

## Monetary Policy in Jobless Recoveries

The relatively slow pace of economic growth during the current recovery—particularly the sluggish performance of labor markets—has inspired numerous comparisons to the “jobless” recovery that followed the 1990-91 recession. While there are some striking similarities between the two episodes, each recession is unique and one should not carry comparisons too far. Nevertheless, it is interesting to consider similarities and differences in the responses of monetary policy during the two recoveries.

Based on the official dating by the National Bureau of Economic Research, both the 1990-91 and 2001 recessions lasted for eight months. Both recessions were relatively mild compared with previous economic downturns, and both were followed by recoveries that did not display the typical rapid bounce-back in growth and employment. Following the business cycle trough of March 1991, cumulative growth in private nonfarm payroll employment remained negative for 18 months. Similarly, cumulative employment growth during the 21 months since the November 2001 turning point has also been negative.

By at least one measure, the stance of monetary policy during these recession/recovery periods has been similar as well. The chart shows a measure of the “real” federal funds rate—the spread between the federal funds rate target established by the Federal Open Market Committee (FOMC) and the inflation rate, measured here as the previous 12-month change in the core personal consumption expenditures (PCE) deflator. This measure shows that the FOMC progressively eased policy during both recessions. In the periods following these recessions, the real federal funds rate ultimately declined to below zero and remained near zero for several months.

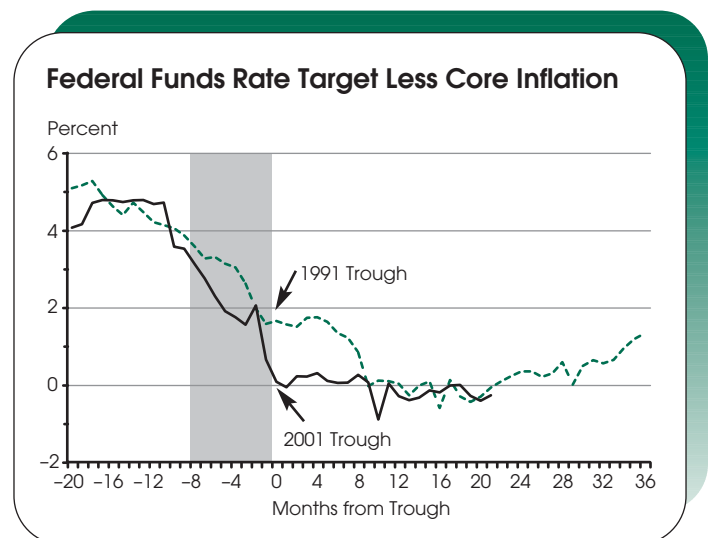
The chart also shows an important difference in the real funds rate behavior: During the most recent recession, the FOMC lowered the federal funds rate target more rapidly than it did in the previous recession. Between July 1990 and March 1991 the funds rate target was reduced eight times for a cumulative total of 225 basis points. A series of further small rate cuts lowered the funds rate an

additional 2 percentage points by the end of 1991, bringing the real federal funds rate down to zero. Three more rate cuts followed in 1992, which maintained a real funds rate near zero as inflation declined.

During the more recent recession, the FOMC also reduced the funds rate target eight times, but in larger increments. Rate cuts in March through November 2001 reduced the target by 350 basis points, bringing the real funds rate close to zero by the trough of the recession. Additional rate cuts in December 2001, November 2002, and June 2003 reduced the funds rate another percentage point.

The timing and magnitude of policy changes during these two episodes are significant because monetary policy is thought to affect the economy with a lag. Ultimately, the sluggish recovery of the early 1990s gave way to the rapid expansion later in the decade, but it wasn't until February 1994—nearly three years after the trough of the recession—that the expansion had picked up noticeable momentum and the FOMC began raising the funds rate target. Despite the lackluster performance of job growth, the recovery from the 2001 recession has already begun showing signs of picking up momentum. Many factors contribute to ongoing macroeconomic developments, but the Fed's relatively rapid and forceful response to deteriorating economic conditions during the 2001 recession is one factor that might help make this jobless recovery shorter than the previous episode.

—Michael R. Pakko



Views expressed do not necessarily reflect official positions of the Federal Reserve System.

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

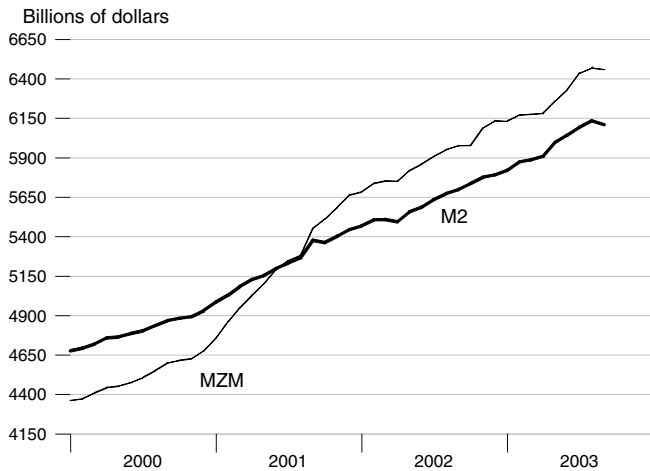
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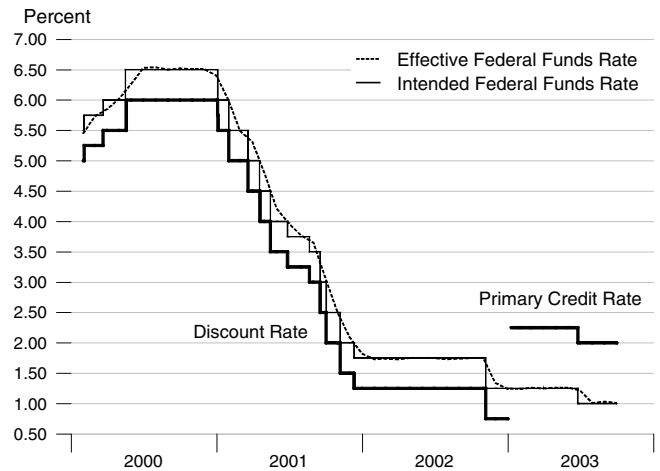
or to:

[stlsFRED@stls.frb.org](mailto:stlsFRED@stls.frb.org)

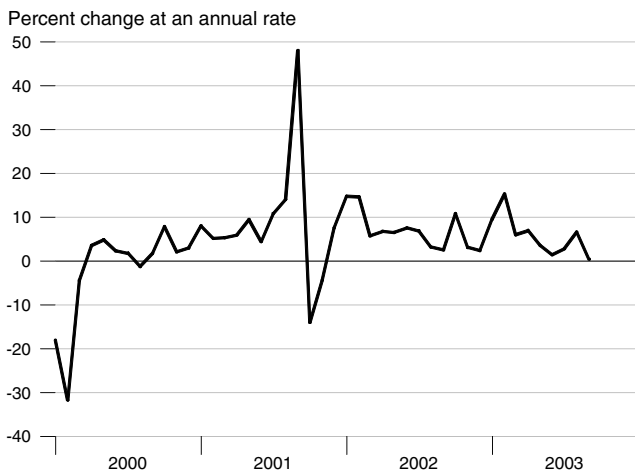
### M2 and MZM



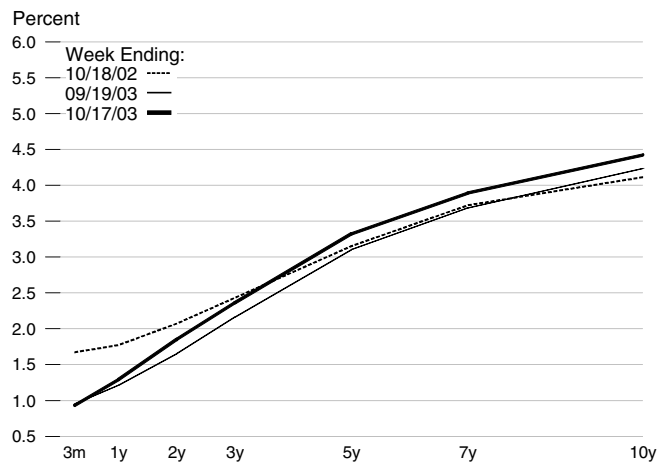
### Reserve Market Rates



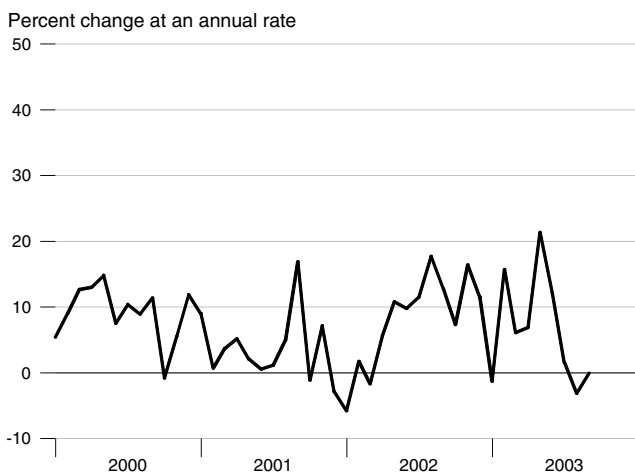
### Adjusted Monetary Base



### Treasury Yield Curve



### Total Bank Credit

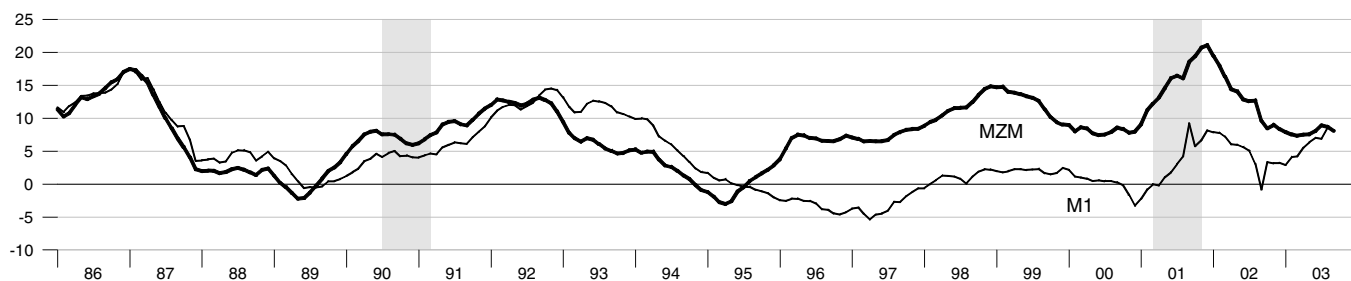


### Interest Rates

	Jul 03	Aug 03	Sep 03
Federal Funds Rate	1.01	1.03	1.01
Prime Rate	4.00	4.00	4.00
Primary Credit Rate	2.00	2.00	2.00
Conventional Mortgage Rate	5.63	6.26	6.15
<b>Treasury Yields:</b>			
3-Month Constant Maturity	0.92	0.97	0.96
6-Month Constant Maturity	0.97	1.05	1.03
1-Year Constant Maturity	1.12	1.31	1.24
3-Year Constant Maturity	1.93	2.44	2.23
5-Year Constant Maturity	2.87	3.37	3.18
10-Year Constant Maturity	3.98	4.45	4.27

