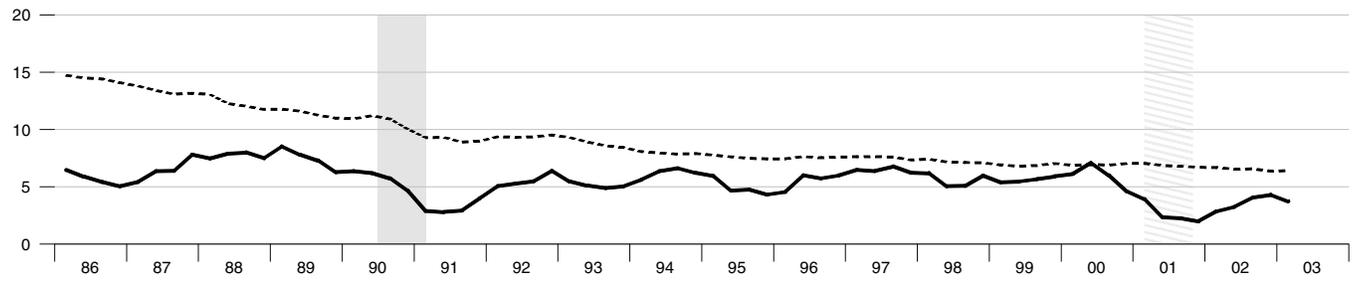
M2 Velocity and Interest Rate Spread

Ratio Scale



Gross Domestic Product

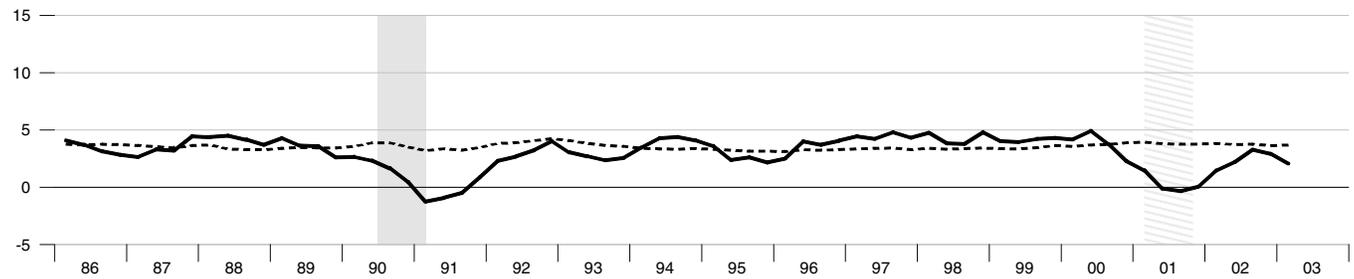
Percent change from year ago



Dashed lines indicate 10-year moving averages.

Real Gross Domestic Product

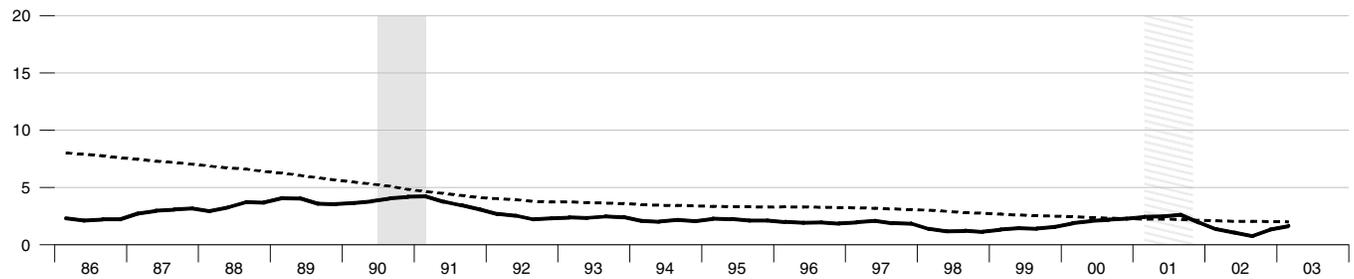
Percent change from year ago



Dashed lines indicate 10-year moving averages.

