Monetary Trends

September 2005

The Monetary Policy Transmission Mechanism?

Despite the fact that the Federal Open Market Committee (FOMC) has increased its target for the federal funds rate by 25 basis points at each of its previous ten meetings, and markets anticipate still further increases, the 10-year Treasury yield has remained largely unchanged. (See p. 9.) Chairman Greenspan recently suggested that the behavior of long-term rates in the face of such changes in the funds rate is "clearly without precedent in our recent experience."[1]

In his final speech before leaving the Fed, former Governor Ben Bernanke gave an explanation for this "unprecedented" experience. Specifically, Bernanke provides strong evidence that "the relatively low level of long-term real interest rates in the world today" is the result of structural change over the past decade that "has created a significant increase in the global supply of saving—a global saving glut."[2] One possible implication of Bernanke's analysis is that domestic real long-term interest rates are determined in a global market, whereas short-term interest rates are determined in domestic markets by monetary policy actions. If real long-term yields are determined in the global market, the core real rate in each country would be the same. Cross-country differences would be due to idiosyncratic risk factors. This possibility is supported by the fact that the inflation index yields on long-term bonds in the United States, France, and the United Kingdom have been relatively close to each other and behaved similarly in recent years. (See p. 11.)

The possibility that domestic real long-term interest rates are segmented from domestic short-term rates has strong implications for perhaps the most widely held theory of the monetary policy transmission mechanism—the interest rate channel of monetary policy.

The interest rate channel of monetary policy exists if monetary policy actions affect interest rates that cause individuals and businesses to alter their spending decisions that, in turn, bring about changes in output and prices. While consumption accounts for more than two thirds of gross domestic product (GDP), it is relatively stable over time and is thought to be relatively insensitive to changes in interest rates. In contrast, GDP's most variable component, investment, is thought to be more interest sensitive. Investment spending might be more sensitive to long-term interest rates than to short-term rates, such as the overnight federal funds rate, which the FOMC targets. The crucial link between the federal funds rate and the long-term rate is the expectations hypothesis (EH), which states that at each point in time the long-term rate is equal to the average of the short-term rate expected to prevail over the maturity of the long-term asset plus a constant risk premium. If the EH is correct, policymakers affect long-term rates by changing current and expected future short-term rates. There is virtually no empirical support for empirical implications of the EH, however. The possibility that domestic real long-term interest rates are segmented from domestic short-term rates provides a new reason to question its validity and, consequently, the interest rate channel of monetary policy.

If long-term real interest rates are determined in a global market, the FOMC's scope for affecting domestic real long-term yields by adjusting its target for the federal funds rate may be limited. It seems unlikely that changes in U.S. monetary policy would have no impact on conditions in the global market. Nevertheless, to the extent that long-term rates are affected by conditions other than the market's expectation of short-term interest rates, both the magnitude and timing of the effect of FOMC actions on long-term rates would be limited—hence, so would any impact that monetary policy has on inflation and output through the adjustment of long-term interest rates.

Of course, if the Fed affects inflation and output mainly through short-term interest rates, rather than long-term rates, the FOMC's ability to influence economic activity via the interest rate channel would not be impaired. Finally, the possible segmentation of the long-term rate from the effect of policy actions on the short-term rate may not impair the FOMC's effectiveness if monetary policy works through other channels.

—Daniel L. Thornton

[1] Greenspan, Alan. Monetary Policy Report to the Congress before the Committee on Financial Services, U.S. House of Representatives, July 20, 2005; http://www.federalreserve.gov/boarddocs/hh/2005/july/testimony.htm.

[2] Bernanke, Ben S. "The Global Saving Glut and the U.S. Current Account Deficit." Speech presented as the Sandridge Lecture, Richmond, Virginia, April 14, 2005; http://www.federalreserve.gov/boarddocs/speeches/2005/20050414/default.htm.

Contents

Conventions used in this publication:

1. Unless otherwise indicated, data are monthly.
2. Shaded areas indicate recessions, as determined by the National Bureau of Economic Research.
3. *Percent change at an annual rate* is the simple, not compounded, monthly percent change multiplied by 12. For example, using consecutive months, the percent change at an annual rate in x between month $t-1$ and the current month t is: $[(x_t/x_{t-1})-1]\times 1200$. Note that this differs from *National Economic Trends.* In that publication, monthly percent changes are compounded and expressed as annual growth rates.
4. The *percent change from year ago* refers to the percent change from the same period in the previous year. For example, the percent change from year ago in x between month $t-12$ and the current month t is: $[(x_t/x_{t-12})-1]\times 100$.

