

“Measured Pace” in the Conduct of Monetary Policy

At the May 2004 meeting, the Federal Open Market Committee (FOMC) introduced the phrase “policy accommodation can be removed at a pace that is likely to be measured” into the statement it makes at the conclusion of each meeting. The “measured pace” language, which was repeated in the next 12 statements, became widely regarded as a signal that the FOMC would raise the funds rate target by 25 basis points at its next meeting. This language was modified at the December 2005 meeting and discontinued at this year’s January meeting. Now that that experience is over, it is useful to consider the extent to which policymakers should signal their next policy action.

The “measured pace” language appears to be a product of the economic conditions that accompanied it. Beginning in January 2001, on evidence that the economy was weakening and that inflation was contained, the FOMC began to ease policy: The Committee reduced the federal funds target from 6.5 percent to 1.75 percent in 2001 and again in 2002 and 2003 to the historically low level of 1 percent. The 1 percent rate was well below anyone’s estimate of the so-called “neutral” nominal rate—the real interest rate (which is independent of monetary policy) plus the FOMC’s implicit objective for inflation. It was understood that a 1 percent funds rate was not sustainable. Faced with strong productivity growth and no evidence of deteriorating inflation expectations, the FOMC decided to increase the target at a “measured pace.”

While signaling the timing and magnitude of the next funds rate target change appears to have been useful under these unusual circumstances, it is unlikely to be useful in others, particularly when the difference between the target and estimated neutral rates is relatively small. The neutral nominal rate changes over time and is subject to considerable uncertainty. Consequently, it is difficult to determine or predict; furthermore, in circumstances where the difference between the target and estimated neutral rates is smaller than it has been in recent years, policymakers may be uncertain whether the target will need to be increased, decreased, or maintained at the next meeting. Indeed, it is not surprising that the measured pace language was phased out when the target rate got closer to a level that some analysts considered “neutral.”

Signaling the policy action at the next meeting is further complicated by the fact that the current level of the policy rate incorporates policymakers’ best guess of the future state of the economy. Even if policymakers’ expectations are correct on average, what will occur by the time of any particular meeting is not perfectly forecastable. This could make policymakers understandably reluctant to decide on the action they’ll take at the next meeting before they receive information about the accuracy of their current expectations.

There may be situations where policymakers believe they can achieve a particular objective by increasing or decreasing the funds rate by x percentage points over a period of time and, thereby, signal the direction and magnitude of the policy action at the next meeting. For example, fearing recession, policymakers might believe that the target may be reduced slowly by some cumulative amount. In such a circumstance, the direction of the next move might be predictable, but the magnitude would likely be less so. Moreover, the further the target gets below the estimated neutral rate, the more wary policymakers will be of signaling a reduction at the next meeting, preferring instead to examine the behavior of inflation indicators between meetings before deciding whether a further reduction is advisable.

That the FOMC may find it difficult, and consequently inadvisable, to signal the next policy action does not prevent the Committee from providing “forward guidance”—a statement of the Committee’s thinking based on the information available at the time of the meeting and the Committee’s expectation of what might happen. Forward guidance is not a commitment. The Committee would act in accordance with its forward guidance only if the Committee’s expectation of what might happen actually occurred. Indeed, as argued in Poole (1999), transparency of this sort likely enhances the efficacy of monetary policy.

—Daniel L. Thornton

Poole, William (1999). “Synching, Not Sinking, the Markets.” Remarks made at a Meeting of the Philadelphia Council for Business Economics, Federal Reserve Bank of Philadelphia, August 6, 1999.

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

We welcome your comments addressed to:

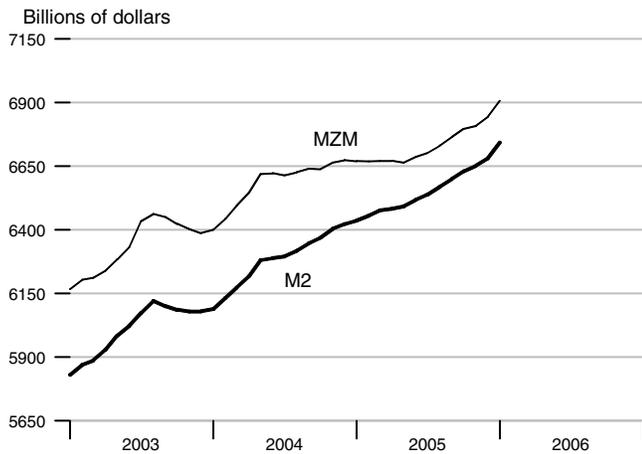
Editor, *Monetary Trends*
Research Division
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P.O. Box 442
St. Louis, MO 63166-0442

On March 23, 2006, the Board of Governors of the Federal Reserve System will cease the publication of the M3 monetary aggregate. It will also cease publishing the following components: large-denomination time deposits, RPs, and eurodollars.

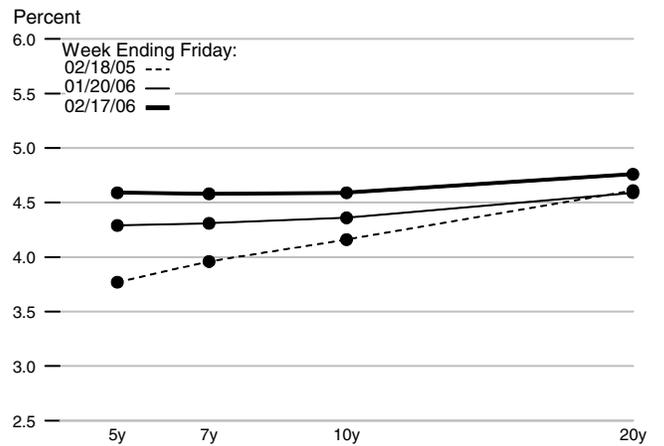
or to:

stlsFRED@stls.frb.org

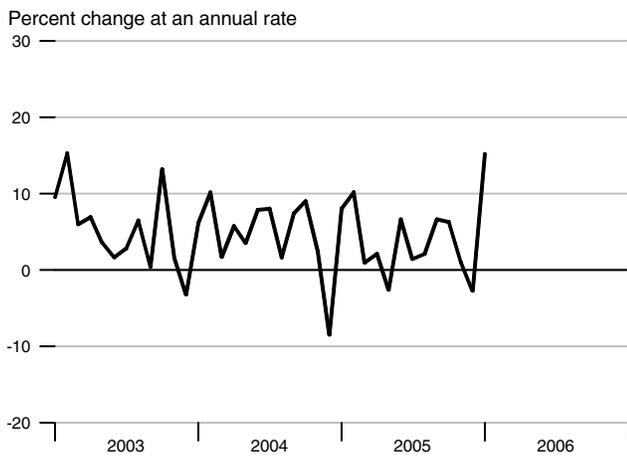
M2 and MZM



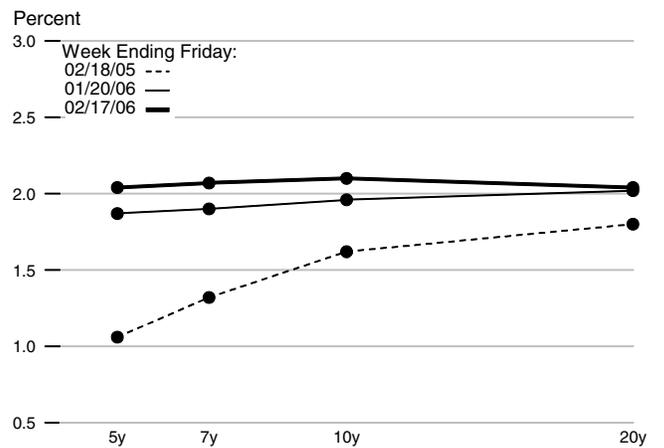
Treasury Yield Curve



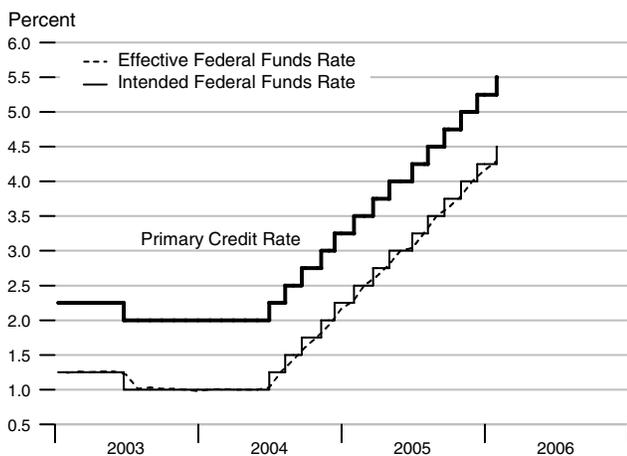
Adjusted Monetary Base



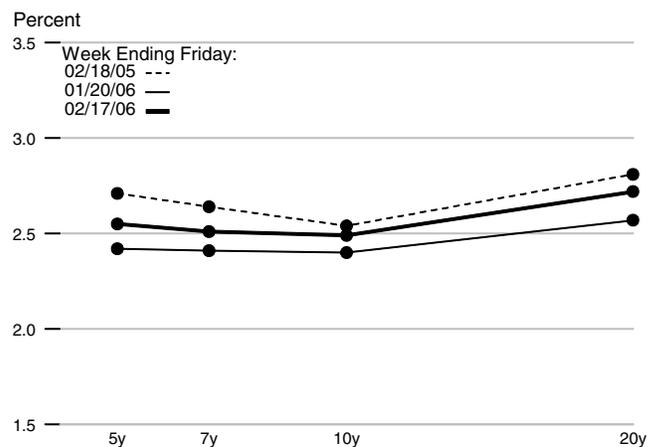
Real Treasury Yield Curve



Reserve Market Rates

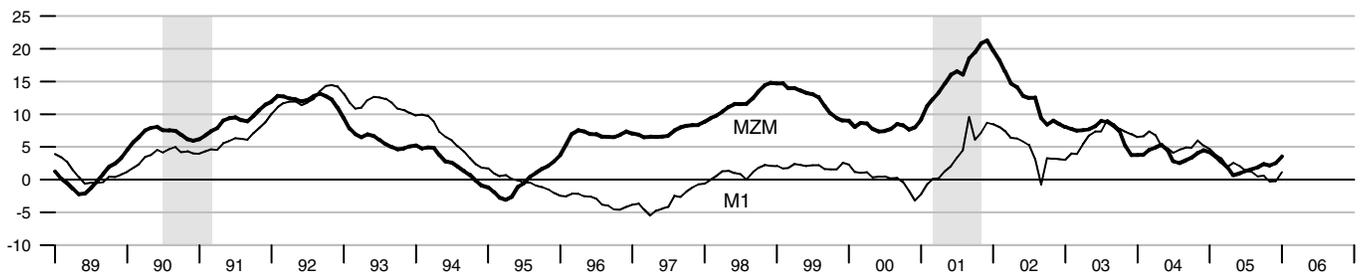


Inflation-Indexed Treasury Yield Spreads



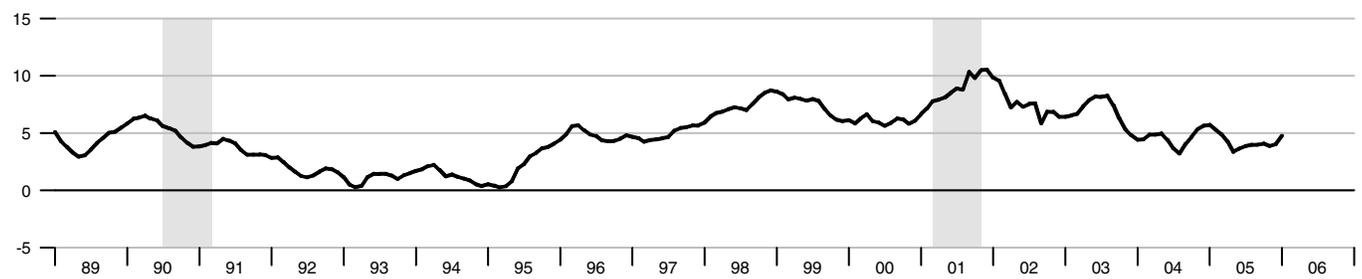
MZM and M1

Percent change from year ago



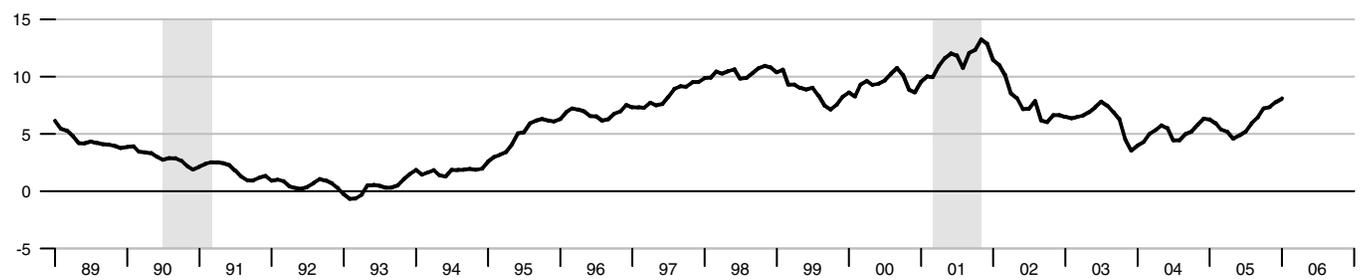
M2

Percent change from year ago



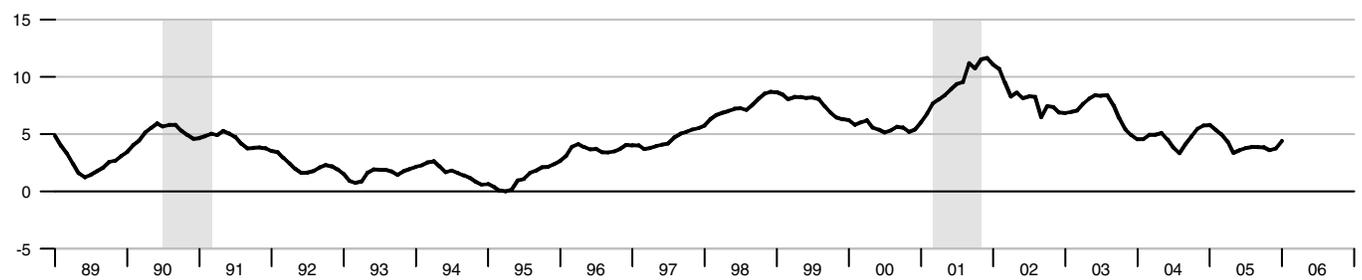
M3

Percent change from year ago



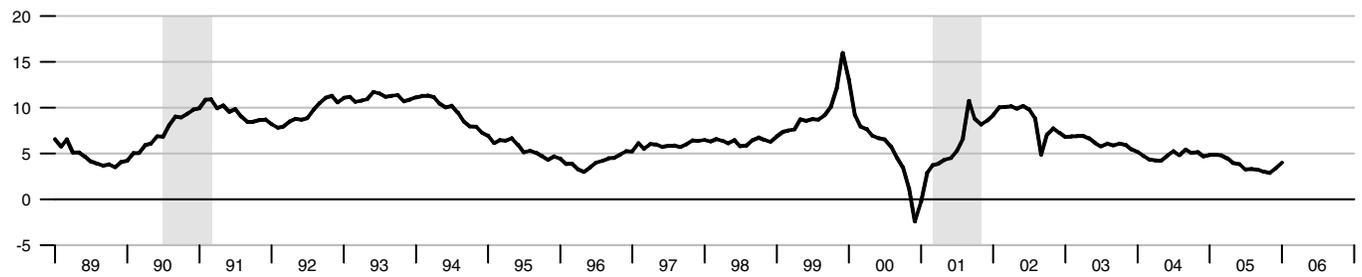
Monetary Services Index - M2

Percent change from year ago



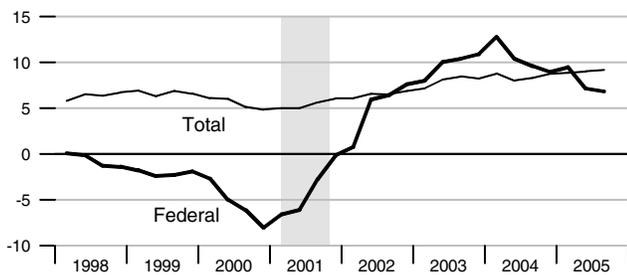
Adjusted Monetary Base

Percent change from year ago



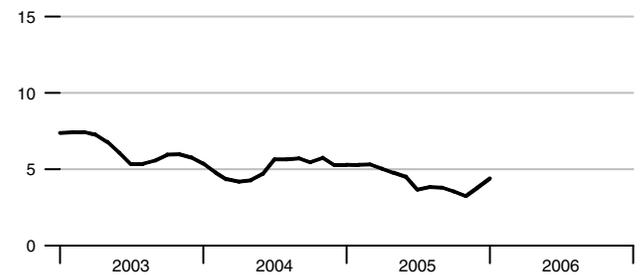
Domestic Nonfinancial Debt

Percent change from year ago



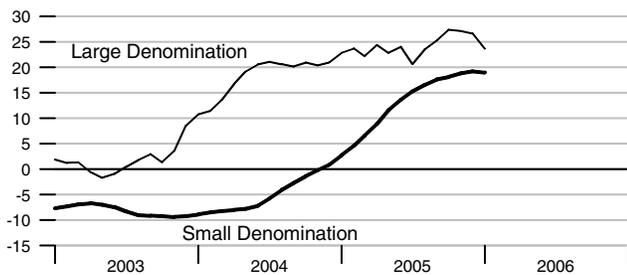
Currency Held by the Nonbank Public

Percent change from year ago



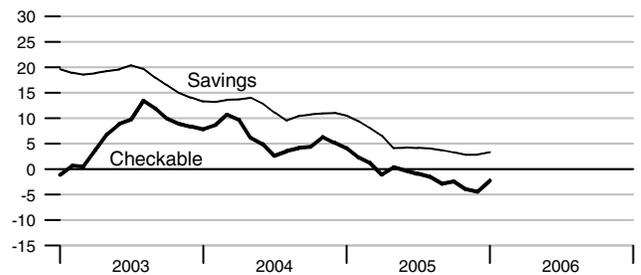
Time Deposits

Percent change from year ago



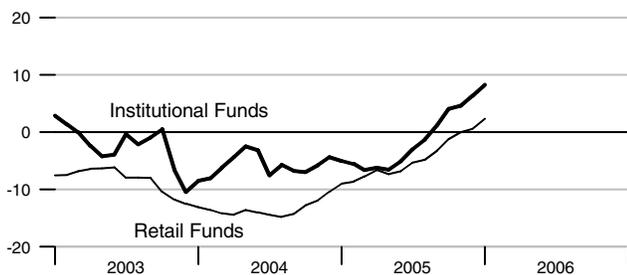
Checkable and Savings Deposits

Percent change from year ago



Money Market Mutual Fund Shares

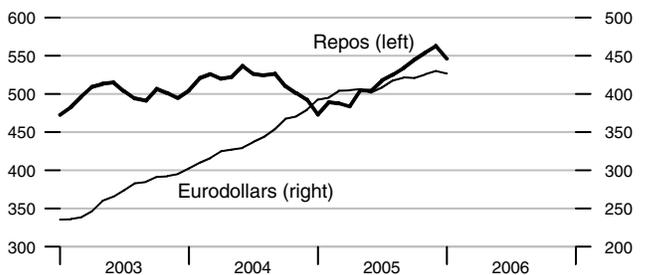
Percent change from year ago



Repurchase Agreements and Eurodollars

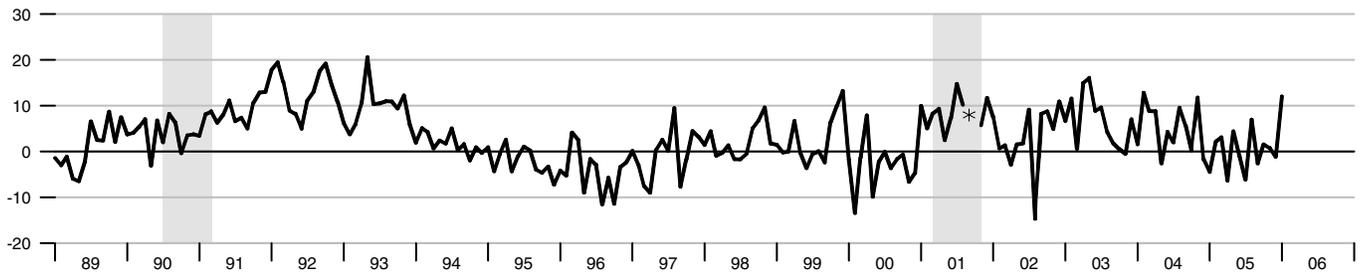
Billions of dollars

Billions of dollars



M1

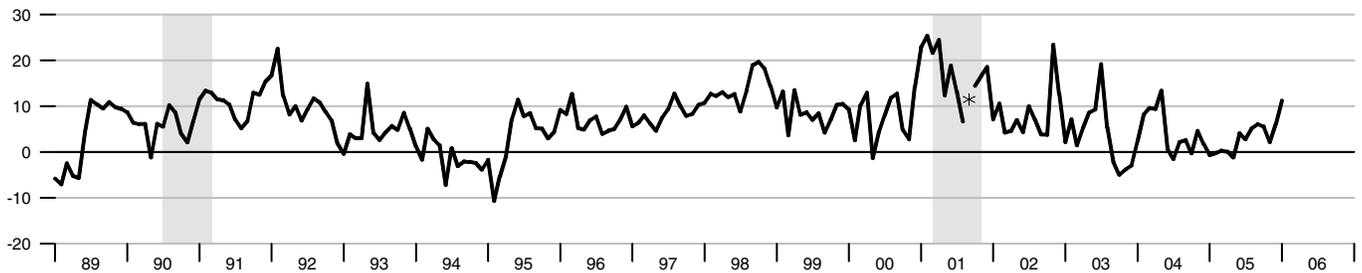
Percent change at an annual rate



*Actual values for September and October 2001 are 55.87 and -38.35 percent rate, respectively.