Gross Domestic Product Price Index

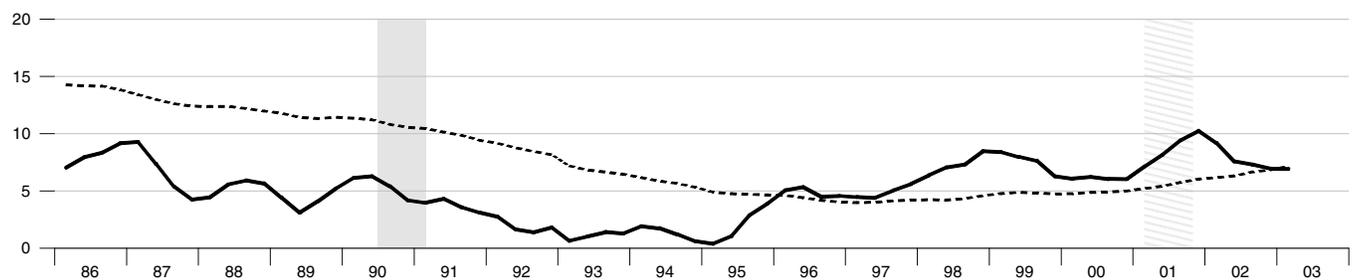
Percent change from year ago



Dashed lines indicate 10-year moving averages.

M2

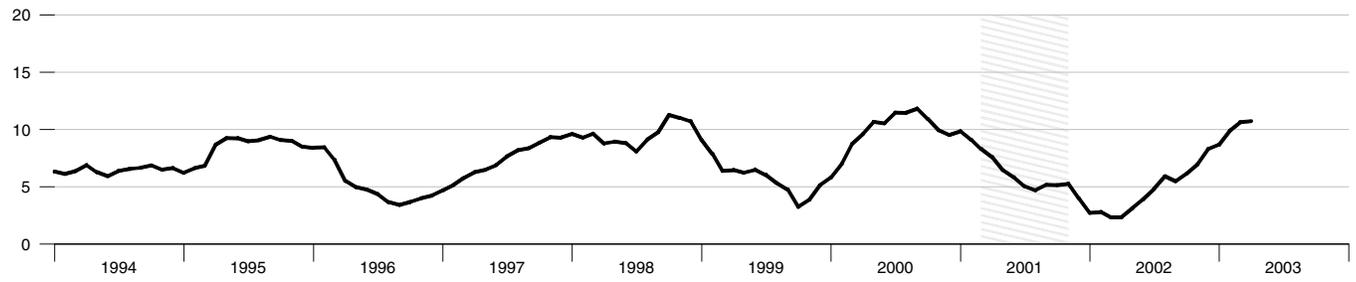
Percent change from year ago



Dashed lines indicate 10-year moving averages.