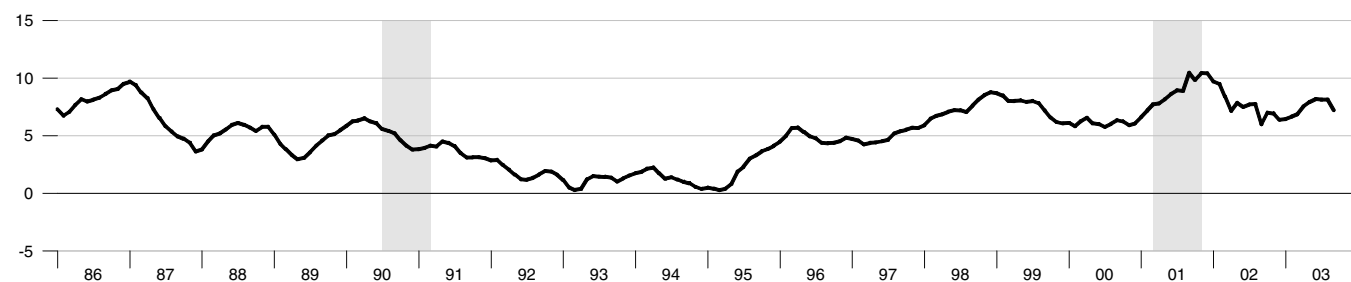
**MZM and M1**

Percent change from year ago



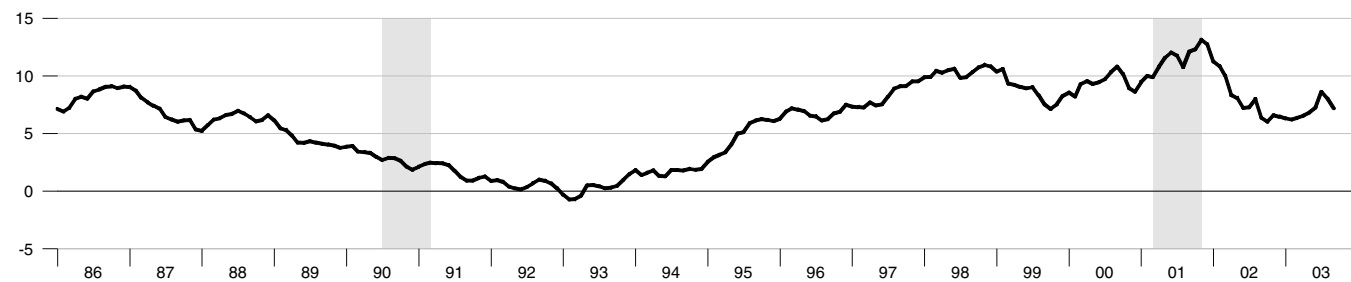
**M2**

Percent change from year ago



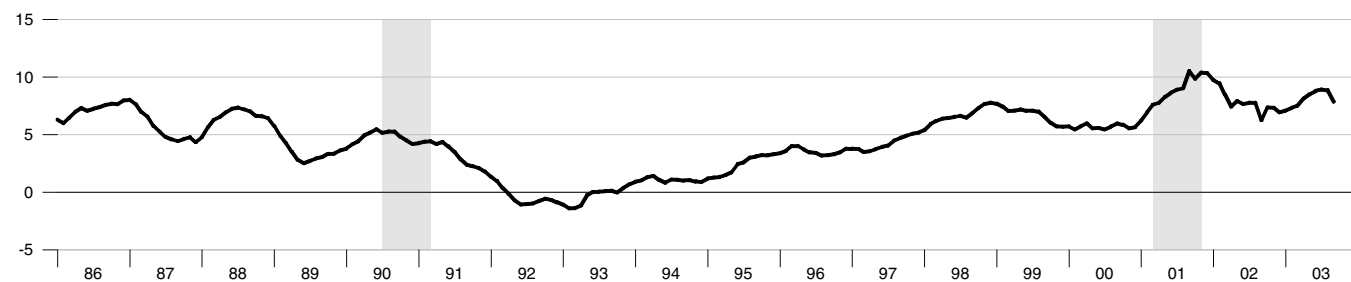
**M3**

Percent change from year ago



**Monetary Services Index - M2**

Percent change from year ago



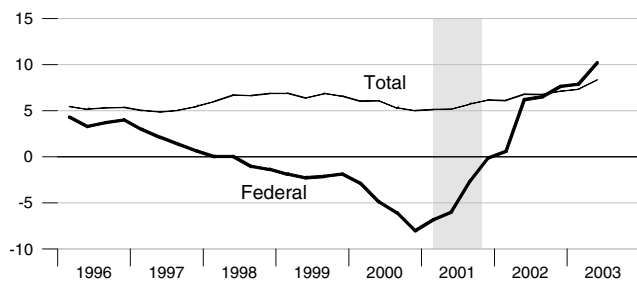
### Adjusted Monetary Base

Percent change from year ago



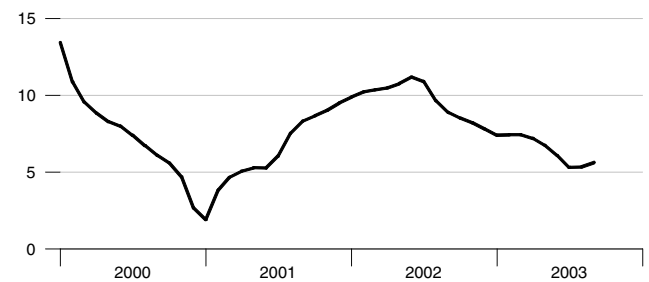
### Domestic Nonfinancial Debt

Percent change from year ago



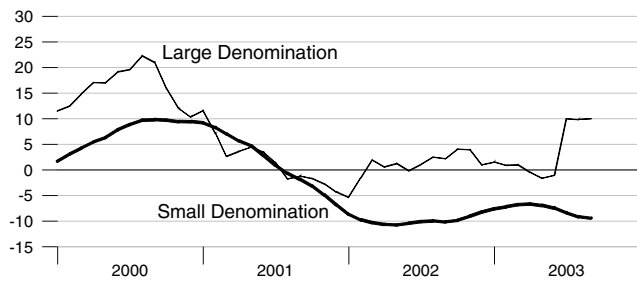
### Currency Held by the Nonbank Public

Percent change from year ago



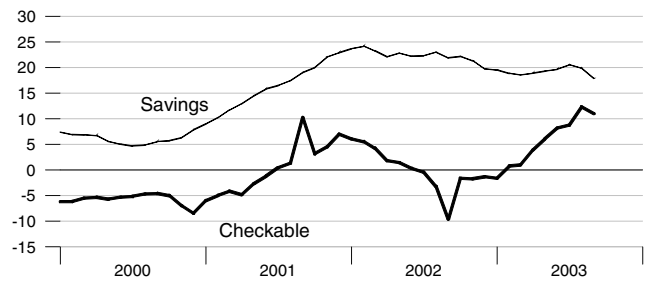
### Time Deposits

Percent change from year ago



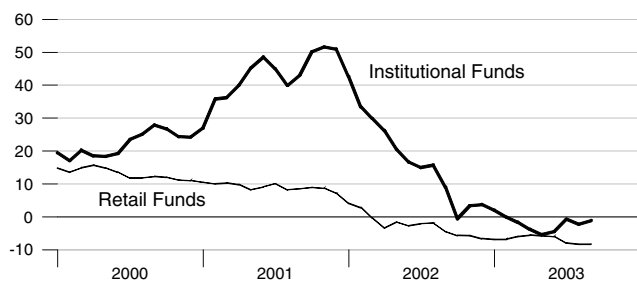
### Checkable and Savings Deposits

Percent change from year ago



### Money Market Mutual Fund Shares

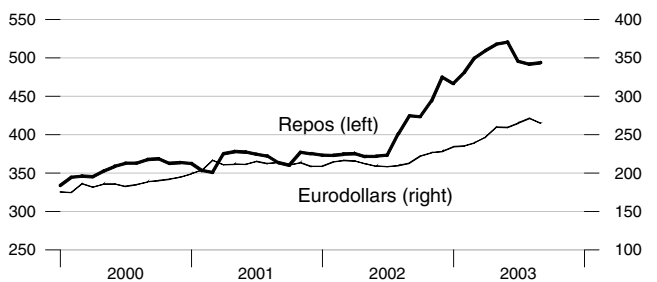
Percent change from year ago



### Repurchase Agreements and Eurodollars

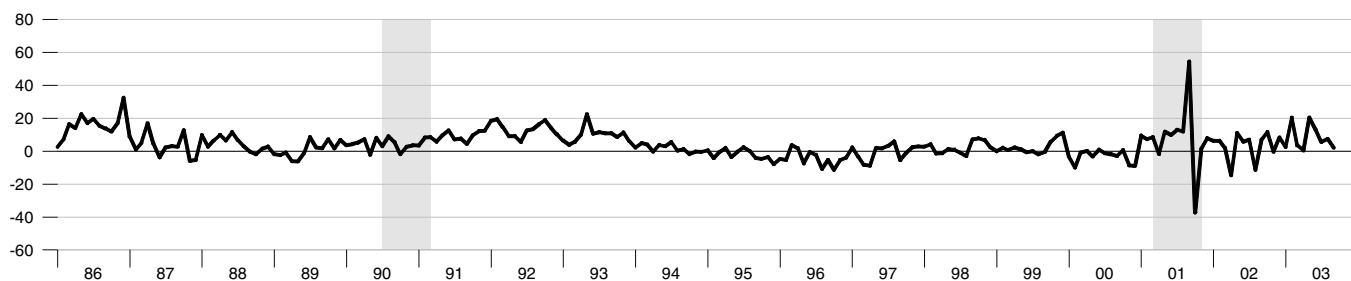