M2M

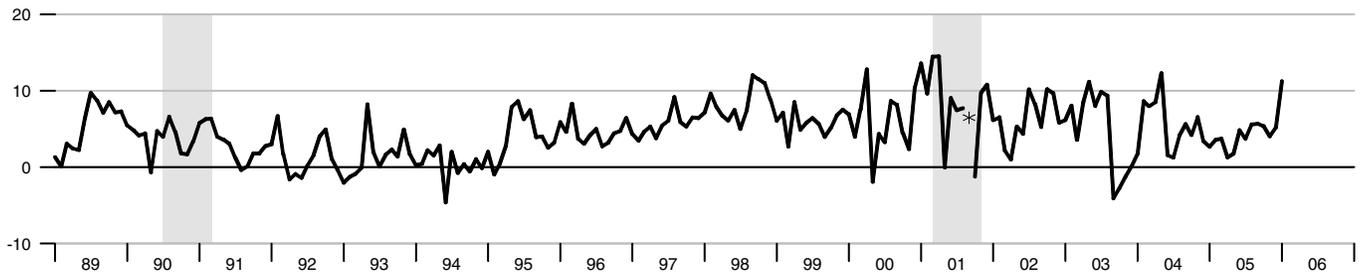
Percent change at an annual rate



*Actual value for September 2001 is 39.41 percent rate.

M2

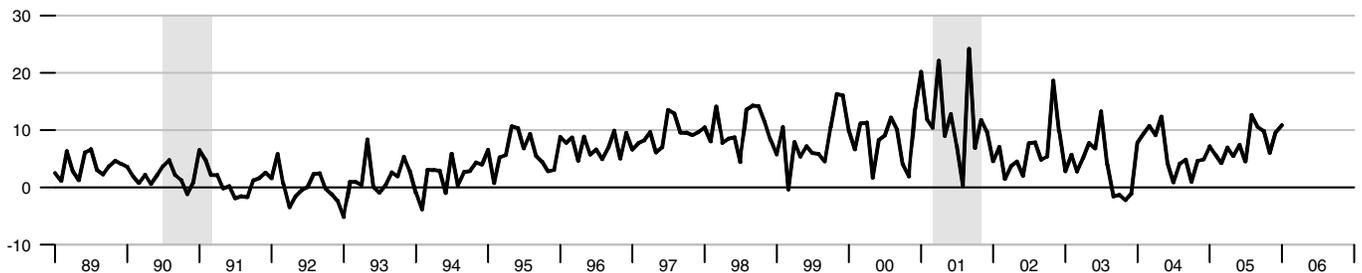
Percent change at an annual rate



*Actual value for September 2001 is 24.90 percent rate.

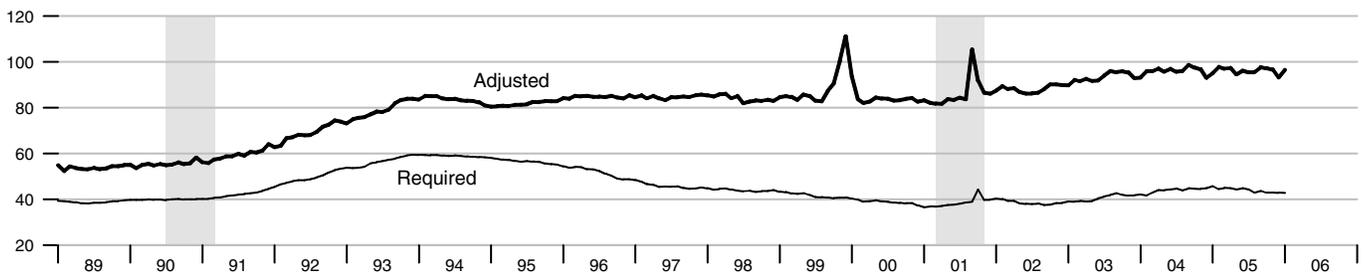
M3

Percent change at an annual rate



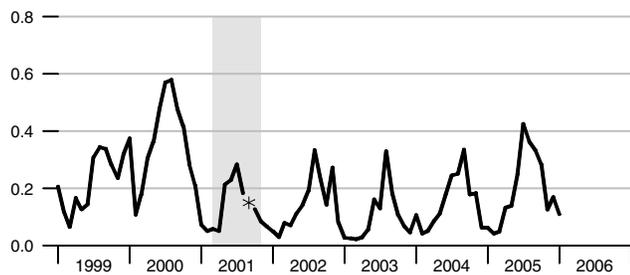
Adjusted and Required Reserves

Billions of dollars



Total Borrowings, nsa

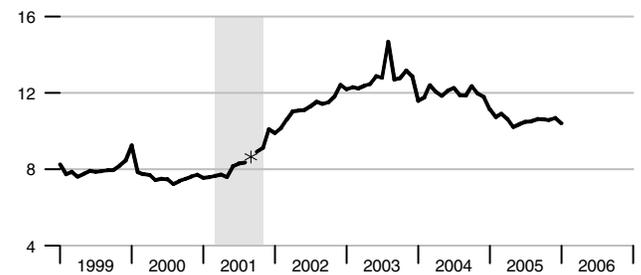
Billions of dollars



*Actual value for September 2001 is \$3.4 billion.

Excess Reserves plus RCB Contracts

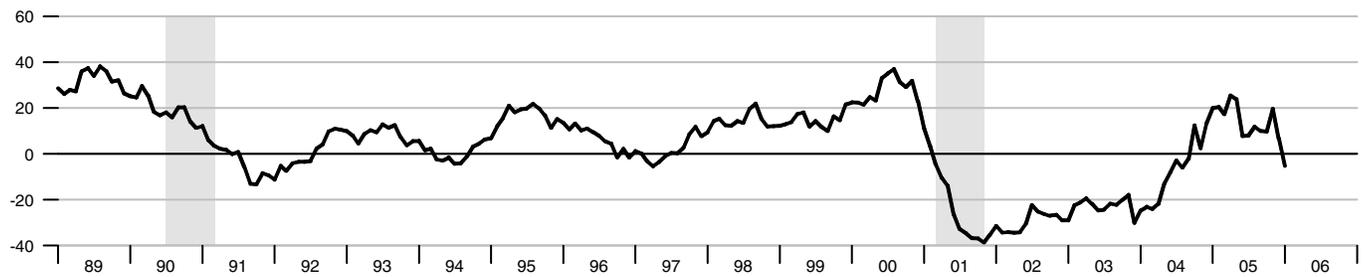
Billions of dollars



*Actual value for September 2001 is \$26.43 billion.