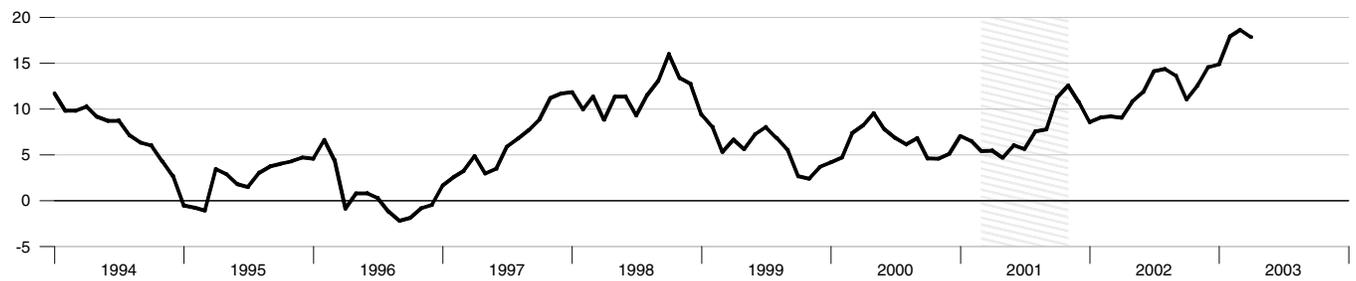
Bank Credit

Percent change from year ago



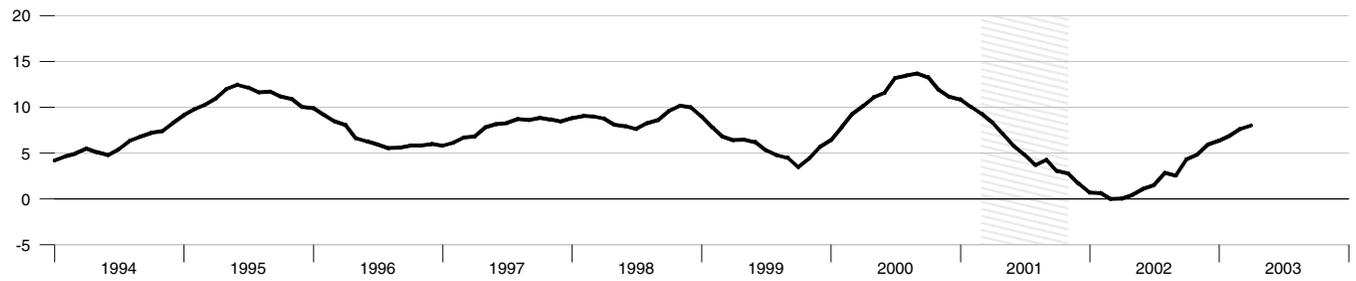
Investment Securities in Bank Credit at Commercial Banks

Percent change from year ago



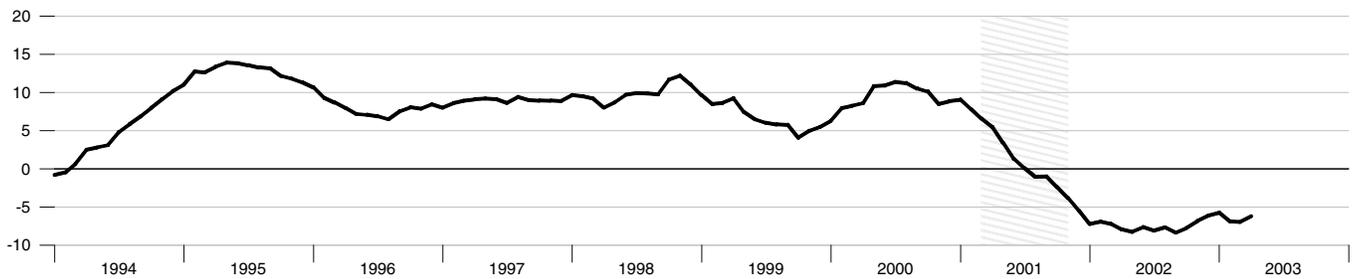
Total Loans and Leases in Bank Credit at Commercial Banks