Billions of dollars

Billions of dollars



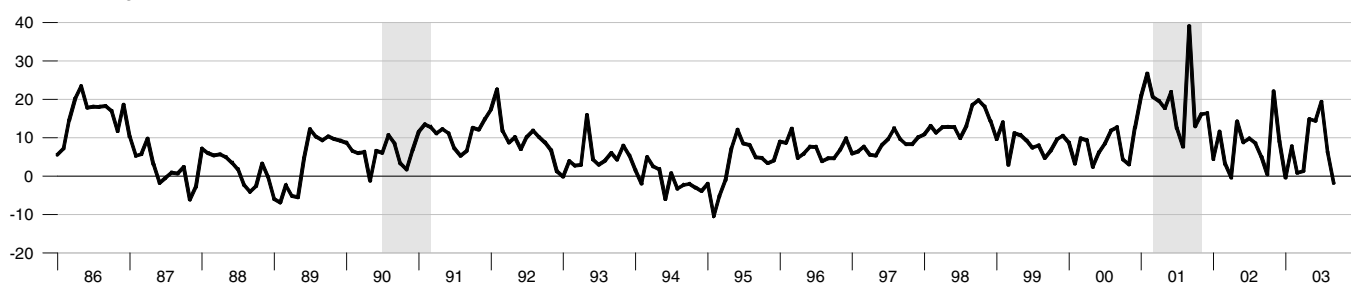
## M1

Percent change at an annual rate



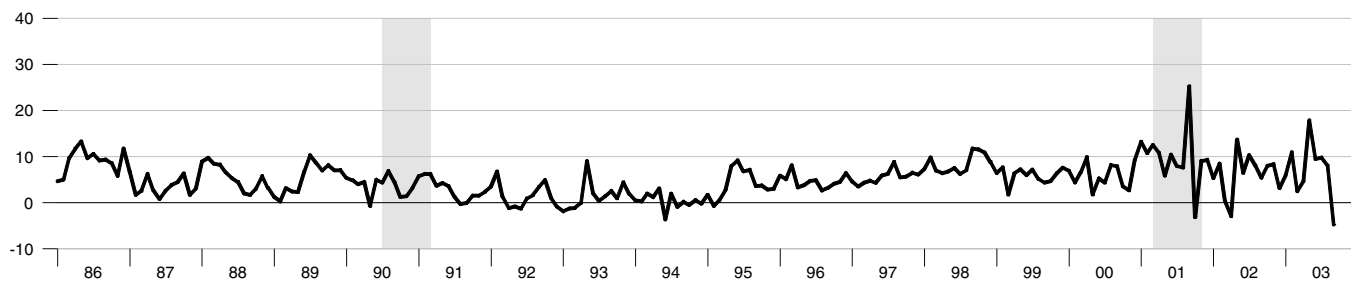
## MZM

Percent change at an annual rate



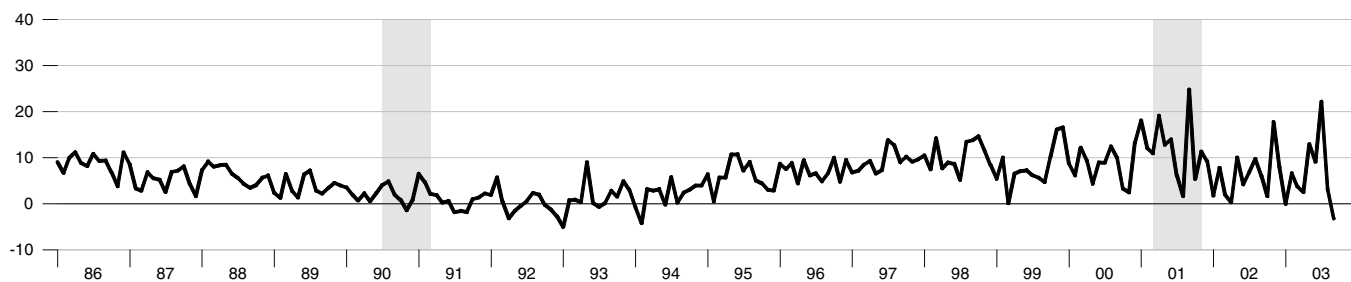
## M2

Percent change at an annual rate



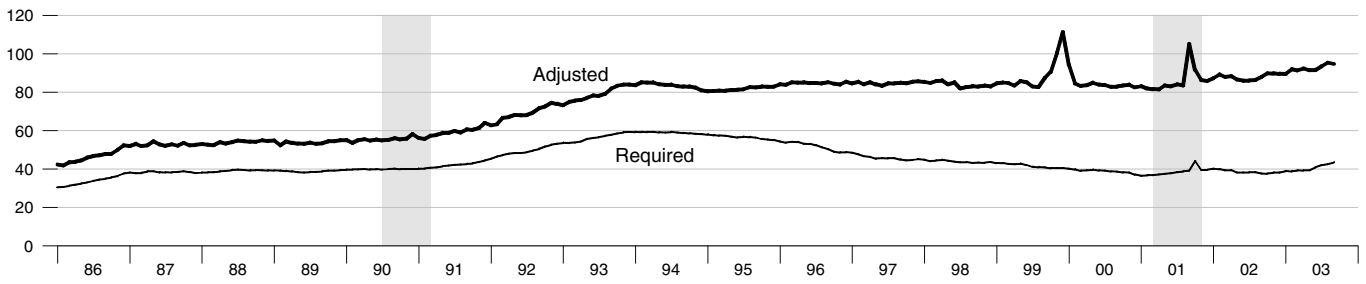
## M3

Percent change at an annual rate



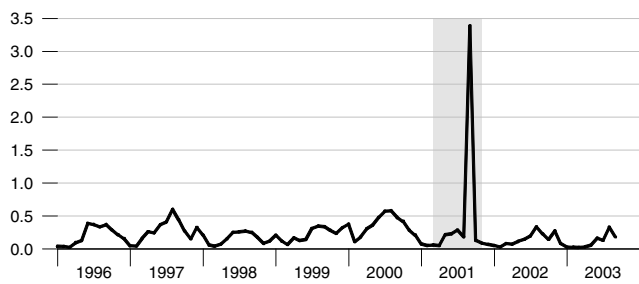
### Adjusted and Required Reserves

Billions of dollars



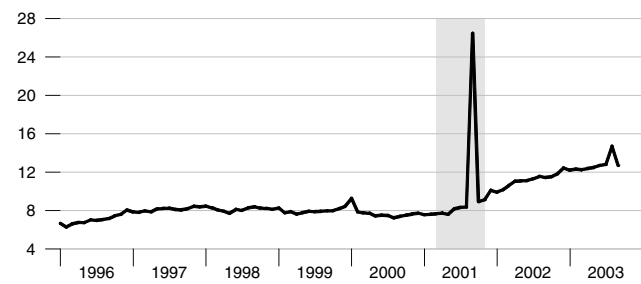
### Total Borrowings, nsa

Billions of dollars



### Excess Reserves plus RCB Contracts

Billions of dollars



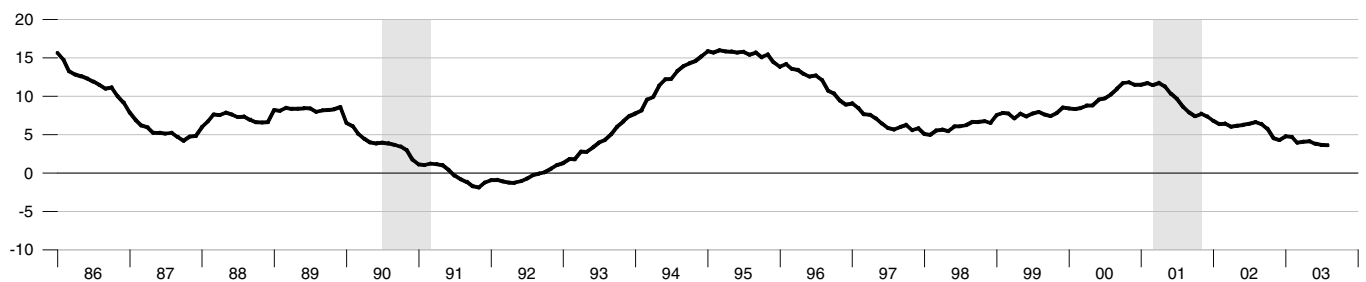
### Nonfinancial Commercial Paper

Percent change from year ago

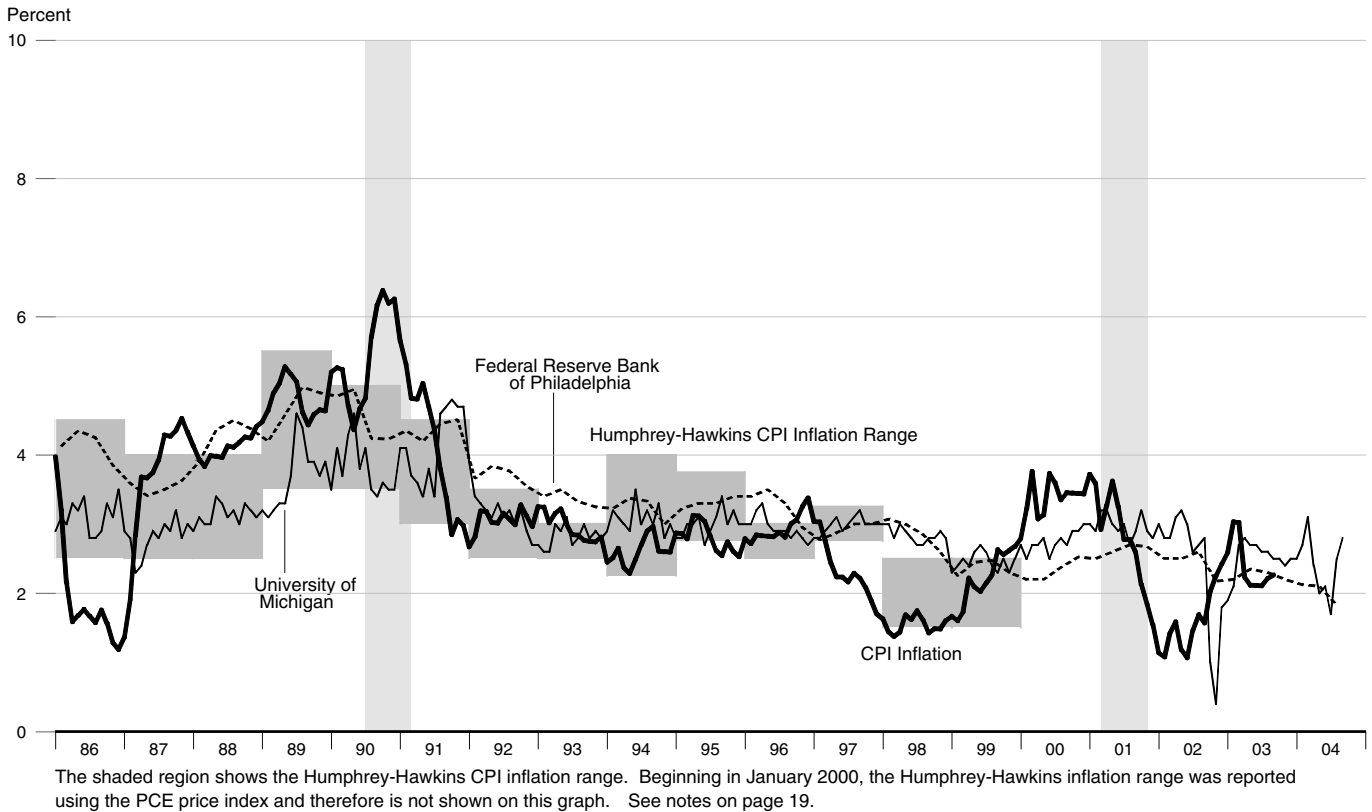


### Consumer Credit

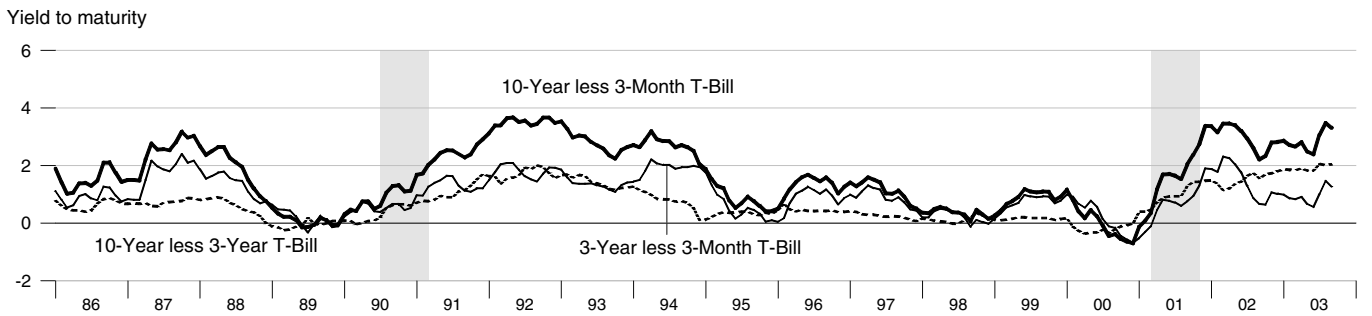
Percent change from year ago



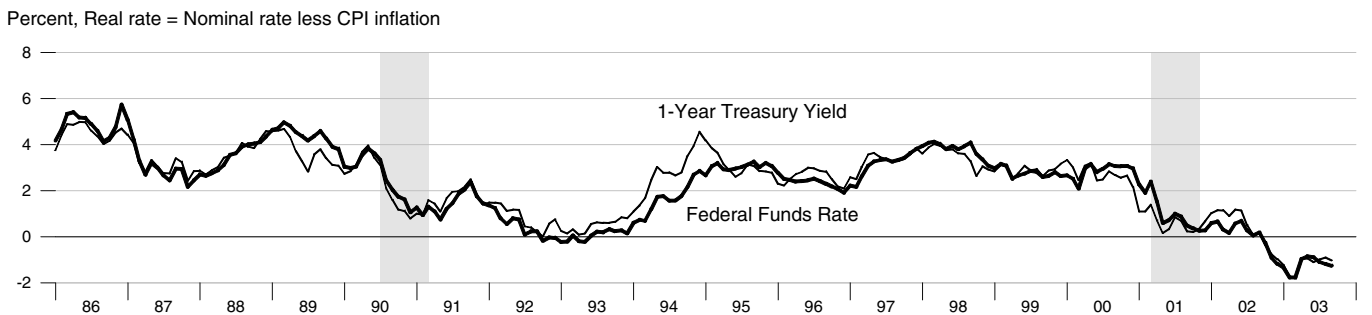
**Inflation and Inflation Expectations**