We welcome your comments addressed to:

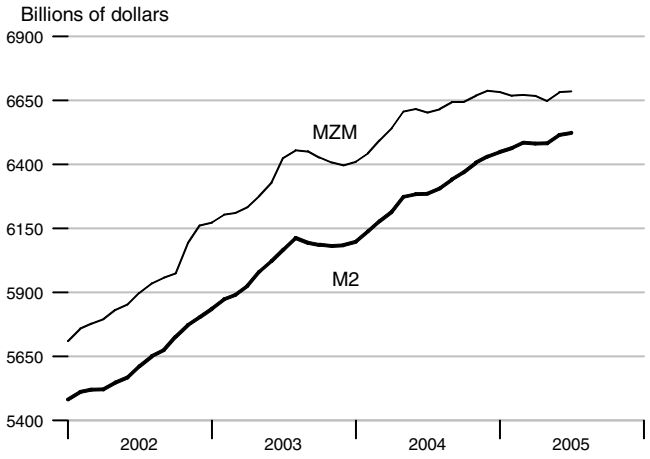
Editor, *Monetary Trends*
Research Division
Federal Reserve Bank of St. Louis
P.O. Box 442
St. Louis, MO 63166-0442

or to:

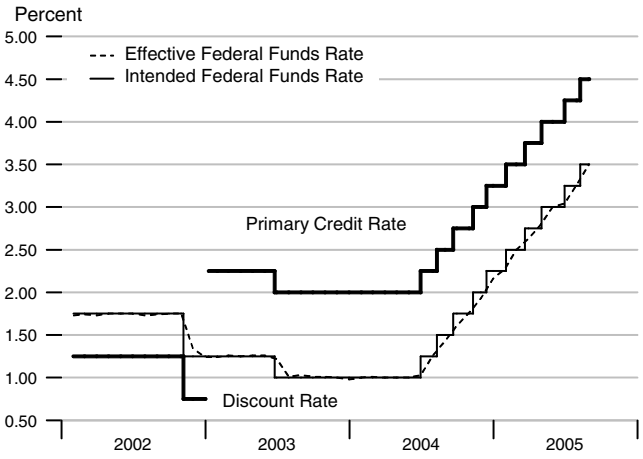
stlsFRED@stls.frb.org

Monetary Trends is published monthly by the Research Division of the Federal Reserve Bank of St. Louis. Visit the Research Division's website at research.stlouisfed.org/publications/mt to download the current version of this publication or register for e-mail notification updates. For more information on data in the publication, please visit research.stlouisfed.org/fred2 or call (314) 444-8590.