Percent change from year ago

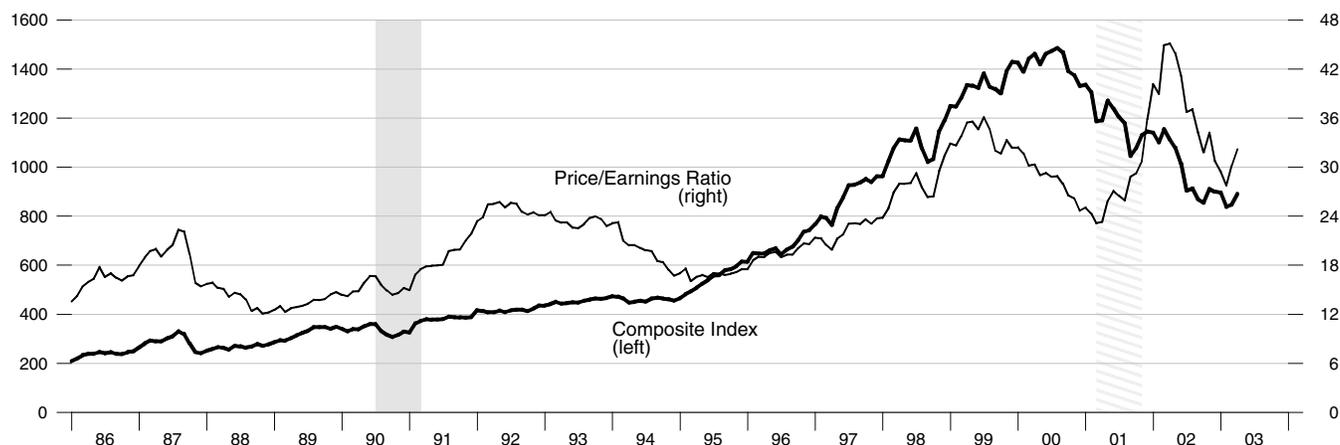


Commercial and Industrial Loans at Commercial Banks

Percent change from year ago



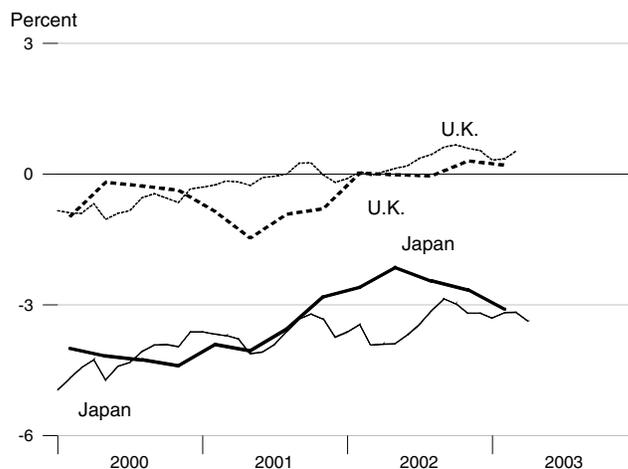
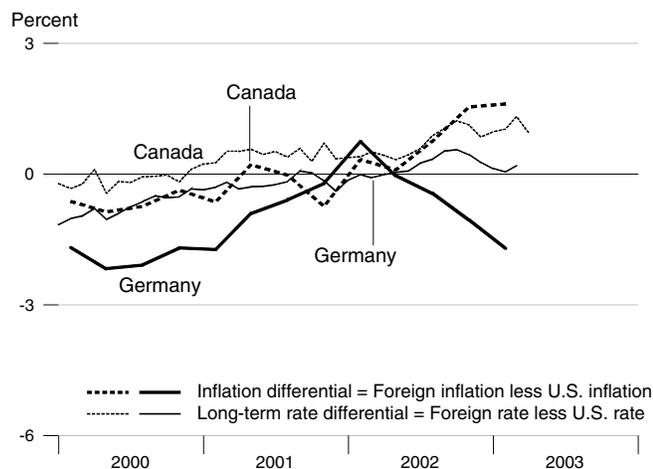
Standard & Poor's 500



Recent Inflation and Long-Term Interest Rates

	Consumer Price Inflation Rates				Long-Term Government Bond Rates			
	Percent change from year ago				Percent			
	2002Q2	2002Q3	2002Q4	2003Q1	Jan03	Feb03	Mar03	Apr03
United States	1.24	1.58	2.25	2.87	4.05	3.90	3.81	3.96
Canada	1.33	2.33	3.79	4.47	5.02	4.93	5.13	4.90
France	1.63	1.75	2.14	2.38	4.41	4.33	4.55	.
Germany	1.20	1.14	1.20	1.17	4.18	3.95	4.00	.
Italy	2.27	2.41	2.77	2.72	4.38	4.16	4.18	4.31
Japan	-0.90	-0.87	-0.40	-0.23	0.75	0.72	0.64	0.59
United Kingdom	1.23	1.53	2.56	3.07	4.37	4.25	4.33	.