**Treasury Security Yield Spreads**

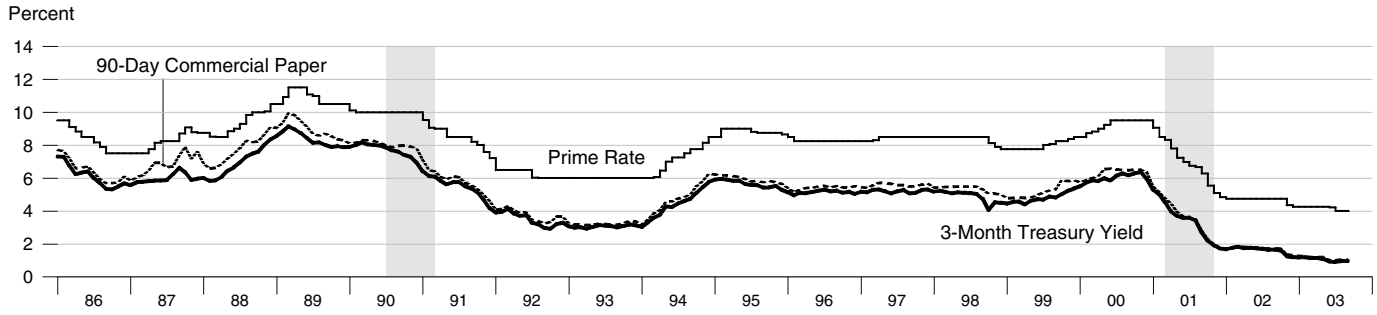


**Real Interest Rates**

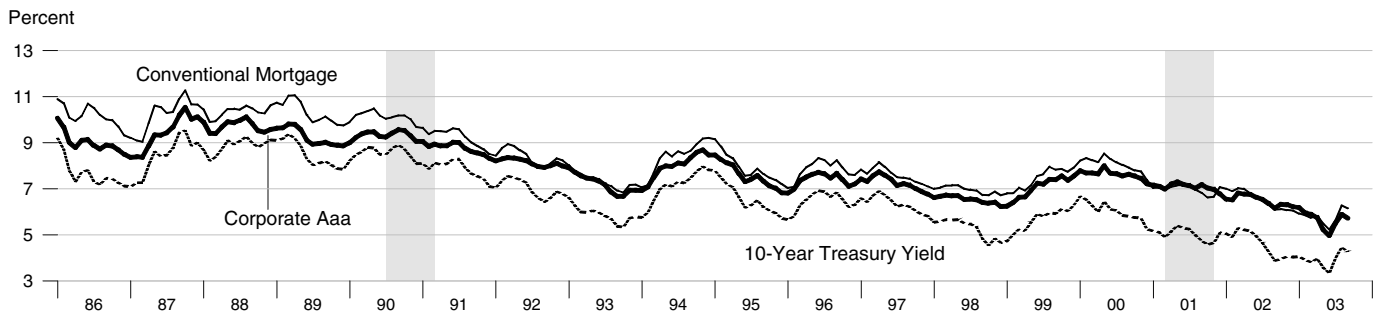




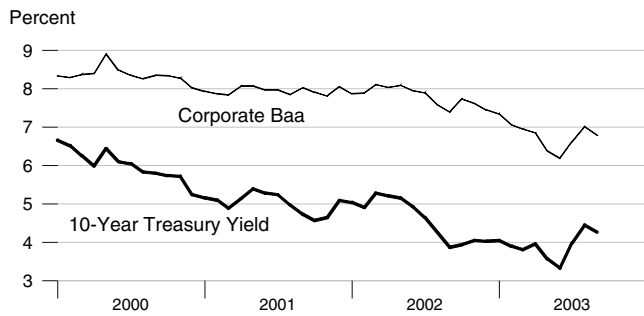
### Short-Term Interest Rates



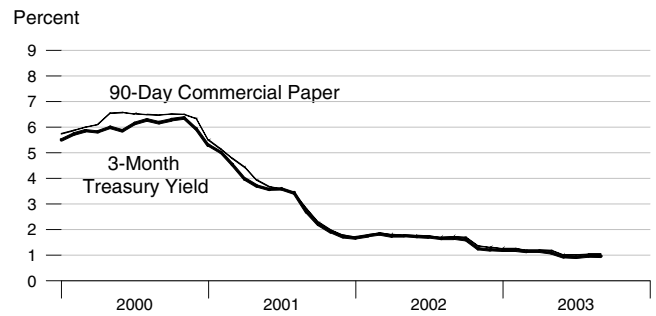
### Long-Term Interest Rates



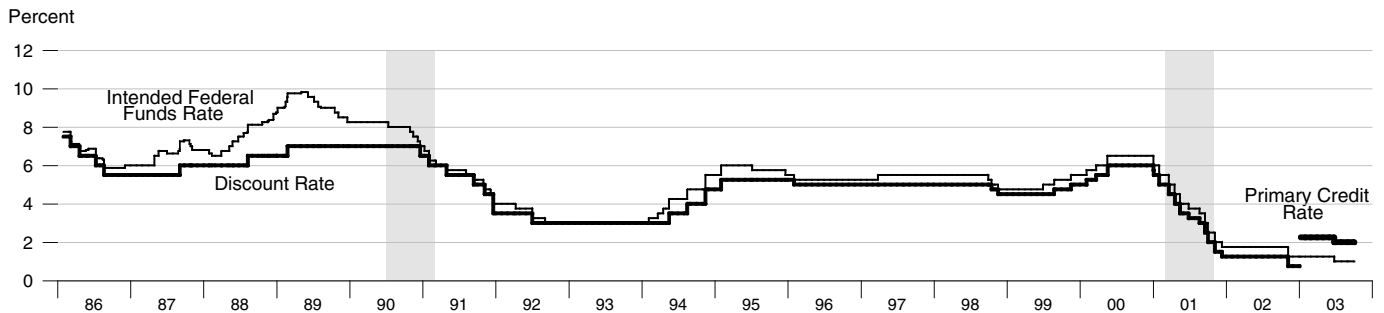
### Long-Term Interest Rates



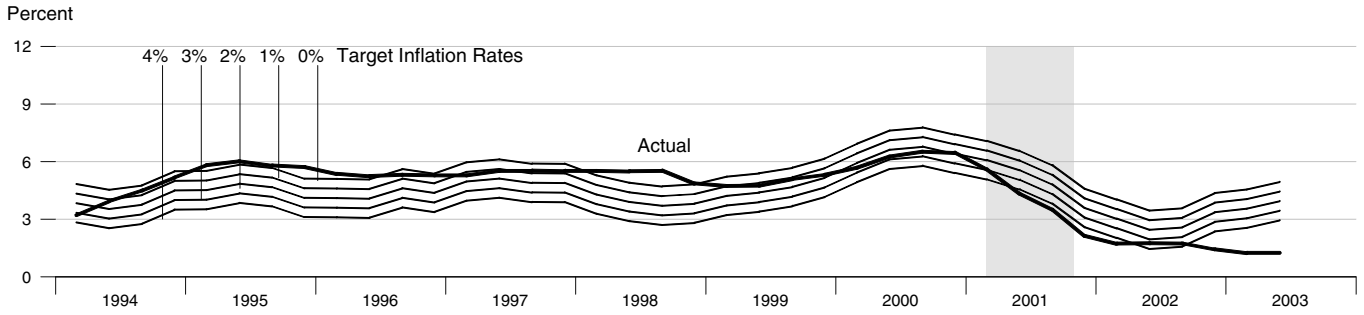
### Short-Term Interest Rates



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



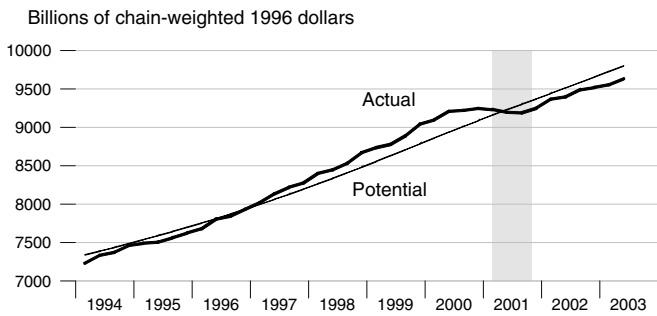
**Federal Funds Rate and Inflation Targets**



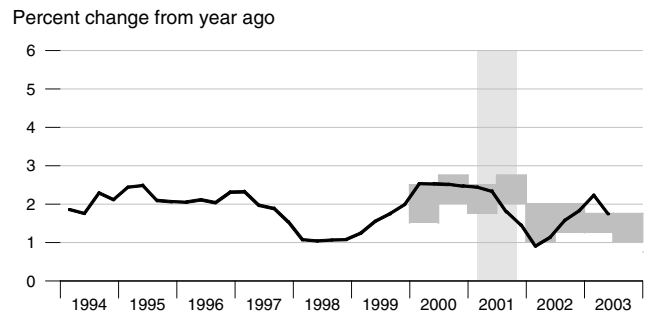
Calculated federal funds rate is based on Taylor's rule. See notes on page 19.

**Components of Taylor's Rule**

**Actual and Potential Real GDP**

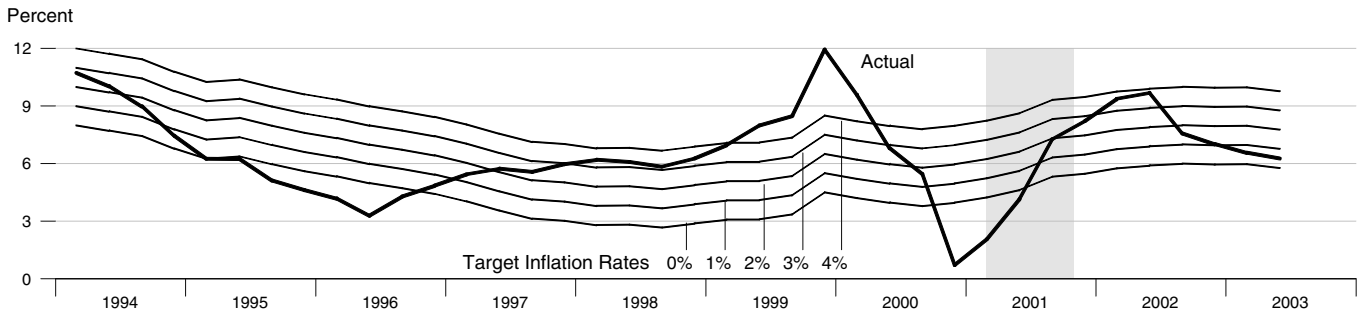