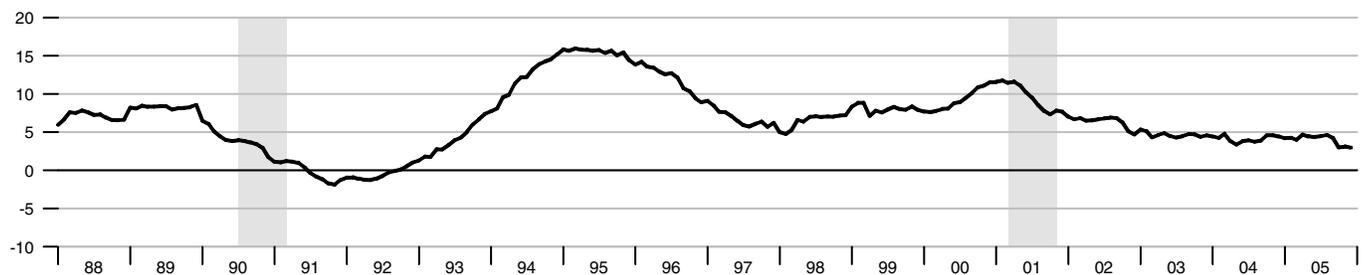
Nonfinancial Commercial Paper

Percent change from year ago

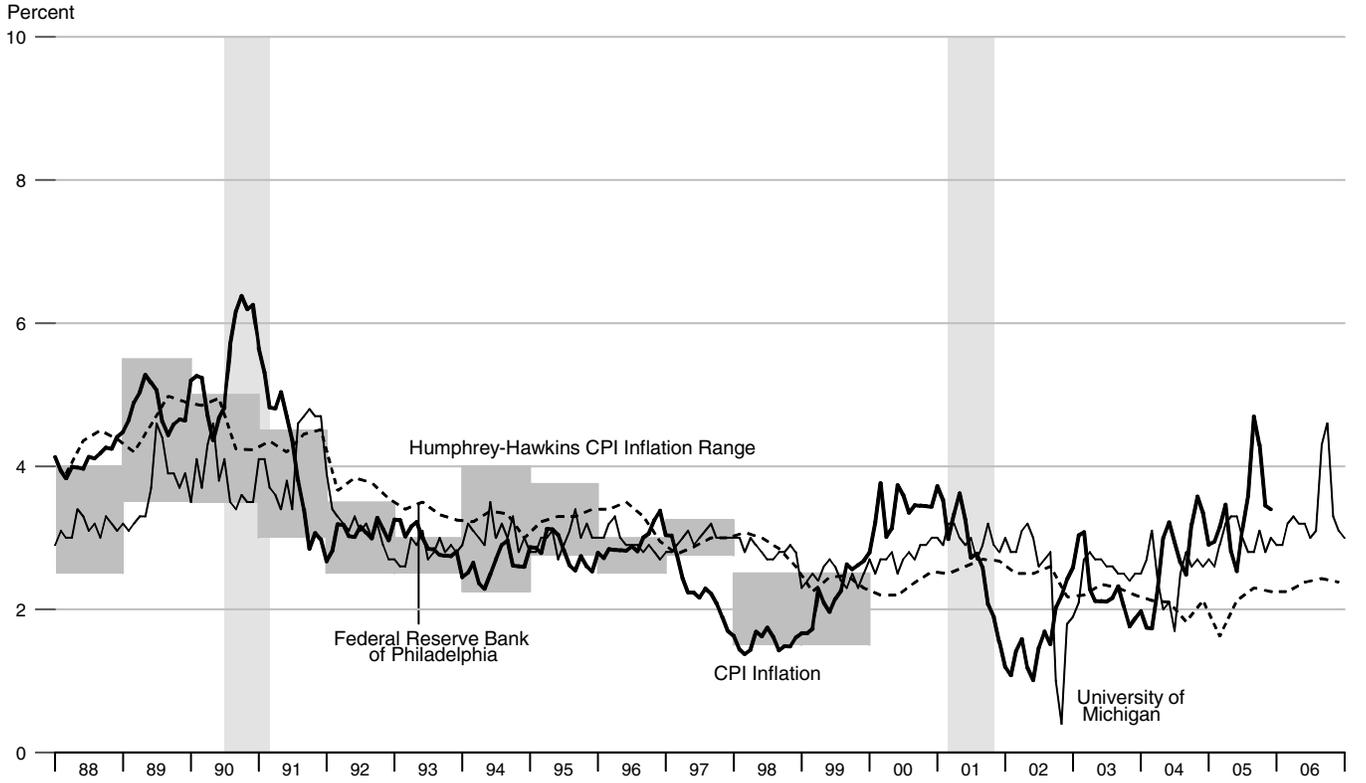


Consumer Credit

Percent change from year ago

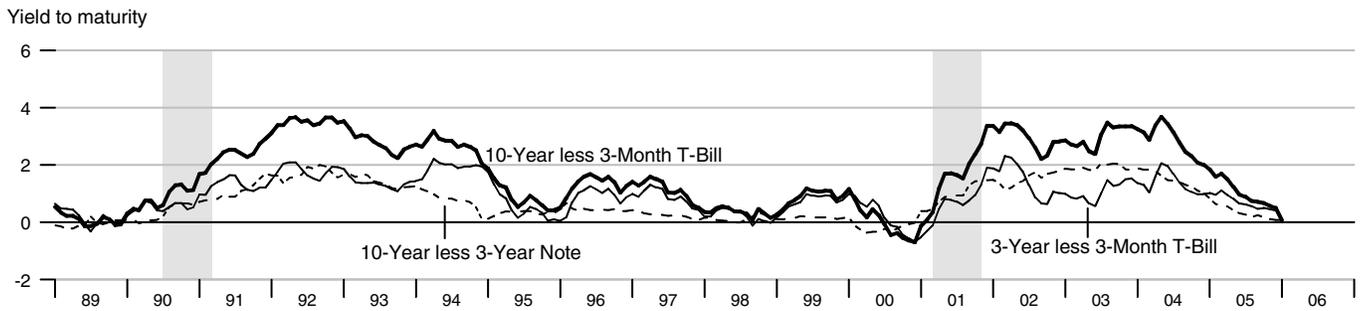


Inflation and Inflation Expectations

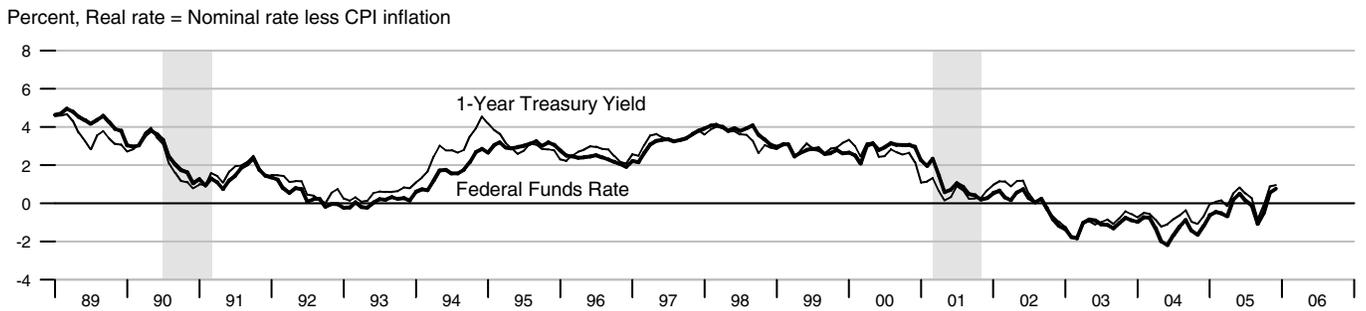


The shaded region shows the Humphrey-Hawkins CPI inflation range. Beginning in January 2000, the Humphrey-Hawkins inflation range was reported using the PCE price index and therefore is not shown on this graph. See notes on page 19.

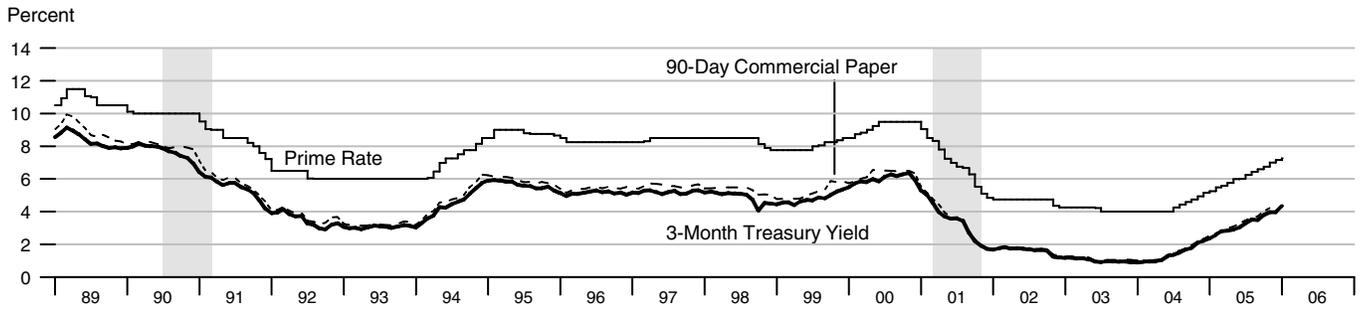
Treasury Security Yield Spreads



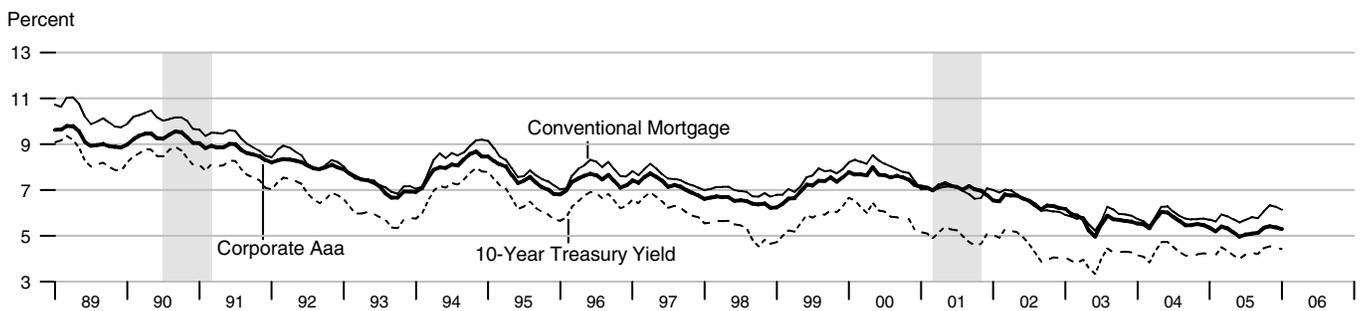
Real Interest Rates



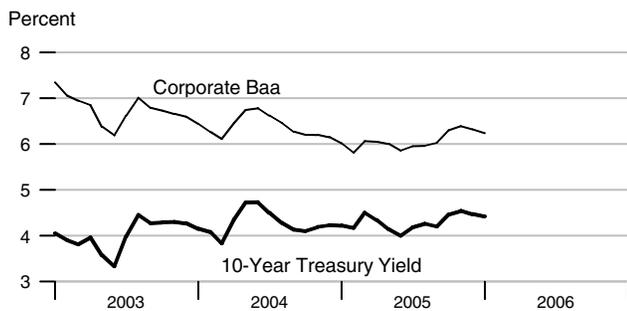
Short-Term Interest Rates



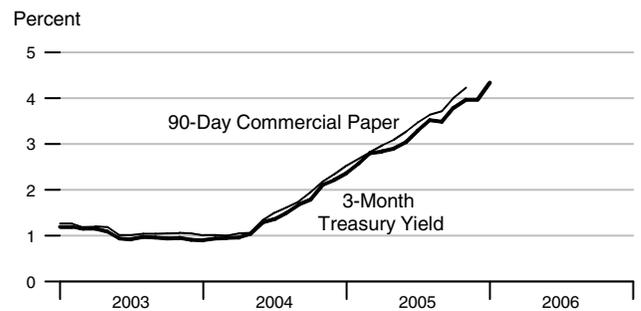
Long-Term Interest Rates



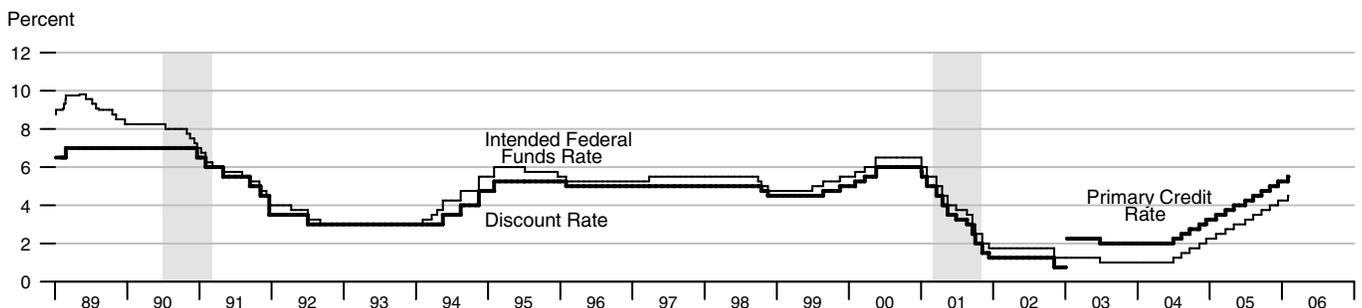
Long-Term Interest Rates



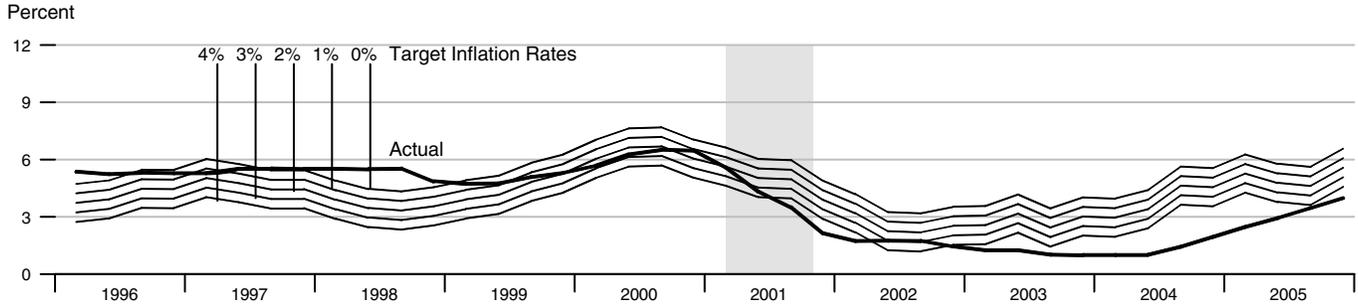
Short-Term Interest Rates



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



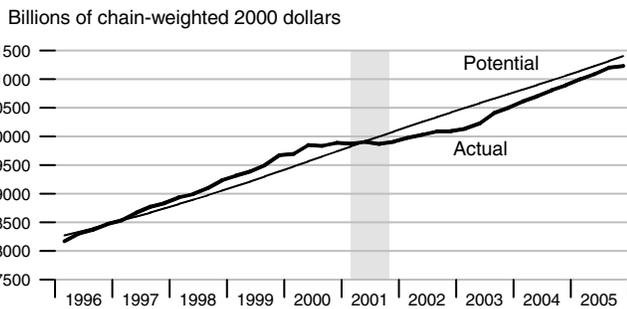
Federal Funds Rate and Inflation Targets