Inflation and Long-Term Interest Rate Differentials



		Money Stock				Bank	Adjusted		
		M1	MZM	M2	M3	Credit	Monetary Base	Reserves	MSI M2
1998		1080.016	3707.676	4206.459	5747.977	4333.248	508.942	67.808	241.499
1999		1101.888	4167.305	4523.633	6248.602	4587.556	557.865	72.360	257.790
2000		1104.045	4504.688	4798.744	6835.799	5037.235	590.821	68.319	272.405
2001		1137.041	5214.991	5218.119	7614.441	5355.780	623.788	68.983	296.067
2002		1191.279	5890.666	5620.554	8224.412	5601.843	678.865	70.129	319.093
<hr/>									
2001	1	1100.484	4851.627	5028.958	7270.803	5282.584	604.848	66.577	285.133
	2	1116.478	5103.197	5156.375	7538.275	5323.925	610.939	65.235	292.627
	3	1163.269	5323.070	5287.777	7718.573	5373.430	633.771	73.522	300.320
	4	1167.931	5582.071	5399.365	7930.112	5443.181	645.595	70.596	306.187
2002	1	1184.655	5719.453	5490.160	8044.869	5421.276	663.335	70.297	311.380
	2	1182.774	5810.252	5545.958	8127.812	5490.827	674.121	69.186	315.070
	3	1192.044	5953.939	5672.616	8283.599	5663.883	684.786	69.477	321.947
	4	1205.644	6079.022	5773.484	8441.369	5831.387	693.218	71.557	327.973
2003	1	1227.069	6174.374	5869.873	8561.871	5949.234	709.396	73.063	334.013
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2001	Apr	1106.282	5023.156	5125.029	7456.386	5317.004	605.800	63.239	290.700
	May	1117.017	5096.859	5149.815	7535.539	5326.230	613.259	67.119	292.380
	Jun	1126.135	5189.575	5194.282	7622.899	5328.540	613.759	65.346	294.800
	Jul	1138.346	5243.358	5228.639	7660.362	5333.730	619.440	66.654	296.830
	Aug	1149.702	5277.079	5262.000	7669.345	5355.717	627.455	66.379	299.080
	Sep	1201.758	5448.773	5372.691	7826.012	5430.844	654.419	87.534	305.050
	Oct	1164.475	5507.546	5358.520	7860.421	5426.103	644.250	72.956	304.050
	Nov	1165.870	5581.293	5398.998	7934.569	5458.293	644.417	69.378	306.220
	Dec	1173.448	5657.374	5440.578	7995.347	5445.147	648.117	69.455	308.290
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2002	Jan	1179.706	5678.119	5464.352	8006.534	5418.916	655.869	70.666	309.800
	Feb	1186.123	5732.647	5502.677	8057.823	5426.384	667.217	71.245	312.010
	Mar	1188.136	5747.592	5503.450	8070.251	5418.528	666.918	68.980	312.330
	Apr	1173.682	5747.375	5491.486	8073.064	5442.539	667.691	68.480	312.260
	May	1184.393	5818.670	5557.324	8137.026	5492.631	676.061	70.546	315.590
	Jun	1190.248	5864.711	5589.065	8173.347	5537.311	678.610	68.531	317.360
	Jul	1197.364	5915.230	5637.898	8222.881	5590.027	682.348	68.943	319.780
	Aug	1186.289	5959.936	5676.871	8292.697	5672.347	684.570	69.021	322.140
	Sep	1192.479	5986.650	5703.079	8335.220	5729.275	687.439	70.468	323.920
	Oct	1203.617	5991.172	5742.422	8342.273	5759.430	690.454	70.817	326.180
	Nov	1202.763	6100.193	5781.383	8462.290	5838.182	693.675	71.461	328.380
	Dec	1210.553	6145.702	5796.646	8519.543	5896.549	695.526	72.392	329.360
<hr/>									
2003	Jan	1212.654	6144.671	5827.356	8517.529	5889.423	701.446	73.007	331.510
	Feb	1232.642	6185.920	5883.525	8572.814	5964.145	713.733	74.057	334.770
	Mar	1235.911	6192.532	5898.739	8595.270	5994.135	713.008	72.126	335.760
	Apr	1236.119	6199.596	5921.166	8600.303	6026.182	713.721	71.855	337.590

*All values are given in billions of dollars.

		Federal	Discount	Primary	Prime	3-mo	Treasury Yields			Corporate	S & L	Conventional
		Funds	Rate	Credit Rate	Rate		CDs	3-mo	3-yr	10-yr	Aaa Bonds	
1998		5.35	4.92		8.35	5.47	4.91	5.14	5.26	6.53	4.93	6.94
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	4.99	6.97
2002		1.67	1.17		4.68	1.73	1.63	3.10	4.61	6.49	4.87	6.54
2001	1	5.59	5.11		8.62	5.26	4.95	4.64	5.05	7.08	5.03	7.01
	2	4.33	3.83		7.34	4.10	3.75	4.43	5.27	7.22	5.11	7.13
	3	3.50	3.06		6.57	3.34	3.24	3.93	4.98	7.11	4.87	6.97
	4	2.13	1.64		5.16	2.06	1.94	3.33	4.77	6.92	4.97	6.78
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
2001	Apr	4.80	4.28		7.80	4.53	3.97	4.42	5.14	7.20	5.14	7.08
	May	4.21	3.73		7.24	4.02	3.70	4.51	5.39	7.29	5.15	7.15
	Jun	3.97	3.47		6.98	3.74	3.57	4.35	5.28	7.18	5.03	7.16
	Jul	3.77	3.25		6.75	3.66	3.59	4.31	5.24	7.13	4.79	7.13
	Aug	3.65	3.16		6.67	3.48	3.44	4.04	4.97	7.02	4.89	6.95
	Sep	3.07	2.77		6.28	2.87	2.69	3.45	4.73	7.17	4.93	6.82
	Oct	2.49	2.02		5.53	2.31	2.20	3.14	4.57	7.03	4.89	6.62
	Nov	2.09	1.58		5.10	2.03	1.91	3.22	4.65	6.97	4.85	6.66
	Dec	1.82	1.33		4.84	1.83	1.72	3.62	5.09	6.77	5.18	7.07
2002	Jan	1.73	1.25		4.75	1.74	1.68	3.56	5.04	6.55	5.05	7.00
	Feb	1.74	1.25		4.75	1.82	1.76	3.55	4.91	6.51	4.93	6.89
	Mar	1.73	1.25		4.75	1.91	1.83	4.14	5.28	6.81	5.09	7.01
	Apr	1.75	1.25		4.75	1.87	1.75	4.01	5.21	6.76	5.09	6.99
	May	1.75	1.25		4.75	1.82	1.76	3.80	5.16	6.75	5.03	6.81
	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