**PCE Inflation and Projections**



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

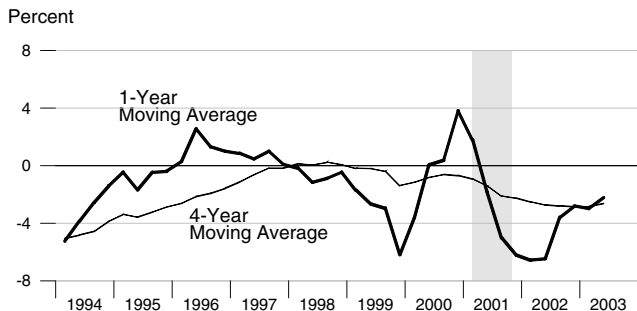
**Monetary Base Growth\* and Inflation Targets**



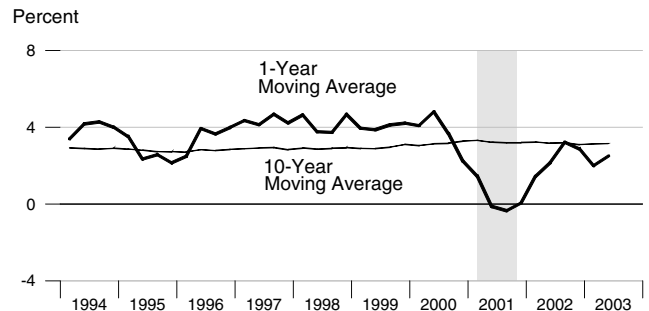
\*Modified for the effects of sweeps programs on reserve demand. Calculated base growth is based on McCallum's rule. Actual base growth is percent change from year ago. See notes on page 19.

**Components of McCallum's Rule**

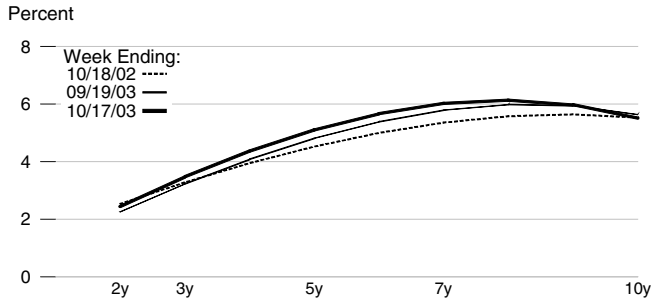
**Monetary Base Velocity Growth**



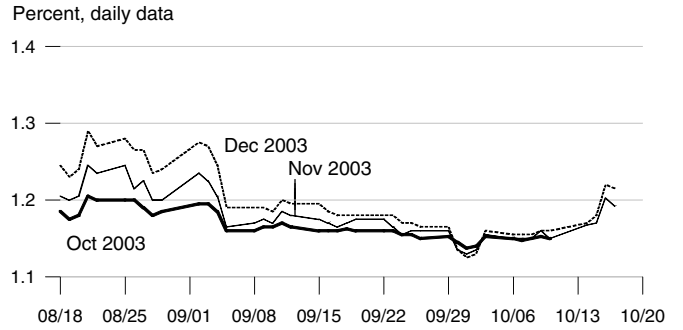
**Real Output Growth**



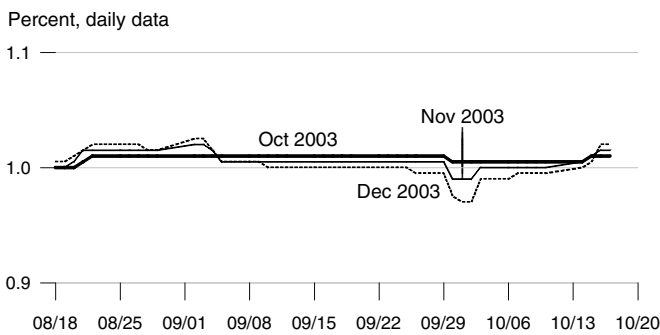
### Implied One-Year Forward Rates



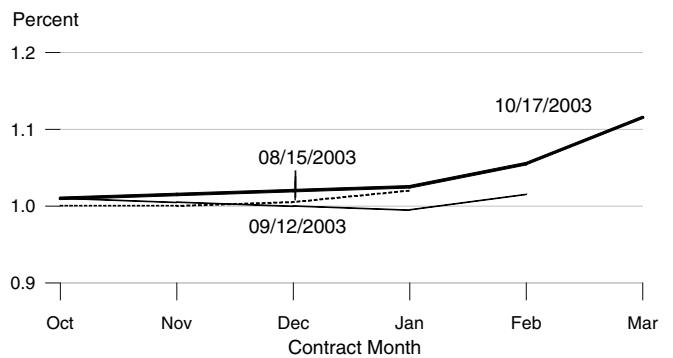
### Rates on 3-Month Eurodollar Futures



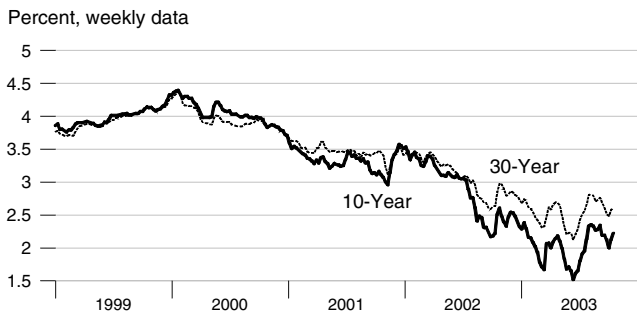
### Rates on Selected Federal Funds Futures Contracts