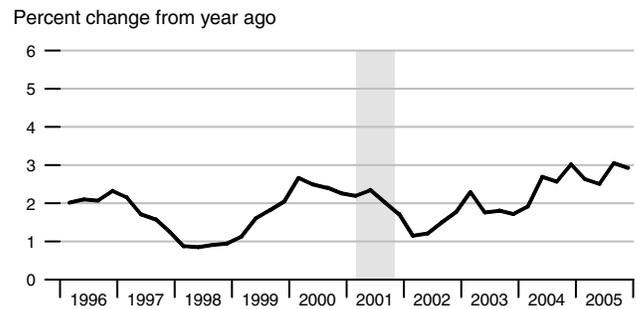
Calculated federal funds rate is based on Taylor's rule. See notes on page 19.

Components of Taylor's Rule

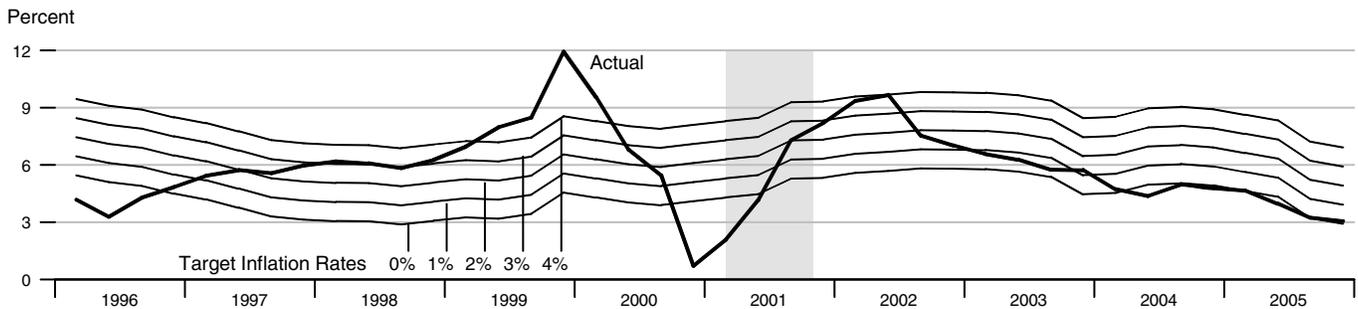
Actual and Potential Real GDP



PCE Inflation



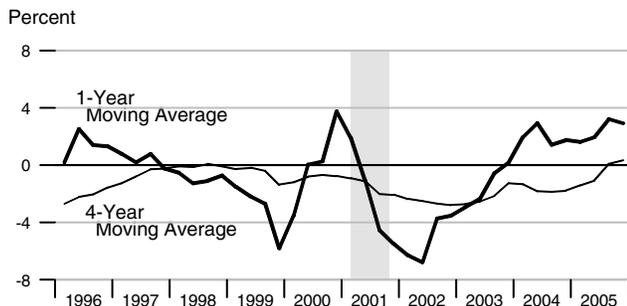
Monetary Base Growth* and Inflation Targets



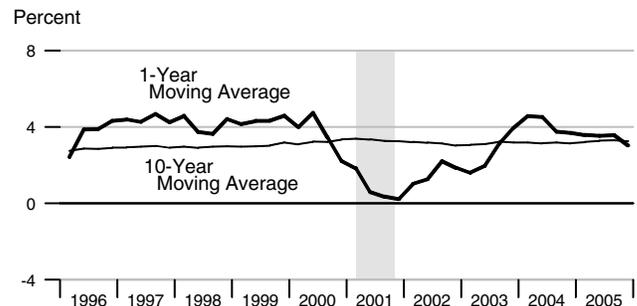
*Modified for the effects of sweeps programs on reserve demand. Calculated base growth is based on McCallum's rule. Actual base growth is percent change from year ago. See notes on page 19.

Components of McCallum's Rule

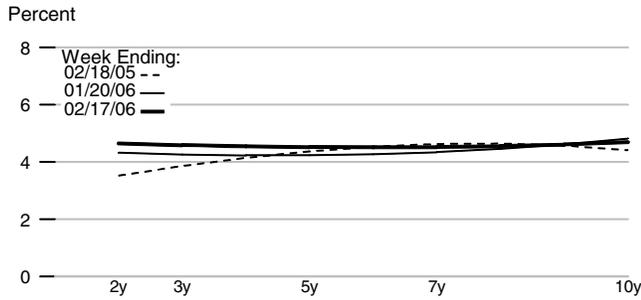
Monetary Base Velocity Growth



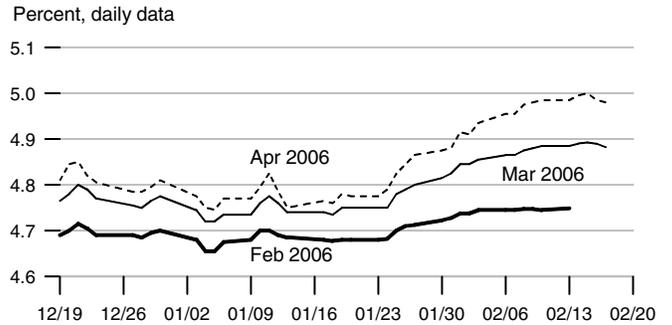
Real Output Growth



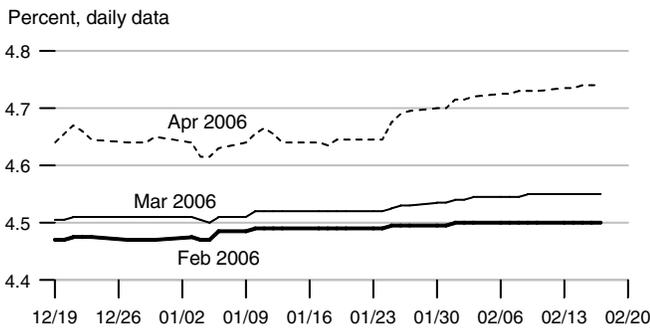
Implied One-Year Forward Rates



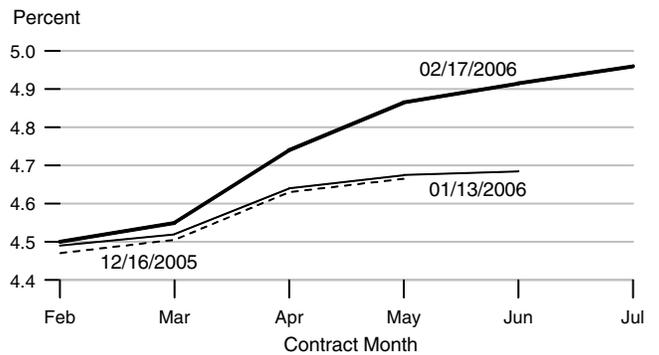
Rates on 3-Month Eurodollar Futures



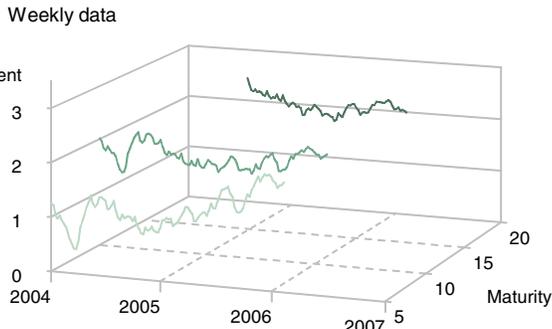
Rates on Selected Federal Funds Futures Contracts



Rates on Federal Funds Futures on Selected Dates

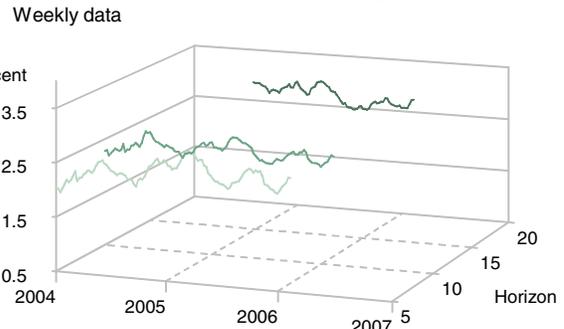


Inflation-Indexed Treasury Securities



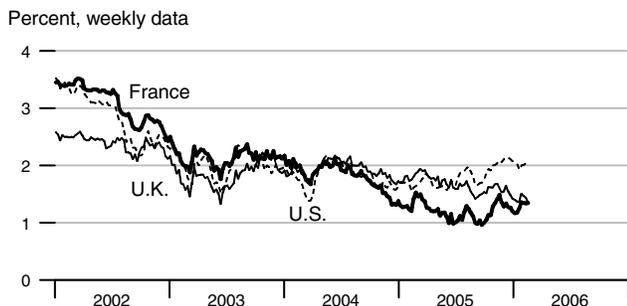
Note: Yields are inflation-indexed constant maturity U.S. Treasury securities

Inflation-Indexed Treasury Yield Spreads

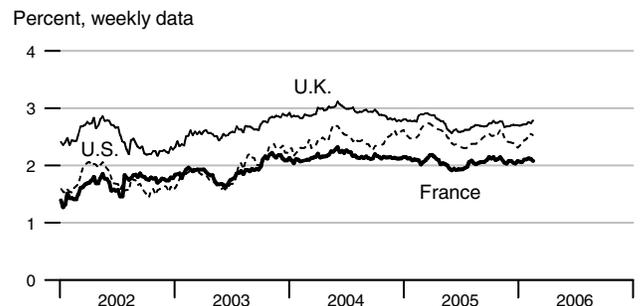


Note: Yield spread is between nominal and inflation-indexed constant maturity U.S. Treasury securities.