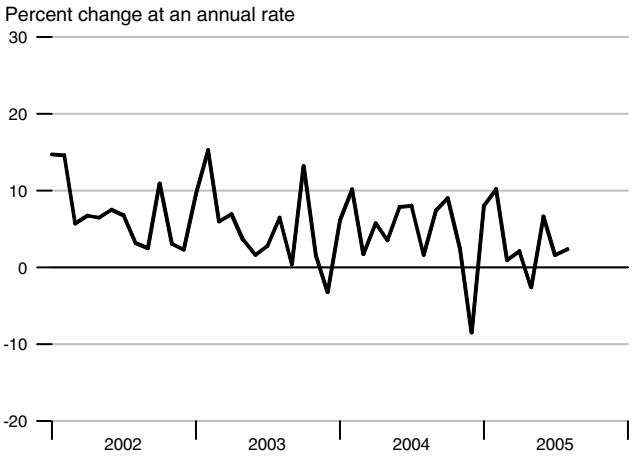
M2 and MZM



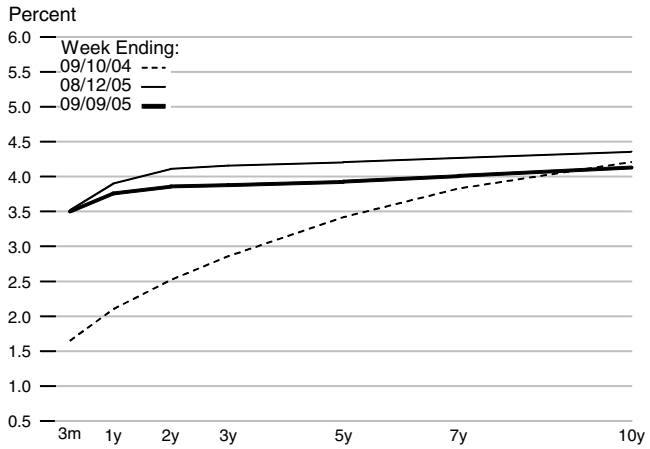
Reserve Market Rates



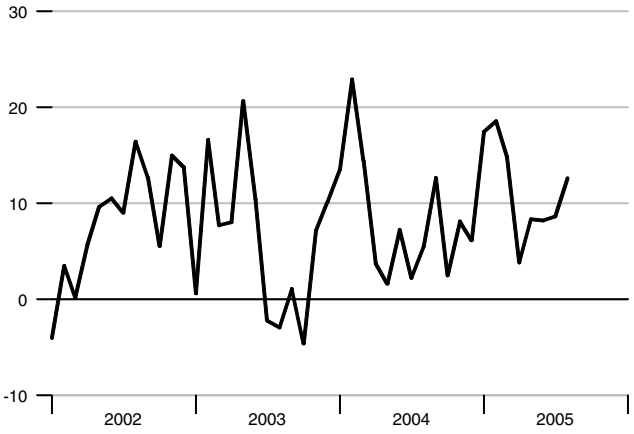
Adjusted Monetary Base



Treasury Yield Curve



Total Bank Credit

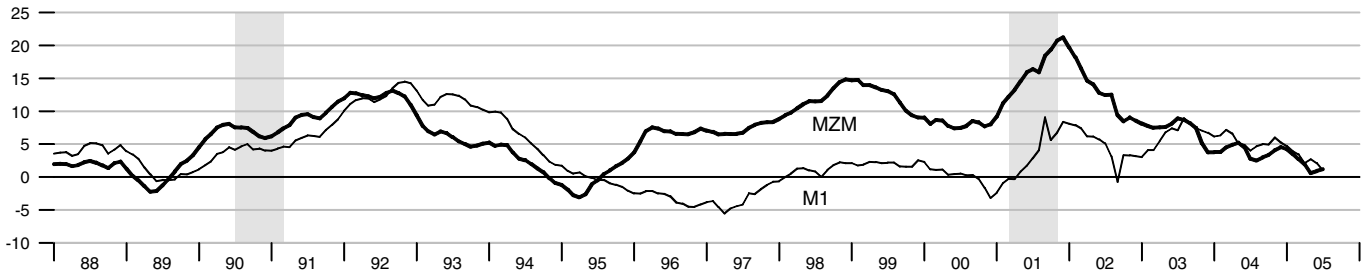


Interest Rates

	Jun 05	Jul 05	Aug 05
Federal Funds Rate	3.04	3.26	3.50
Prime Rate	6.01	6.25	6.44
Primary Credit Rate	4.01	4.25	4.44
Conventional Mortgage Rate	5.58	5.70	5.82
Treasury Yields:			
3-Month Constant Maturity	3.04	3.29	3.52
6-Month Constant Maturity	3.22	3.53	3.78
1-Year Constant Maturity	3.36	3.64	3.87
3-Year Constant Maturity	3.69	3.91	4.08
5-Year Constant Maturity	3.77	3.98	4.12
10-Year Constant Maturity	4.00	4.18	4.26