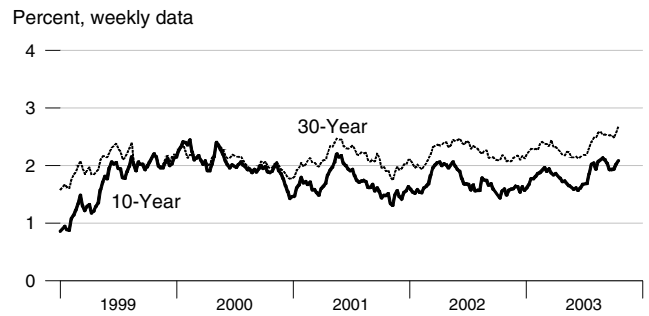
### Rates on Federal Funds Futures on Selected Dates



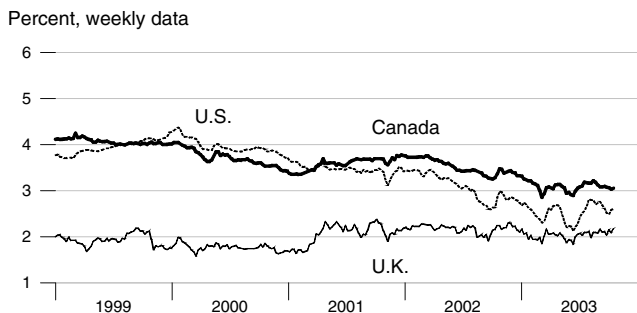
### Inflation-Indexed Treasury Bonds



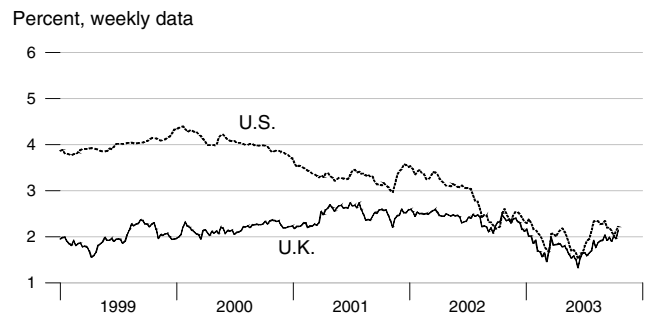
### Inflation-Indexed Treasury Yield Spreads



### Inflation-Indexed 30-Year Government Bonds

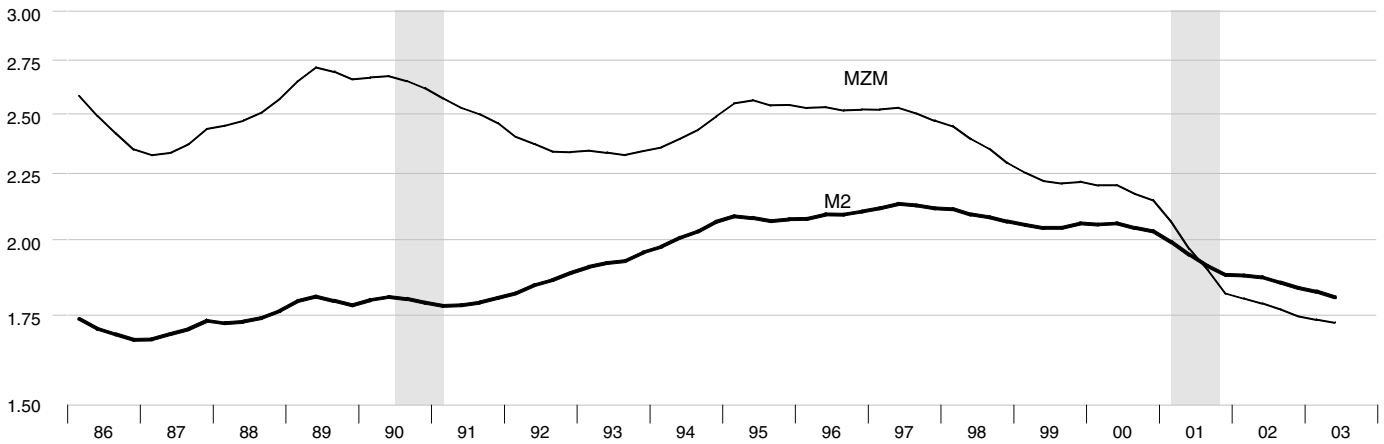


### Inflation-Indexed 10-Year Government Bonds



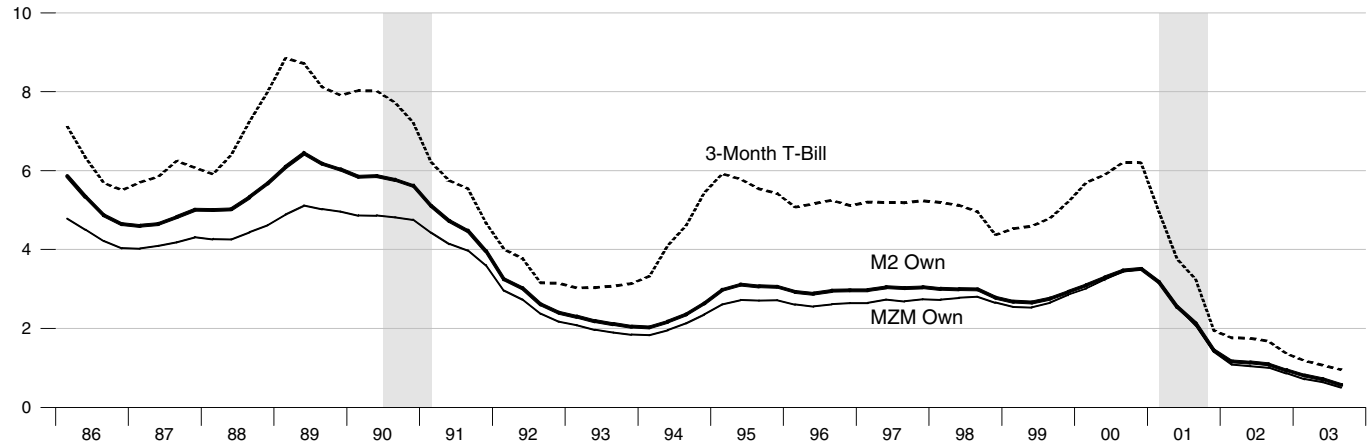
Velocity

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



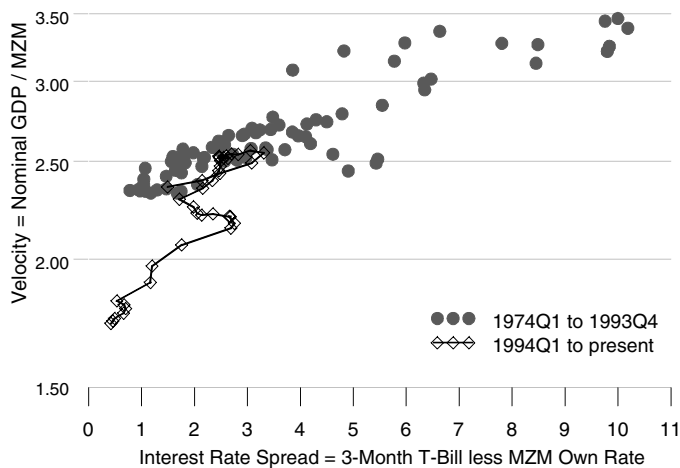
Interest Rates

Percent



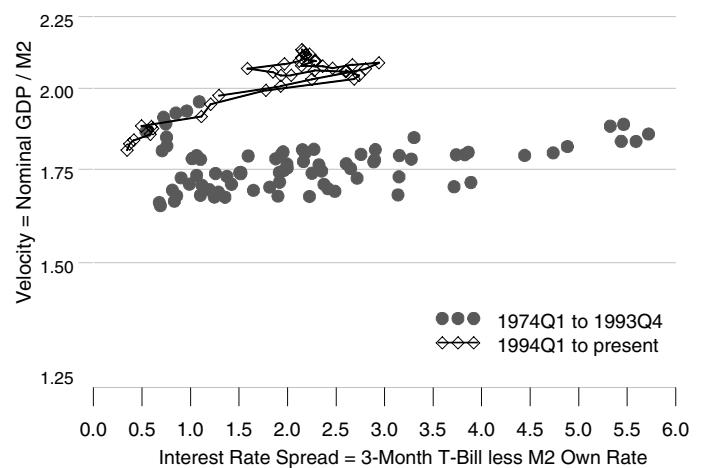
MZM Velocity and Interest Rate Spread

Ratio Scale



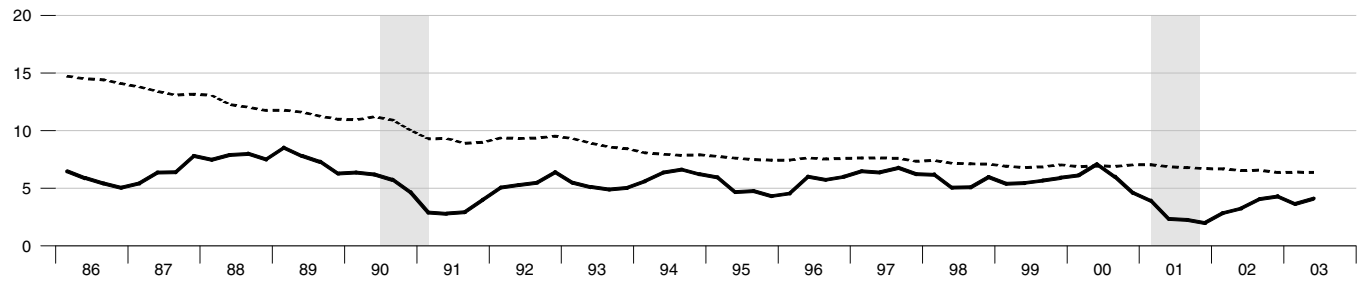
M2 Velocity and Interest Rate Spread

Ratio Scale



### Gross Domestic Product

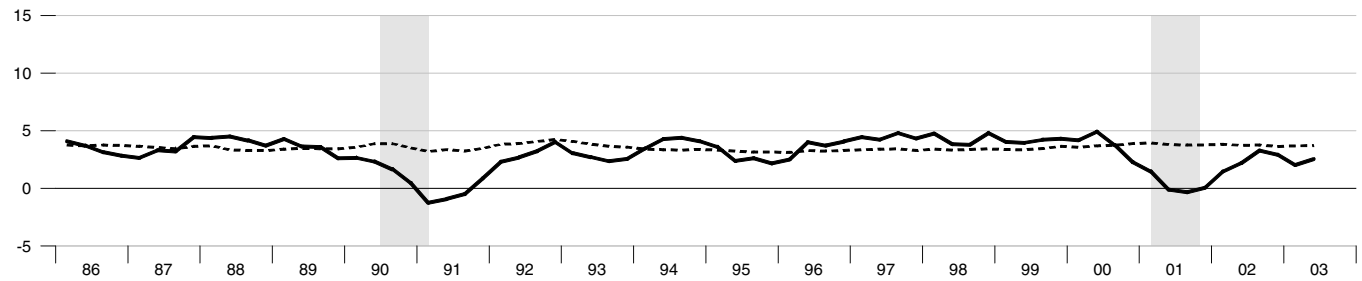
Percent change from year ago



Dashed lines indicate 10-year moving averages.