Inflation-Indexed 10-Year Government Notes

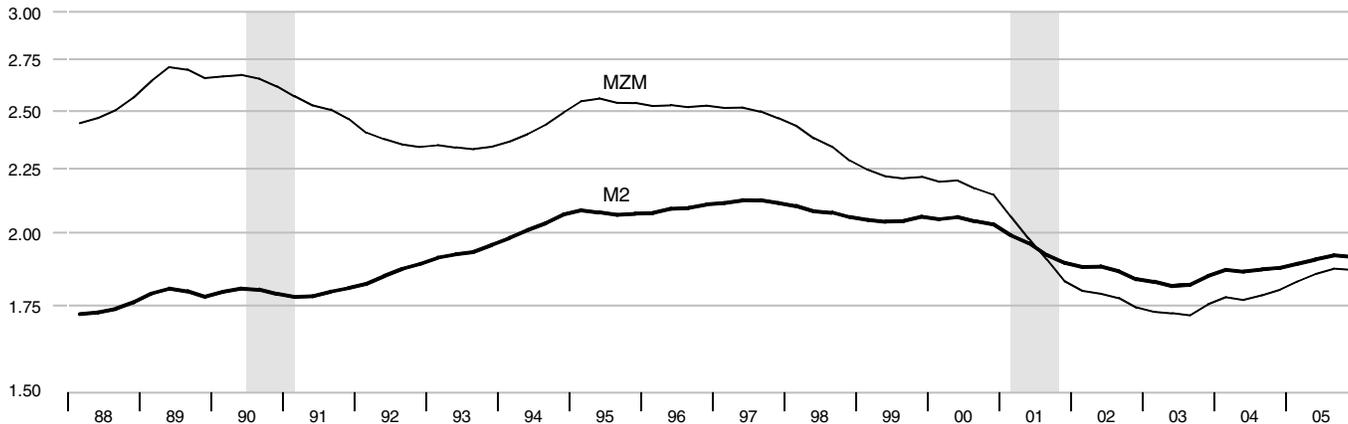


Inflation-Indexed 10-Year Government Yield Spreads



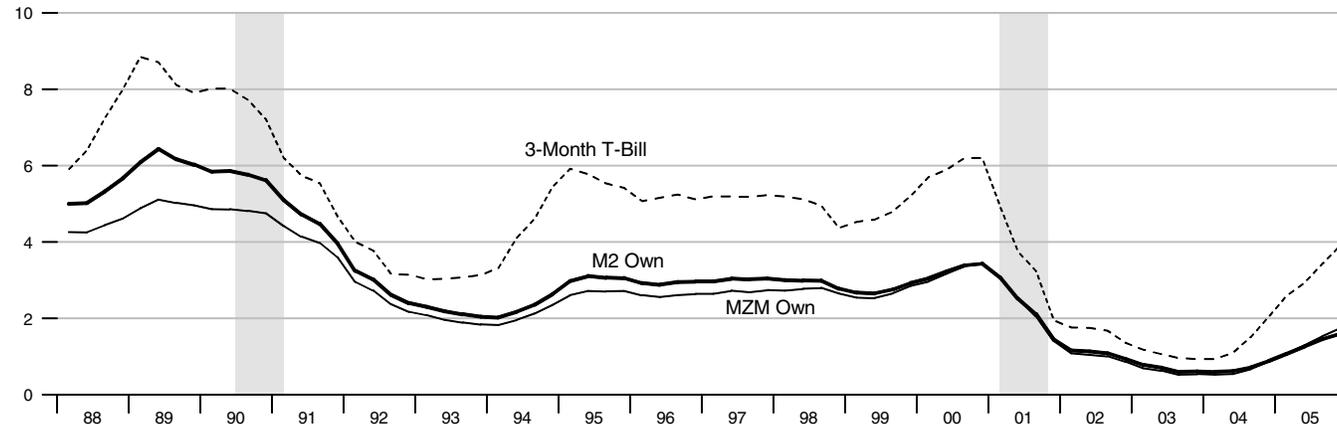
Velocity

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



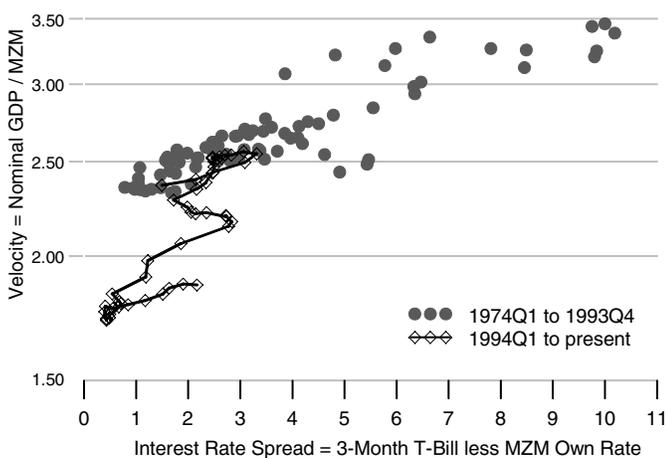
Interest Rates

Percent



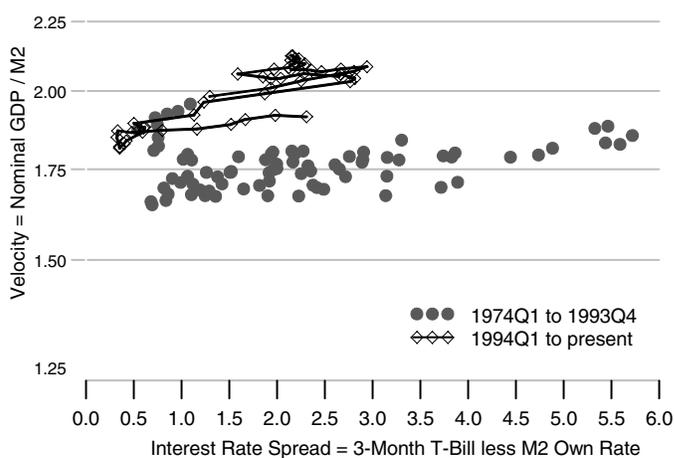
MZM Velocity and Interest Rate Spread

Ratio Scale



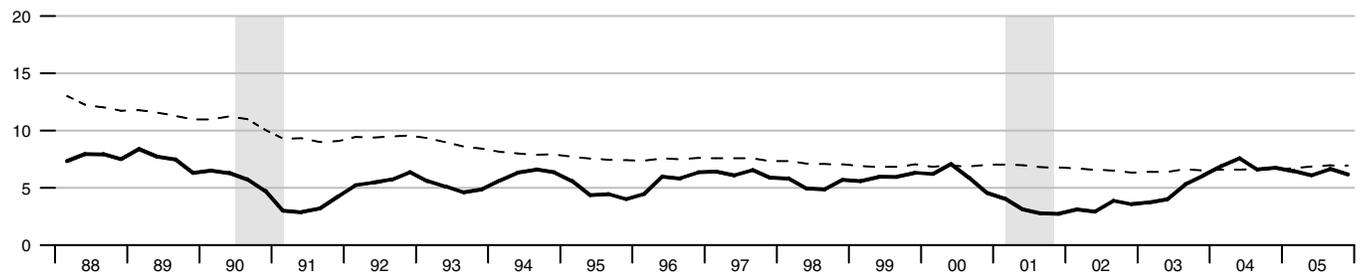
M2 Velocity and Interest Rate Spread

Ratio Scale



Gross Domestic Product

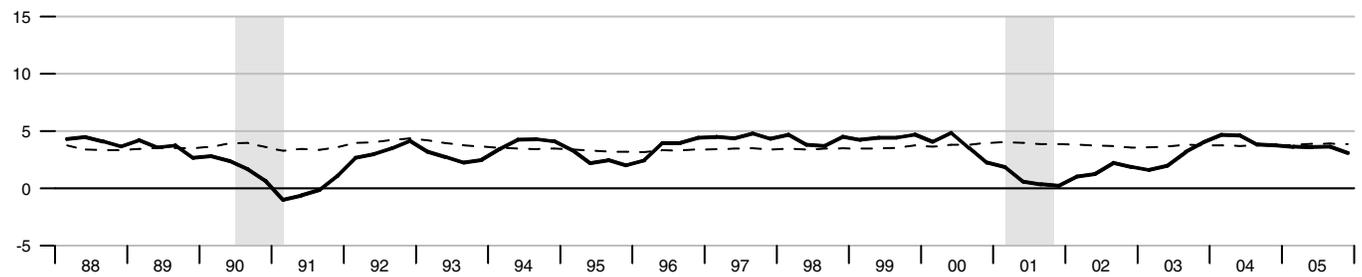
Percent change from year ago



Dashed lines indicate 10-year moving averages.

Real Gross Domestic Product

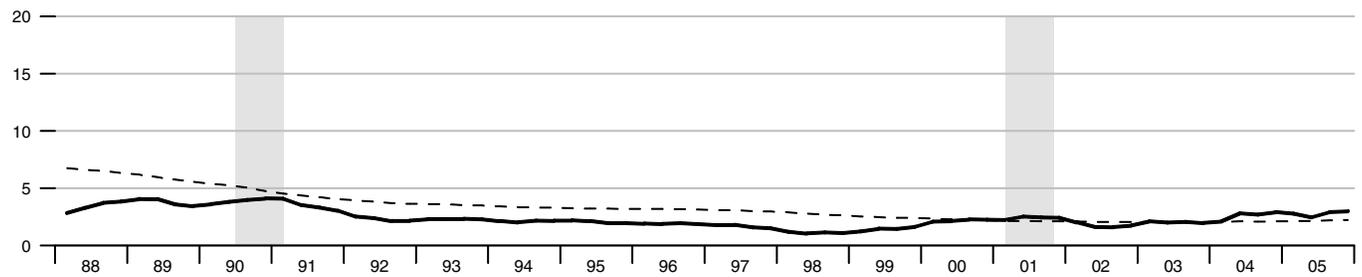
Percent change from year ago



Dashed lines indicate 10-year moving averages.

Gross Domestic Product Price Index

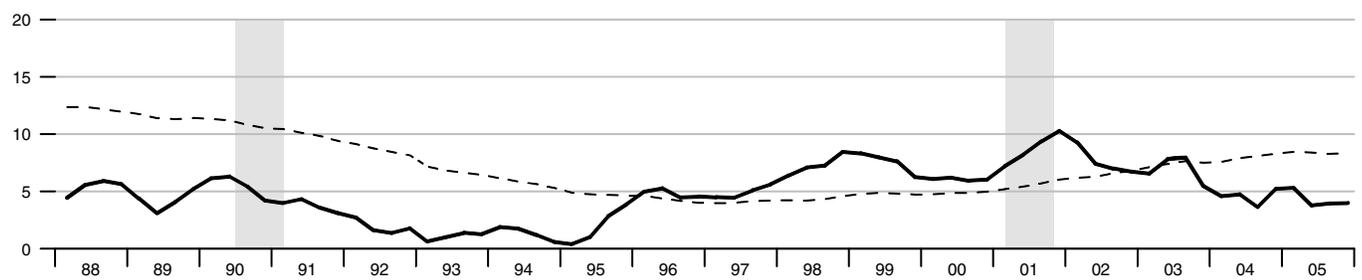
Percent change from year ago



Dashed lines indicate 10-year moving averages.