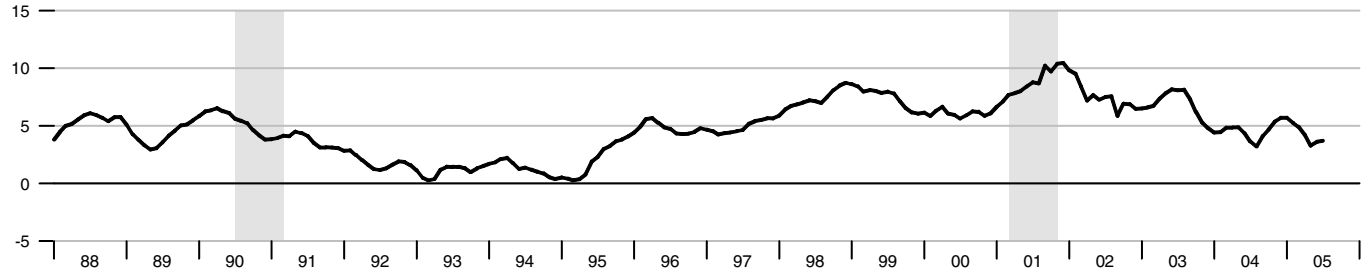
MZM and M1

Percent change from year ago



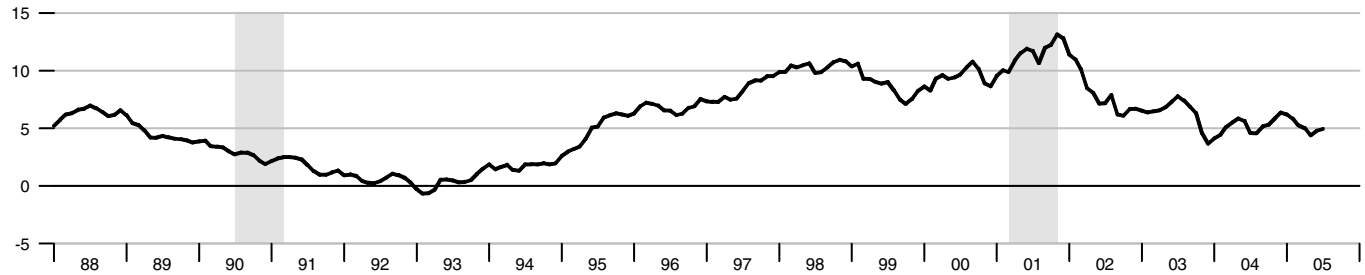
M2

Percent change from year ago



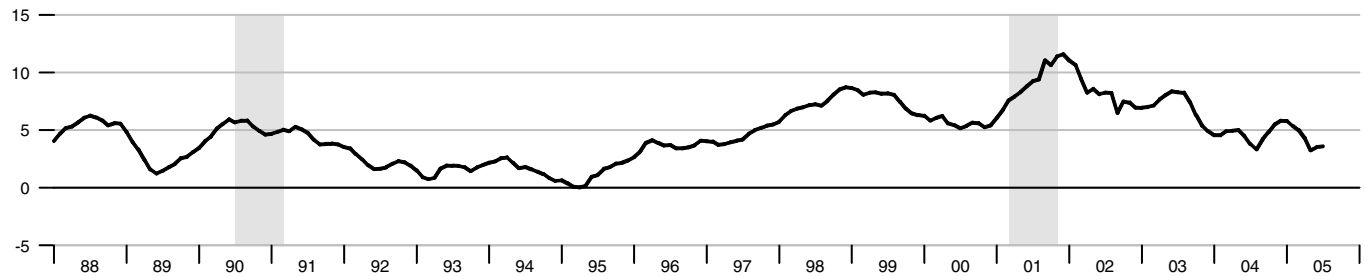
M3

Percent change from year ago



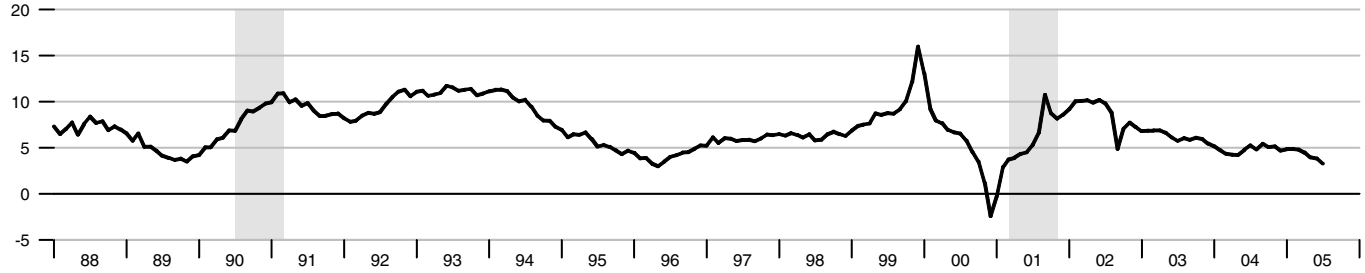
Monetary Services Index - M2

Percent change from year ago



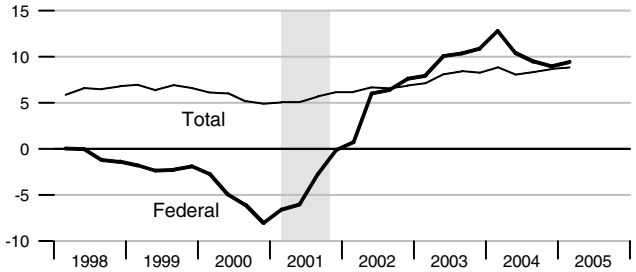
Adjusted Monetary Base

Percent change from year ago



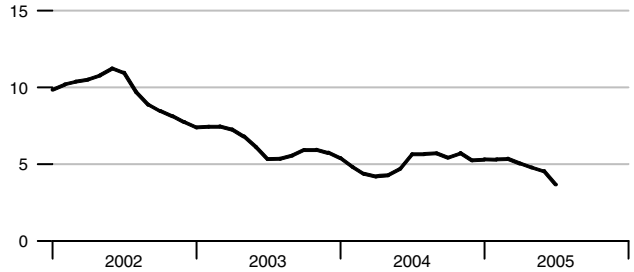
Domestic Nonfinancial Debt

Percent change from year ago



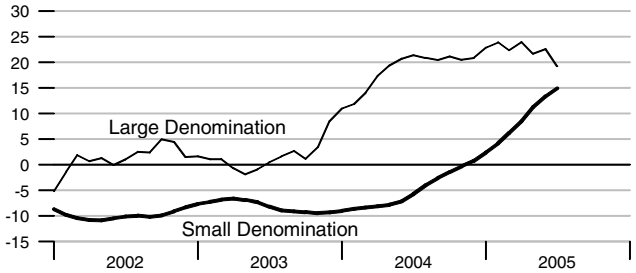
Currency Held by the Nonbank Public

Percent change from year ago



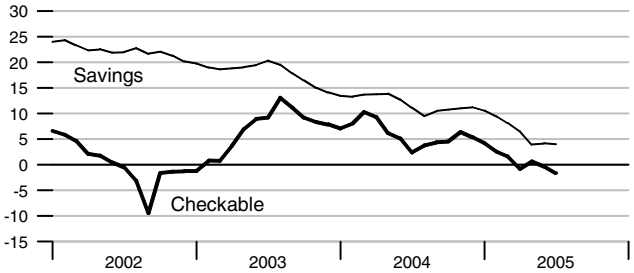
Time Deposits

Percent change from year ago