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

		M1	MZM	M2	M3	
Percent change at an annual rate						
1998		1.00	11.67	7.30	10.36	
1999		2.03	12.40	7.54	8.71	
2000		0.20	8.10	6.08	9.40	
2001		2.99	15.77	8.74	11.39	
2002		4.77	12.96	7.71	8.01	
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2001	1	2.66	18.59	10.64	13.23	
	2	5.81	20.74	10.13	14.71	
	3	16.76	17.23	10.19	9.57	
	4	1.60	19.46	8.44	10.96	
2002	1	5.73	9.84	6.73	5.79	
	2	-0.64	6.35	4.07	4.12	
	3	3.13	9.89	9.14	7.67	
	4	4.56	8.40	7.11	7.62	
2003	1	7.11	6.27	6.68	5.71	
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2001	Apr	-1.82	19.55	10.81	19.07	
	May	11.64	17.61	5.80	12.74	
	Jun	9.80	21.83	10.36	13.91	
	Jul	13.01	12.44	7.94	5.90	
	Aug	11.97	7.72	7.66	1.41	
	Sep	54.33	39.04	25.24	24.51	
	Oct	-37.23	12.94	-3.17	5.28	
	Nov	1.44	16.07	9.06	11.32	
	Dec	7.80	16.36	9.24	9.19	
	2002	Jan	6.40	4.40	5.24	1.68
		Feb	6.53	11.52	8.42	7.69
		Mar	2.04	3.13	0.17	1.85
Apr		-14.60	-0.05	-2.61	0.42	
May		10.95	14.89	14.39	9.51	
Jun		5.93	9.50	6.85	5.36	
Jul		7.17	10.34	10.48	7.27	
Aug		-11.10	9.07	8.30	10.19	
Sep		6.26	5.38	5.54	6.15	
Oct		11.21	0.91	8.28	1.02	
Nov		-0.85	21.84	8.14	17.26	
Dec		7.77	8.95	3.17	8.12	
2003	Jan	2.08	-0.20	6.36	-0.28	
	Feb	19.78	8.06	11.57	7.79	
	Mar	3.18	1.28	3.10	3.14	
	Apr	0.20	1.37	4.56	0.70	

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 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).

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 research.stlouisfed.org/aggreg/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 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 *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 research.stlouisfed.org/aggreg/swdata.html. For analytical purposes,

MZM largely replaces M1. The **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 Department 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/fred/data/wkly.html. See also *Federal Reserve Bulletin*, table 1.35. The 30-year constant maturity series was discontinued by the Treasury Department 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 *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

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

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 research.stlouisfed.org/aggregreg/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 $m = 1, \dots, 10$ 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** each 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 Bonds** are yields on the most recently issued inflation-indexed securities of 10- and 30-year original maturities. **Inflation-Indexed Treasury Yield Spreads** equal, for 10- and 30-year maturities, the difference between the yields on the most recently issued inflation-indexed securities and the unadjusted bond yields of similar maturity. **Inflation-Indexed 30-Year Government Bonds** shows the yield of an inflation-indexed bond that is scheduled to mature in approximately (but not greater than) 30 years. The current bond for Canada has a maturity date of 12/01/2031, the current U.K. bond has a maturity date of 7/22/2030, and the current U.S. bond has a maturity date of 4/15/2032. **Inflation-Indexed 10-Year Government Bonds** shows the yield of an inflation-indexed bond that is scheduled to mature in approximately (but not greater than) 10 years. The current U.K. bond has a maturity date of 8/23/2011 and the current U.S. bond has a maturity date of 7/15/2012.

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 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.

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

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: 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 & Poors Inc.

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. inflation-protected security yields.

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- Note:** Articles from this Bank's *Review* are available on the Internet at research.stlouisfed.org/publications/review/.