### Real Gross Domestic Product

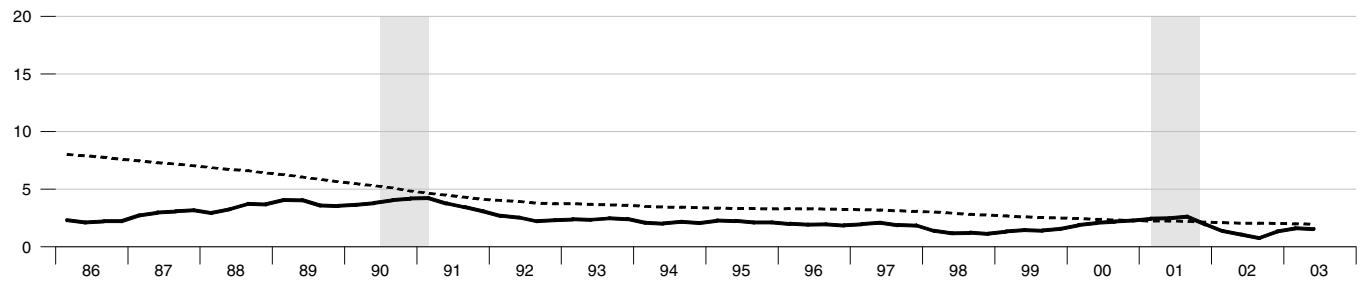
Percent change from year ago



Dashed lines indicate 10-year moving averages.

### Gross Domestic Product Price Index

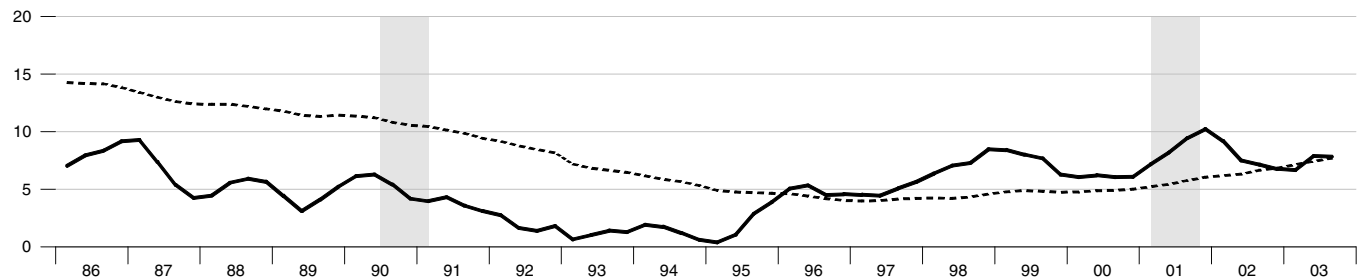
Percent change from year ago



Dashed lines indicate 10-year moving averages.

### M2

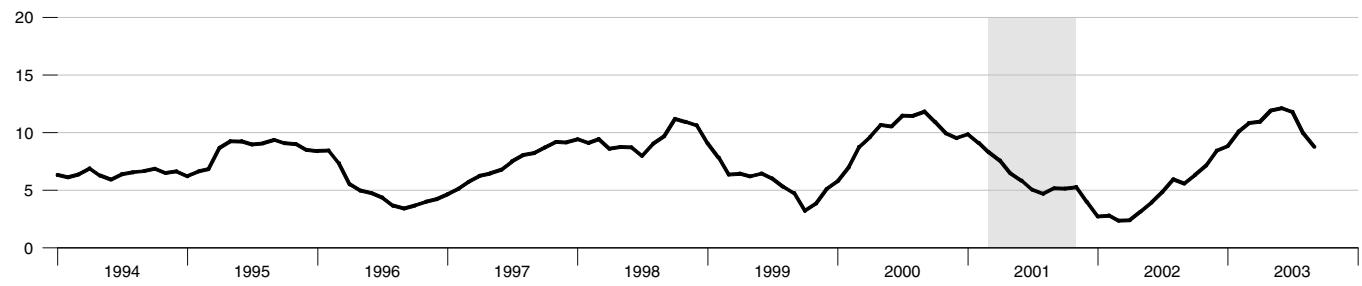
Percent change from year ago



Dashed lines indicate 10-year moving averages.

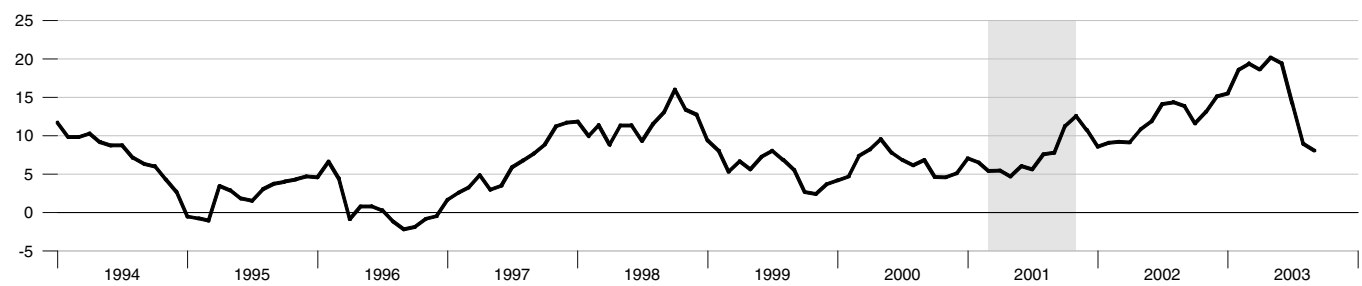
**Bank Credit**

Percent change from year ago



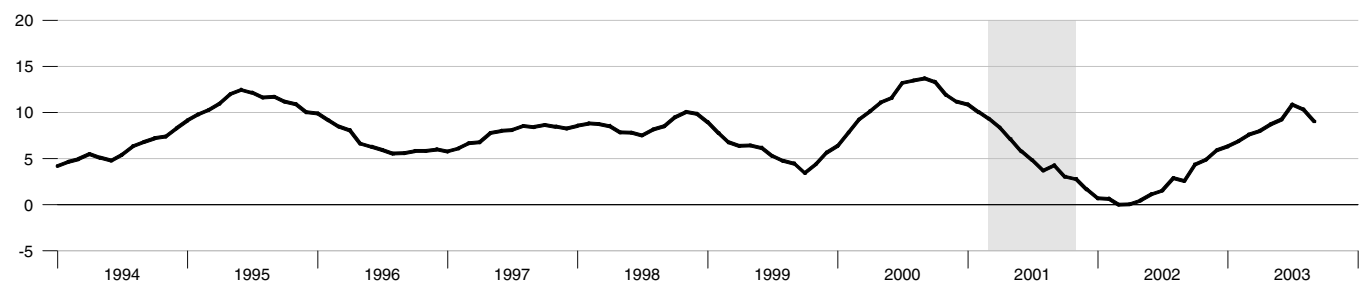
**Investment Securities in Bank Credit at Commercial Banks**

Percent change from year ago



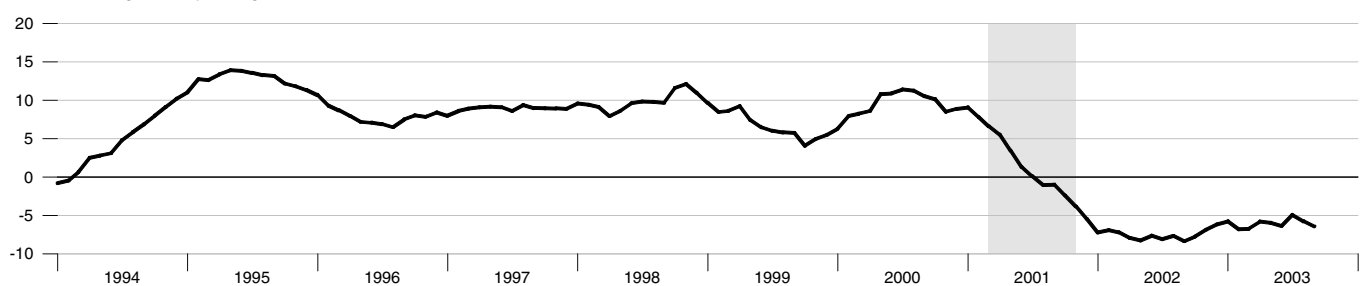
**Total Loans and Leases in Bank Credit at Commercial Banks**