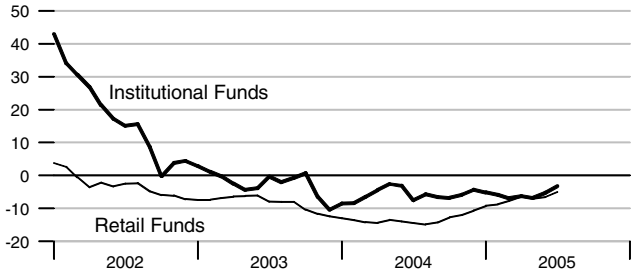
Checkable and Savings Deposits

Percent change from year ago



Money Market Mutual Fund Shares

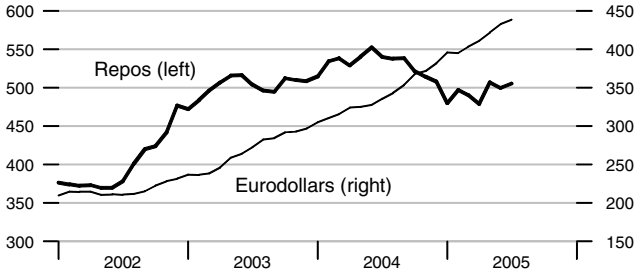
Percent change from year ago



Repurchase Agreements and Eurodollars

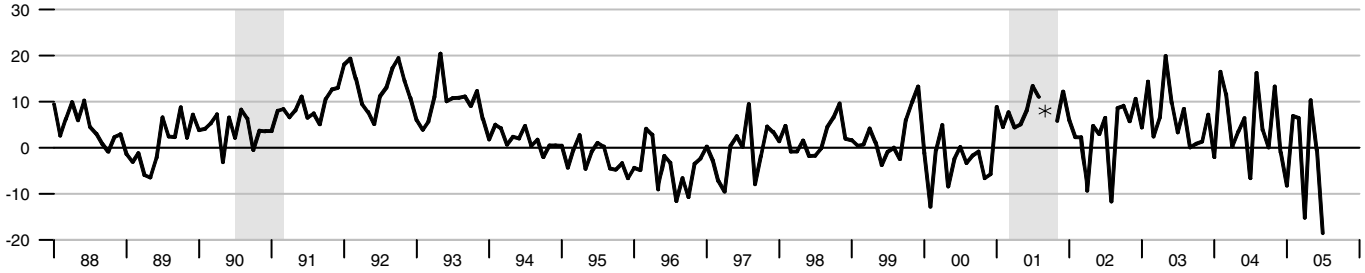
Billions of dollars

Billions of dollars



M1

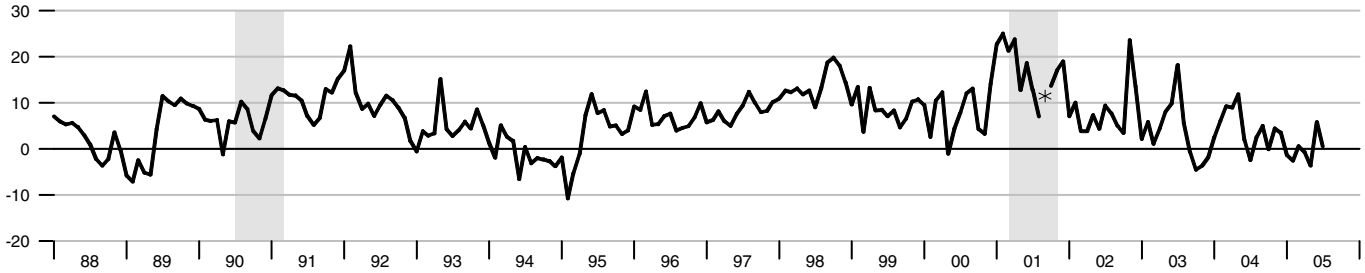
Percent change at an annual rate



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

MZM

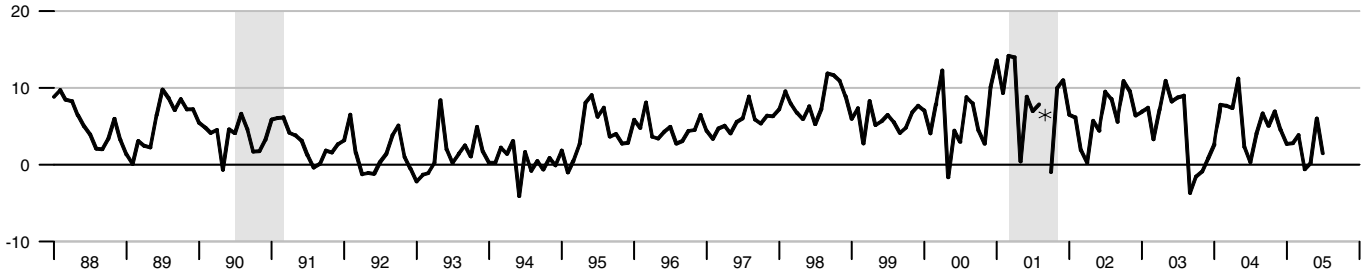
Percent change at an annual rate



*Actual value for September 2001 is 39.41 percent rate.

M2

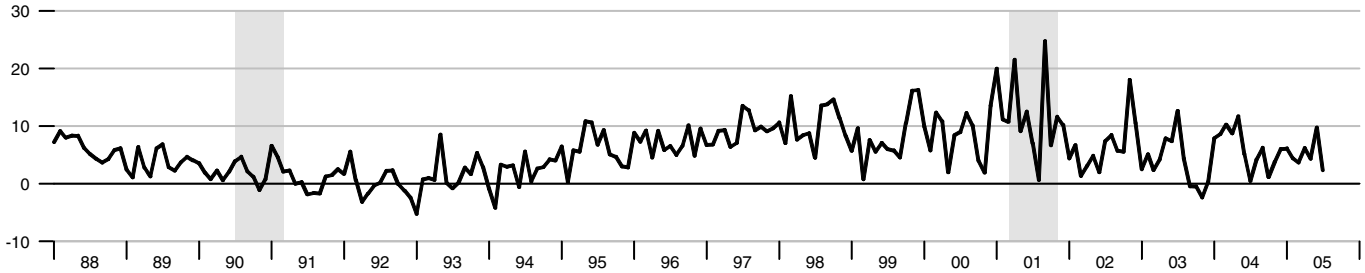
Percent change at an annual rate



*Actual value for September 2001 is 24.90 percent rate.