M2

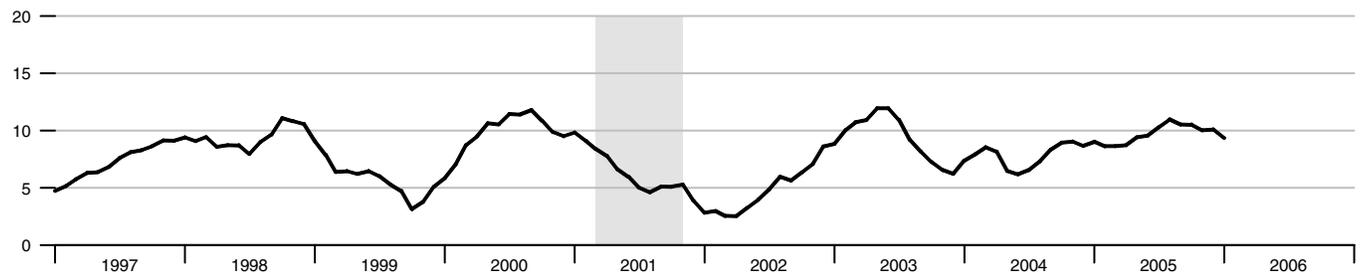
Percent change from year ago



Dashed lines indicate 10-year moving averages.

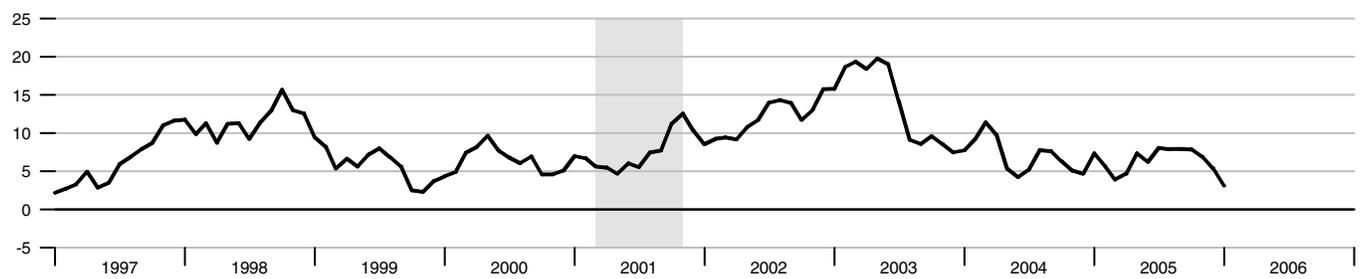
Bank Credit

Percent change from year ago



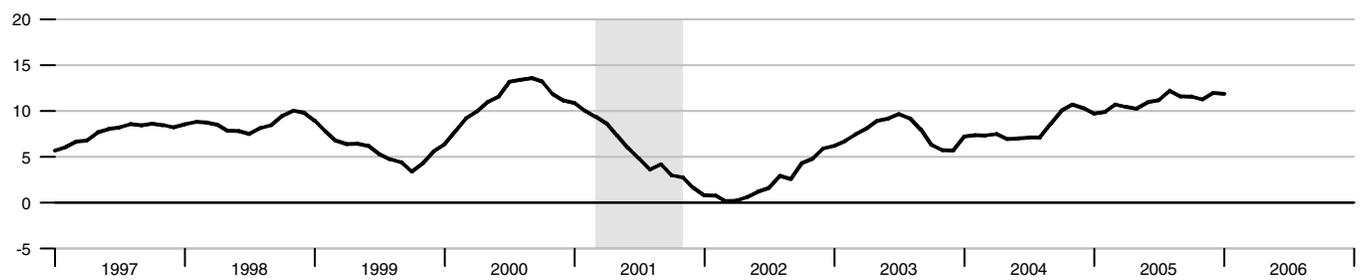
Investment Securities in Bank Credit at Commercial Banks

Percent change from year ago



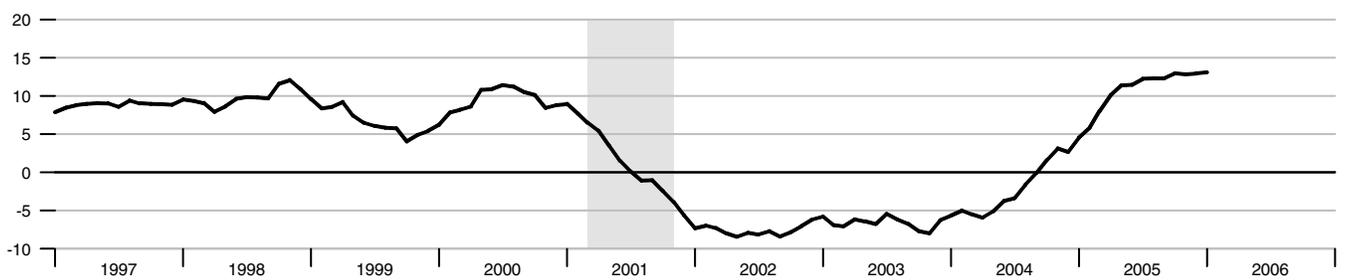
Total Loans and Leases in Bank Credit at Commercial Banks

Percent change from year ago

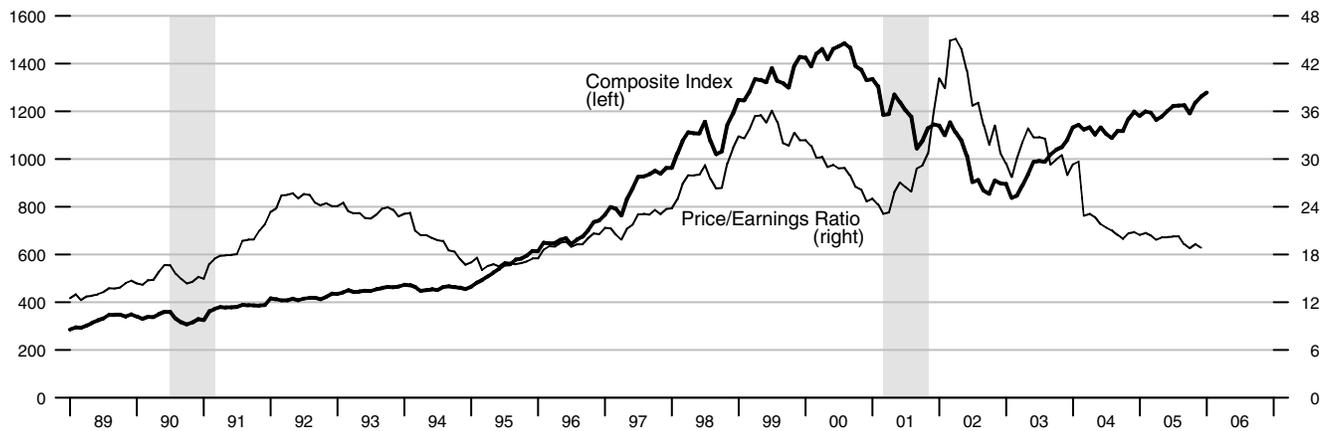


Commercial and Industrial Loans at Commercial Banks

Percent change from year ago



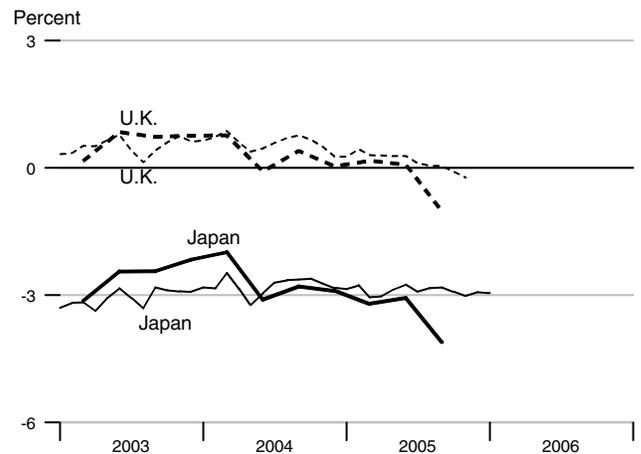
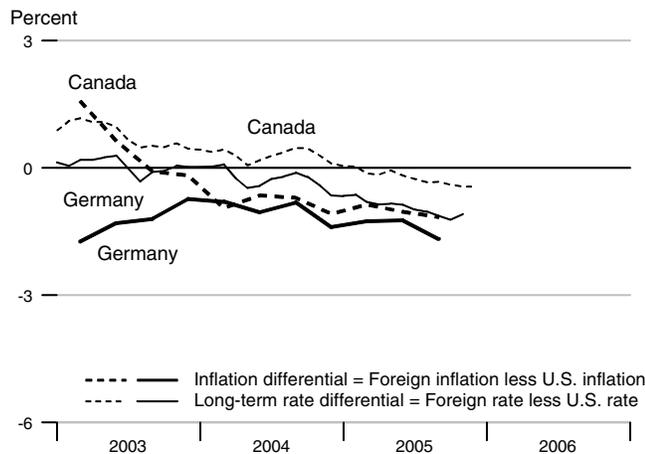
Standard & Poor's 500



Recent Inflation and Long-Term Interest Rates

	Consumer Price Inflation Rates				Long-Term Government Bond Rates			
	Percent change from year ago				Percent			
	2005Q1	2005Q2	2005Q3	2005Q4	Oct05	Nov05	Dec05	Jan06
United States	3.00	2.93	3.80	3.72	4.46	4.54	4.47	4.42
Canada	2.13	1.90	2.64	.	4.06	4.10	4.03	.
France	1.70	1.69	1.90	.	3.29	3.50	.	.
Germany	1.74	1.70	2.13	.	3.24	3.45	.	.
Italy	1.92	1.84	2.03	.	3.44	3.66	3.55	.
Japan	-0.20	-0.14	-0.31	.	1.54	1.52	1.54	1.47
United Kingdom	3.17	3.01	2.78	.	4.37	4.31	.	.