Percent change from year ago

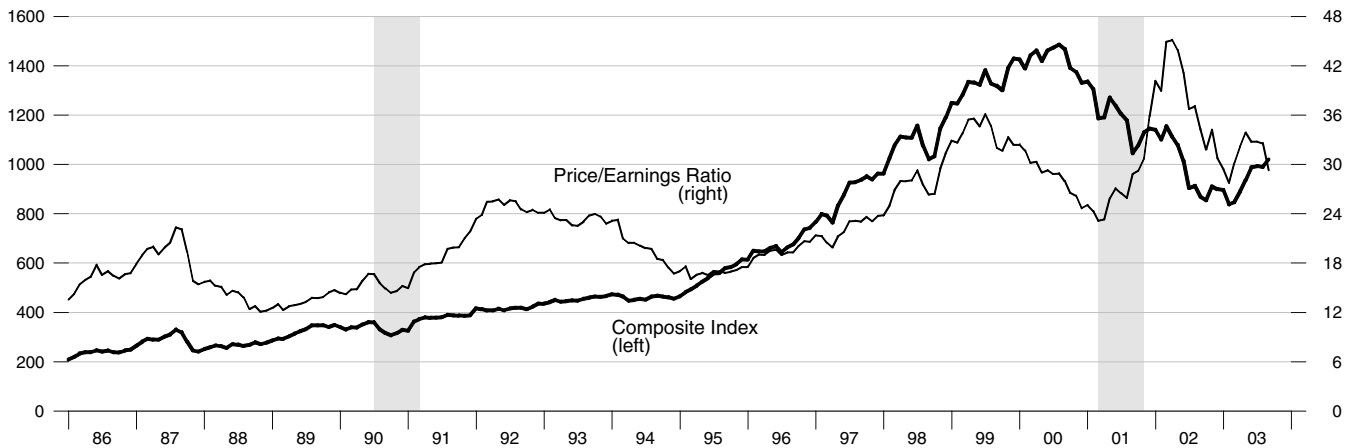


**Commercial and Industrial Loans at Commercial Banks**

Percent change from year ago



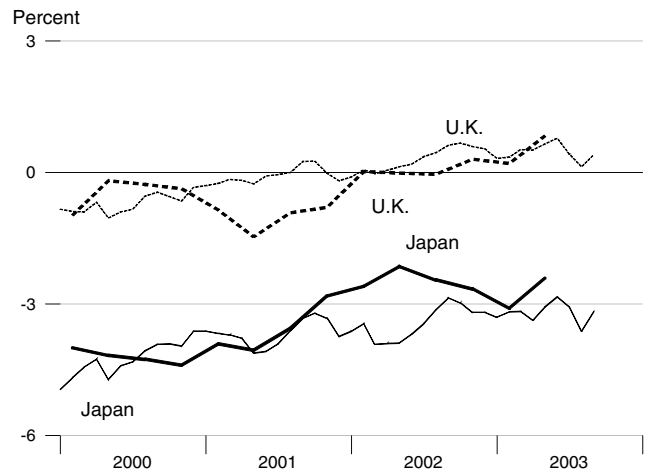
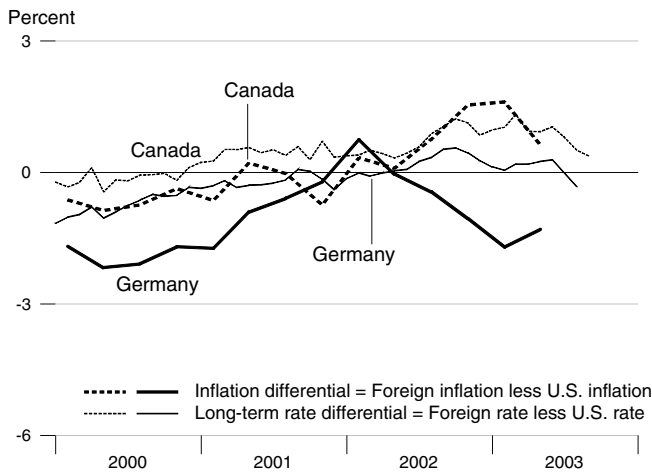
### Standard & Poor's 500



### Recent Inflation and Long-Term Interest Rates

	Consumer Price Inflation Rates				Long-Term Government Bond Rates			
	Percent change from year ago				Percent			
	2002Q4	2003Q1	2003Q2	2003Q3	Jun03	Jul03	Aug03	Sep03
United States	2.25	2.87	2.17	2.22	3.33	3.98	4.45	4.27
Canada	3.79	4.47	2.81	.	4.37	4.78	4.96	4.64
France	2.14	2.38	1.92	.	3.93	4.10	4.32	.
Germany	1.20	1.17	0.87	.	3.62	3.97	4.13	.
Italy	2.77	2.72	2.70	2.75	4.13	4.29	4.31	.
Japan	-0.40	-0.23	-0.24	.	0.49	0.92	0.83	1.10
United Kingdom	2.56	3.07	3.01	.	4.11	4.40	4.58	4.68

### Inflation and Long-Term Interest Rate Differentials



		Money Stock				Bank	Adjusted		
		M1	MZM	M2	M3	Credit	Monetary Base	Reserves	MSI M2
1998		1079.870	3709.461	4207.774	5749.669	4324.465	525.184	84.060	241.553
1999		1101.495	4170.041	4525.776	6252.403	4577.142	574.181	88.664	257.899
2000		1103.401	4507.638	4801.216	6841.050	5025.759	607.106	84.511	272.523
2001		1136.611	5219.148	5222.053	7621.164	5343.603	641.167	85.931	296.264
2002		1190.219	5886.330	5619.615	8230.140	5592.542	697.071	87.924	319.383
2001	1	1100.135	4855.582	5032.979	7276.070	5270.444	619.676	82.207	285.337
	2	1116.115	5107.405	5160.250	7543.173	5311.782	629.484	82.722	292.824
	3	1162.814	5327.317	5291.714	7725.994	5361.309	651.930	90.906	300.515
	4	1167.377	5586.289	5403.270	7939.418	5430.878	663.578	87.887	306.379
2002	1	1183.762	5724.200	5494.692	8055.189	5409.458	680.264	88.157	311.592
	2	1181.589	5810.078	5546.486	8137.525	5479.838	692.937	86.979	315.246
	3	1190.469	5944.931	5668.995	8283.101	5653.617	702.753	86.820	322.274
	4	1205.056	6066.110	5768.287	8444.743	5827.254	712.330	89.741	328.421
2003	1	1227.801	6158.569	5859.882	8562.351	5946.114	726.820	90.930	334.331
	2	1255.956	6257.192	5982.756	8697.202	6118.491	738.230	91.800	341.897
	3	1283.995	6453.173	6111.944	8941.200	6192.670	744.013	94.530	349.763
2001	Sep	1201.220	5452.848	5376.486	7834.870	5418.692	671.628	105.077	305.239
	Oct	1163.909	5511.680	5362.390	7869.901	5413.799	663.798	91.551	304.243
	Nov	1165.335	5585.475	5402.792	7943.815	5445.913	661.381	86.229	306.405
	Dec	1172.887	5661.711	5444.629	8004.539	5432.921	665.556	85.880	308.489
2002	Jan	1179.038	5682.740	5468.738	8016.263	5406.840	673.713	87.296	310.009
	Feb	1185.171	5737.333	5507.159	8068.056	5414.494	681.914	89.238	312.222
	Mar	1187.077	5752.527	5508.180	8081.248	5407.039	685.165	87.936	312.545
	Apr	1172.605	5750.632	5494.803	8083.327	5432.359	689.008	88.352	312.465
	May	1183.278	5818.519	5557.289	8150.476	5481.201	692.736	86.588	315.719
	Jun	1188.883	5861.084	5587.366	8178.773	5525.955	697.068	85.998	317.553
	Jul	1195.728	5908.708	5635.199	8224.904	5578.790	701.032	86.100	320.051
	Aug	1184.451	5950.731	5673.074	8291.447	5661.002	702.878	86.382	322.459
	Sep	1191.228	5975.354	5698.711	8332.951	5721.059	704.350	87.978	324.312
	Oct	1202.609	5977.782	5736.585	8344.346	5756.122	710.664	89.827	326.553
	Nov	1202.180	6087.446	5776.528	8467.225	5834.719	712.472	89.818	328.851
	Dec	1210.378	6133.101	5791.748	8522.658	5890.920	713.853	89.579	329.860
2003	Jan	1212.991	6130.968	5820.530	8522.478	5884.742	719.528	89.511	331.941
	Feb	1233.421	6170.215	5873.451	8569.020	5961.624	728.657	91.909	335.088
	Mar	1236.990	6174.524	5885.664	8595.556	5991.977	732.276	91.371	335.964
	Apr	1237.372	6181.355	5908.497	8613.440	6026.459	736.488	92.367	337.795
	May	1258.304	6257.649	5996.161	8706.054	6133.558	738.668	91.471	342.475
	Jun	1272.191	6332.572	6043.611	8772.112	6195.456	739.535	91.562	345.420
	Jul	1278.050	6434.185	6092.748	8933.587	6203.578	741.244	93.478	348.562
	Aug	1285.855	6467.553	6133.707	8957.035	6187.448	745.276	95.369	350.953
	Sep	1288.081	6457.780	6109.378	8932.977	6186.985	745.520	94.744	349.774

\*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	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
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	4.95	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
	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
2001	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
	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

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

		M1	MZM	M2	M3
<b>Percent change at an annual rate</b>					
<hr/>					
	1998	0.99	11.67	7.29	10.36
	1999	2.00	12.42	7.56	8.74
	2000	0.17	8.10	6.09	9.41
	2001	3.01	15.78	8.77	11.40
	2002	4.72	12.78	7.61	7.99
<hr/>					
2001	1	2.71	18.62	10.65	13.24
	2	5.81	20.75	10.11	14.68
	3	16.74	17.22	10.19	9.69
	4	1.57	19.44	8.43	11.05
2002	1	5.61	9.87	6.77	5.83
	2	-0.73	6.00	3.77	4.09
	3	3.01	9.28	8.84	7.16
	4	4.90	8.15	7.01	7.81
2003	1	7.55	6.10	6.35	5.57
	2	9.17	6.41	8.39	6.30
	3	8.93	12.53	8.64	11.22
<hr/>					
2001	Sep	54.30	38.98	25.20	24.71
	Oct	-37.27	12.95	-3.15	5.37
	Nov	1.47	16.07	9.04	11.27
	Dec	7.78	16.38	9.29	9.17
<hr/>					
2002	Jan	6.29	4.46	5.31	1.76
	Feb	6.24	11.53	8.43	7.75
	Mar	1.93	3.18	0.22	1.96
	Apr	-14.63	-0.40	-2.91	0.31
	May	10.92	14.17	13.65	9.97
	Jun	5.68	8.78	6.49	4.17
	Jul	6.91	9.75	10.27	6.77
	Aug	-11.32	8.53	8.07	9.71
	Sep	6.87	4.97	5.42	6.01
	Oct	11.46	0.49	7.98	1.64
	Nov	-0.43	22.01	8.36	17.67
	Dec	8.18	9.00	3.16	7.86
<hr/>					
2003	Jan	2.59	-0.42	5.96	-0.03
	Feb	20.21	7.68	10.91	6.55
	Mar	3.47	0.84	2.50	3.72
	Apr	0.37	1.33	4.66	2.50
	May	20.30	14.81	17.80	12.90
	Jun	13.24	14.37	9.50	9.11
	Jul	5.53	19.26	9.76	22.09
	Aug	7.33	6.22	8.07	3.15
	Sep	2.08	-1.81	-4.76	-3.22

## 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, 1996b, 2001).

**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, 2001).

**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](http://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](http://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 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](http://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,  $\pi_{t-1}$  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  $\Delta MB_t^*$  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/aggreg/swdata.html](http://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  $m = 1, \dots, 10$  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** 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 8/16/2013 and the current U.S. bond has a maturity date of 7/15/2013.

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

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