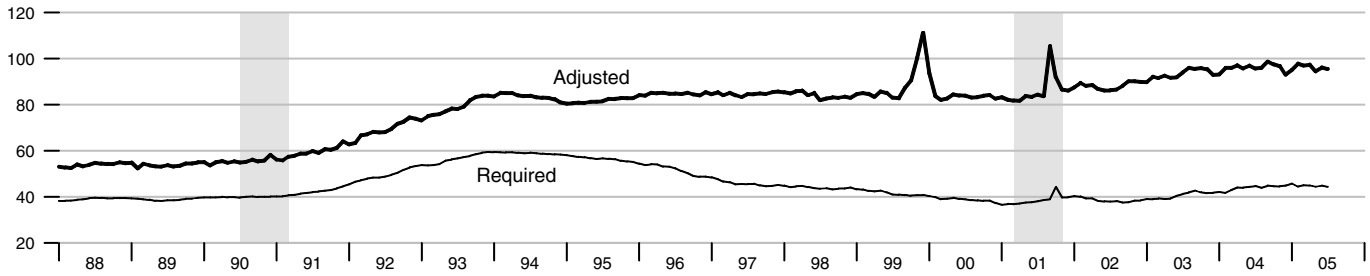
M3

Percent change at an annual rate



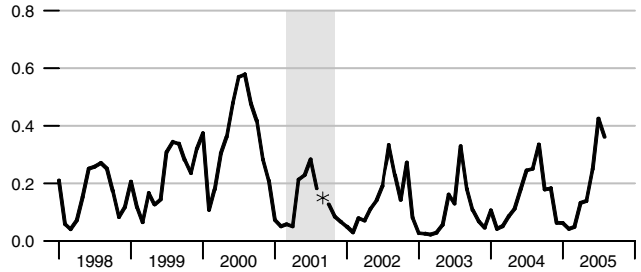
Adjusted and Required Reserves

Billions of dollars



Total Borrowings, nsa

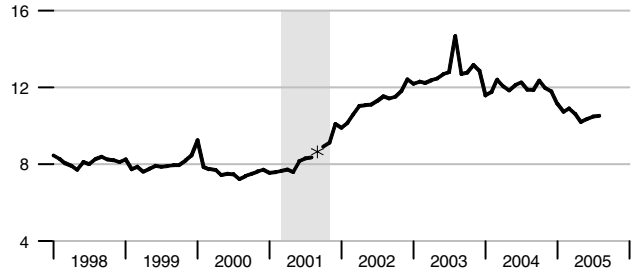
Billions of dollars



*Actual value for September 2001 is $3.4 billion.

Excess Reserves plus RCB Contracts

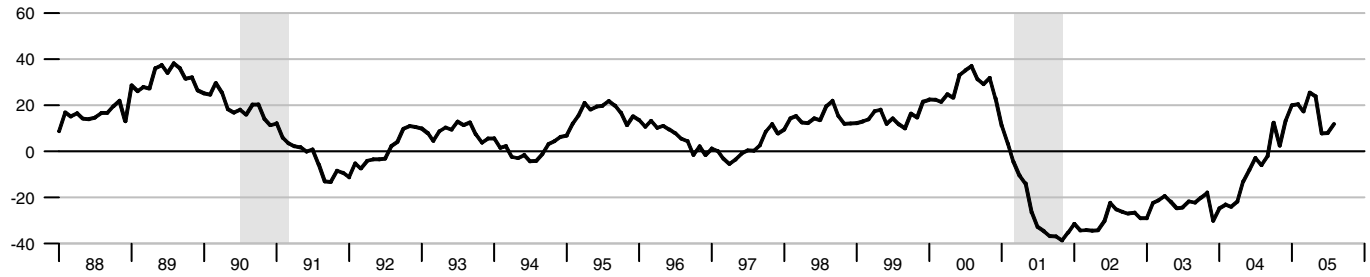
Billions of dollars



*Actual value for September 2001 is $26.43 billion.