Inflation and Long-Term Interest Rate Differentials



		Money Stock				Bank	Adjusted		
		M1	MZM	M2	M3	Credit	Monetary Base	Reserves	MSI M2
2001		1140.194	5223.790	5219.729	7647.122	5343.999	641.167	86.172	271.418
2002		1196.304	5895.682	5615.341	8261.412	5596.949	697.092	88.158	294.176
2003		1273.874	6333.044	6004.852	8788.772	6120.440	740.929	93.313	315.220
2004		1344.809	6581.878	6277.881	9236.688	6597.515	776.706	96.065	329.928
2005		1368.645	6723.028	6544.202	9792.421	7238.815	806.305	96.184	343.697
2003	1	1234.075	6194.044	5862.073	8623.154	5954.723	726.942	91.199	307.662
	2	1268.163	6284.973	5978.401	8741.195	6135.072	738.455	92.122	313.758
	3	1293.883	6448.626	6097.615	8905.988	6187.760	744.335	95.167	320.092
	4	1299.373	6404.534	6081.317	8884.751	6204.205	753.986	94.762	319.367
2004	1	1318.491	6446.239	6131.124	9005.440	6428.349	761.428	95.033	322.095
	2	1339.022	6595.770	6262.097	9224.868	6560.281	771.146	96.603	329.016
	3	1352.700	6626.757	6319.858	9318.217	6645.832	782.782	96.800	332.170
	4	1369.023	6658.748	6398.444	9398.226	6755.598	791.469	95.824	336.430
2005	1	1369.836	6669.661	6455.965	9532.940	6992.301	798.244	96.652	339.429
	2	1368.644	6673.851	6497.695	9674.806	7166.573	802.634	96.047	341.429
	3	1366.778	6732.692	6569.149	9863.521	7350.299	808.398	96.288	344.932
	4	1369.323	6815.908	6653.999	10098.42	7446.086	815.945	95.748	348.998
2004	Jan	1305.957	6400.119	6088.266	8931.912	6321.749	756.795	93.210	319.883
	Feb	1319.901	6443.579	6132.086	9002.017	6442.659	763.197	95.940	322.144
	Mar	1329.614	6495.018	6173.019	9082.391	6520.638	764.293	95.949	324.258
	Apr	1339.369	6545.925	6216.884	9151.381	6540.996	767.950	97.097	326.540
	May	1336.468	6618.866	6280.601	9245.609	6549.959	770.211	95.781	330.011
	Jun	1341.229	6622.518	6288.805	9277.613	6589.888	775.276	96.930	330.498
	Jul	1343.460	6614.016	6295.411	9284.571	6602.294	780.465	95.693	330.944
	Aug	1354.143	6625.958	6317.259	9316.289	6632.673	781.530	96.029	332.012
	Sep	1360.497	6640.298	6346.905	9353.791	6702.530	786.352	98.679	333.553
	Oct	1360.805	6638.593	6369.248	9361.356	6713.829	792.251	97.564	334.872
	Nov	1374.121	6663.955	6403.997	9397.514	6759.504	793.883	96.835	336.734
	Dec	1372.144	6673.695	6422.086	9435.807	6793.462	788.274	93.073	337.683
2005	Jan	1367.044	6669.919	6436.425	9492.097	6892.721	793.547	95.100	338.430
	Feb	1369.469	6668.684	6455.705	9536.480	6999.410	800.277	97.812	339.420
	Mar	1372.994	6670.381	6475.766	9570.244	7084.771	800.907	97.043	340.438
	Apr	1365.736	6670.762	6482.699	9625.628	7112.382	802.314	97.407	340.791
	May	1370.711	6664.081	6492.131	9669.599	7166.459	800.583	94.557	341.109
	Jun	1369.486	6686.710	6518.255	9729.192	7220.878	805.005	96.176	342.386
	Jul	1362.514	6702.217	6538.453	9766.046	7281.258	805.967	95.507	343.426
	Aug	1370.388	6730.917	6568.936	9868.797	7360.589	807.387	95.637	344.897
	Sep	1367.432	6764.941	6600.058	9955.721	7409.050	811.840	97.721	346.473
	Oct	1369.176	6796.288	6629.620	10037.72	7420.577	816.105	97.295	347.803
	Nov	1370.037	6808.596	6651.951	10088.29	7437.593	816.789	96.696	348.853
	Dec	1368.755	6842.839	6680.425	10169.23	7480.088	814.941	93.254	350.338
2006	Jan	1382.478	6906.772	6743.045	10261.30	7538.485	825.255	96.496	353.350

*All values are given in billions of dollars.

		Federal Funds	Primary Credit Rate	Prime Rate	3-mo CDs	Treasury Yields			Corporate Aaa Bonds	S & L Aaa Bonds	Conventional Mortgage
						3-mo	3-yr	10-yr			
2001		3.89		6.92	3.69	3.47	4.08	5.02	7.08	5.01	6.97
2002		1.67		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
2004		1.35	2.34	4.34	1.56	1.40	2.78	4.27	5.63	4.50	5.84
2005		3.21	4.19	6.19	3.51	3.21	3.93	4.29	5.23	4.28	5.86
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
	3	1.43	2.42	4.42	1.70	1.51	2.92	4.30	5.64	4.54	5.89
	4	1.95	2.94	4.94	2.25	2.04	3.05	4.17	5.48	4.39	5.73
2005	1	2.47	3.44	5.44	2.78	2.58	3.61	4.30	5.32	4.23	5.76
	2	2.94	3.91	5.91	3.23	2.93	3.73	4.16	5.15	4.15	5.72
	3	3.46	4.43	6.43	3.74	3.43	3.98	4.21	5.09	4.28	5.76
	4	3.98	4.97	6.97	4.30	3.91	4.37	4.49	5.38	4.45	6.22
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	4.01	1.46	1.29	3.26	4.73	6.01	4.85	6.29
	Jul	1.26	2.25	4.25	1.57	1.36	3.05	4.50	5.82	4.71	6.06
	Aug	1.43	2.43	4.43	1.68	1.50	2.88	4.28	5.65	4.52	5.87
	Sep	1.61	2.58	4.58	1.86	1.68	2.83	4.13	5.46	4.40	5.75
	Oct	1.76	2.75	4.75	2.04	1.79	2.85	4.10	5.47	4.38	5.72
	Nov	1.93	2.93	4.93	2.26	2.11	3.09	4.19	5.52	4.45	5.73
	Dec	2.16	3.15	5.15	2.45	2.22	3.21	4.23	5.47	4.35	5.75
2005	Jan	2.28	3.25	5.25	2.61	2.37	3.39	4.22	5.36	4.24	5.71
	Feb	2.50	3.49	5.49	2.77	2.58	3.54	4.17	5.20	4.16	5.63
	Mar	2.63	3.58	5.58	2.97	2.80	3.91	4.50	5.40	4.29	5.93
	Apr	2.79	3.75	5.75	3.09	2.84	3.79	4.34	5.33	4.18	5.86
	May	3.00	3.98	5.98	3.22	2.90	3.72	4.14	5.15	4.20	5.72
	Jun	3.04	4.01	6.01	3.38	3.04	3.69	4.00	4.96	4.08	5.58
	Jul	3.26	4.25	6.25	3.57	3.29	3.91	4.18	5.06	4.18	5.70
	Aug	3.50	4.44	6.44	3.77	3.52	4.08	4.26	5.09	4.33	5.82
	Sep	3.62	4.59	6.59	3.87	3.49	3.96	4.20	5.13	4.34	5.77
	Oct	3.78	4.75	6.75	4.13	3.79	4.29	4.46	5.35	4.49	6.07
	Nov	4.00	5.00	7.00	4.31	3.97	4.43	4.54	5.42	4.42	6.33
	Dec	4.16	5.15	7.15	4.45	3.97	4.39	4.47	5.37	4.46	6.27
2006	Jan	4.29	5.26	7.26	4.56	4.34	4.35	4.42	5.30	4.27	6.15

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

		M1	MZM	M2	M3
Percent change at an annual rate					
2001		3.33	15.88	8.77	11.47
2002		4.92	12.86	7.58	8.03
2003		6.48	7.42	6.94	6.38
2004		5.57	3.93	4.55	5.10
2005		1.77	2.14	4.24	6.02
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2003	1	7.88	7.90	6.65	6.77
	2	11.05	5.87	7.94	5.48
	3	8.11	10.42	7.98	7.54
	4	1.70	-2.73	-1.07	-0.95
2004	1	5.89	2.60	3.28	5.43
	2	6.23	9.28	8.54	9.75
	3	4.09	1.88	3.69	4.05
	4	4.83	1.93	4.97	3.43
2005	1	0.24	0.66	3.60	5.73
	2	-0.35	0.25	2.59	5.95
	3	-0.55	3.53	4.40	7.80
	4	0.74	4.94	5.17	9.53
<hr/>					
2004	Jan	1.58	2.43	1.76	7.83
	Feb	12.81	8.15	8.64	9.42
	Mar	8.83	9.58	8.01	10.71
	Apr	8.80	9.41	8.53	9.12
	May	-2.60	13.37	12.30	12.36
	Jun	4.27	0.66	1.57	4.15
	Jul	2.00	-1.54	1.26	0.90
	Aug	9.54	2.17	4.16	4.10
	Sep	5.63	2.60	5.63	4.83
	Oct	0.27	-0.31	4.22	0.97
	Nov	11.74	4.58	6.55	4.63
	Dec	-1.73	1.75	3.39	4.89
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2005	Jan	-4.46	-0.68	2.68	7.16
	Feb	2.13	-0.22	3.59	5.61
	Mar	3.09	0.31	3.73	4.25
	Apr	-6.34	0.07	1.28	6.94
	May	4.37	-1.20	1.75	5.48
	Jun	-1.07	4.07	4.83	7.40
	Jul	-6.11	2.78	3.72	4.55
	Aug	6.93	5.14	5.59	12.63
	Sep	-2.59	6.07	5.69	10.57
	Oct	1.53	5.56	5.37	9.88
	Nov	0.75	2.17	4.04	6.05
	Dec	-1.12	6.04	5.14	9.63
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2006	Jan	12.03	11.21	11.25	10.86

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** and **Real Treasury Yield Curve** show constant maturity yields calculated by the U.S. Treasury for securities 5, 7, 10, and 20 years to maturity. **Inflation-Indexed Treasury Yield Spreads** are a

measure of inflation compensation at those horizons, and it is simply the nominal constant maturity yield less the real constant maturity yield. 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 testimony that accompanies the Monetary Policy Report to the Congress. Beginning February 2000, the FOMC began using the personal consumption expenditures (PCE) price index to report its inflation range; the FOMC then switched to the PCE chain-type price index excluding food and energy prices ("core") beginning July 2004. Accordingly, neither are 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 $((y_t - y_{t-40})/40) \times 400$, 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 $m = 1, \dots, 10$ 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 Securities and Yield Spreads** are those plotted on page 3. **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 7/25/2015, the current U.K. note has a maturity date of 8/16/2013, and the current U.S. note has a maturity date of 7/15/2015. **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.

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Note: *Available on the Internet at research.stlouisfed.org/publications/review/.