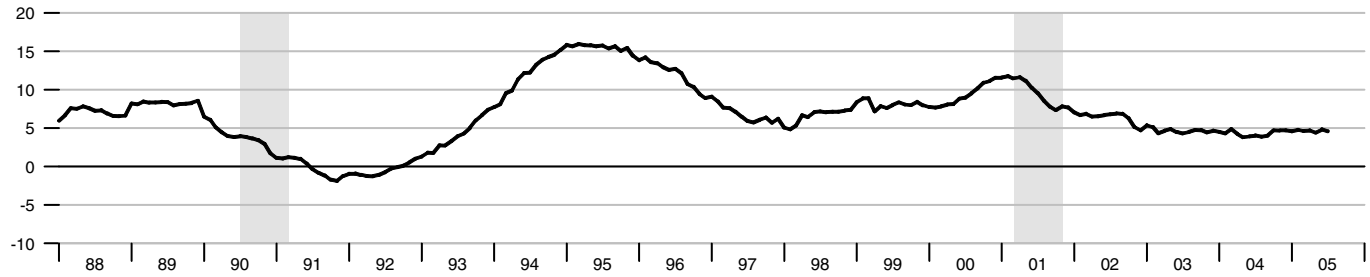
Nonfinancial Commercial Paper

Percent change from year ago

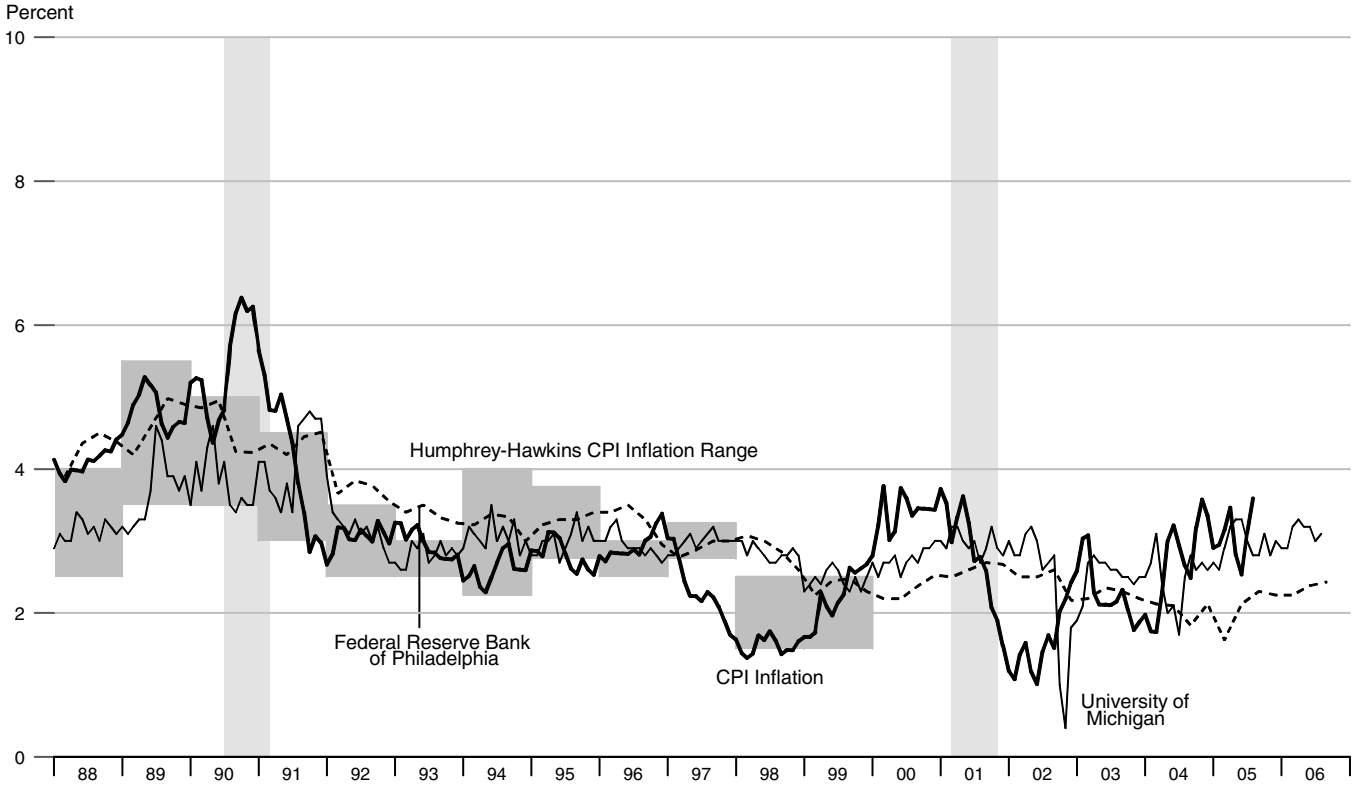


Consumer Credit

Percent change from year ago

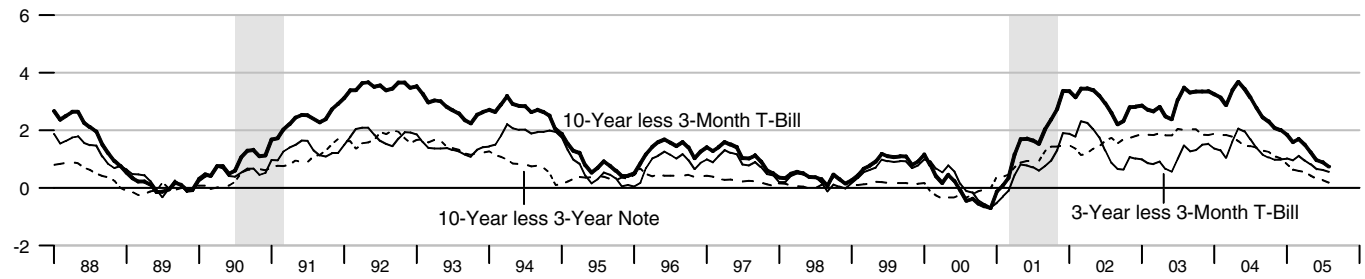


Inflation and Inflation Expectations

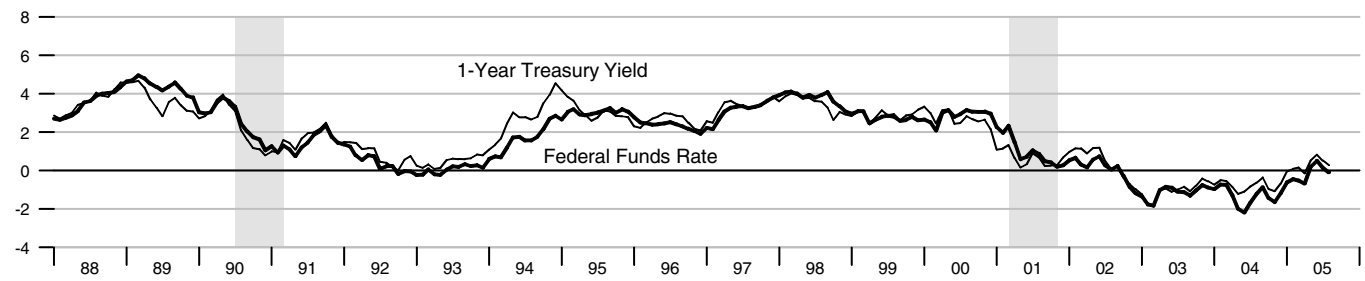


The shaded region shows the Humphrey-Hawkins CPI inflation range. Beginning in January 2000, the Humphrey-Hawkins inflation range was reported using the PCE price index and therefore is not shown on this graph. See notes on page 19.

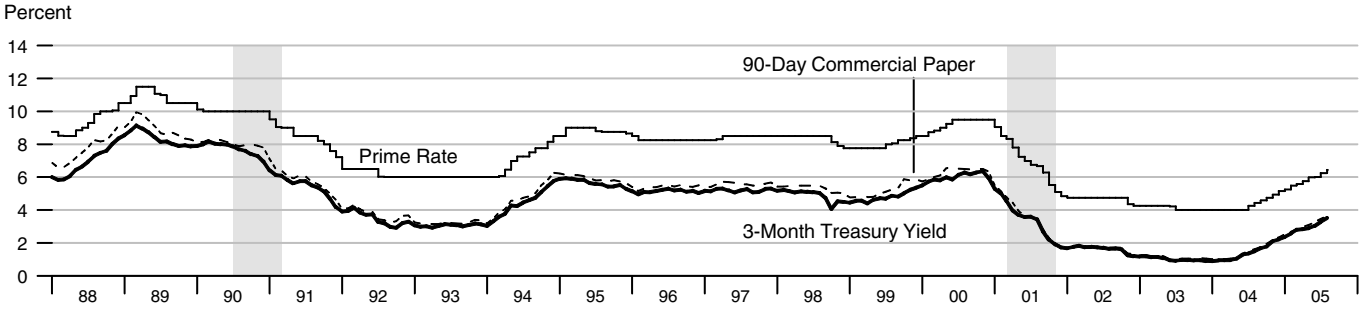
Treasury Security Yield Spreads



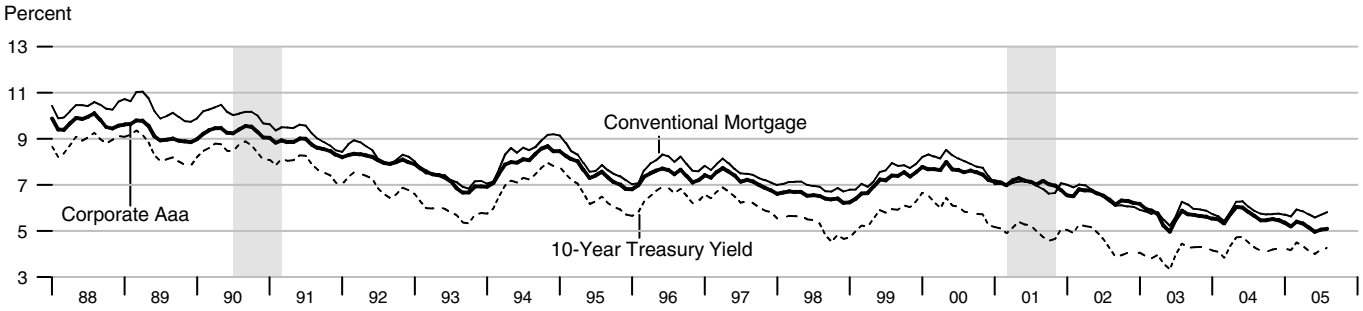
Real Interest Rates



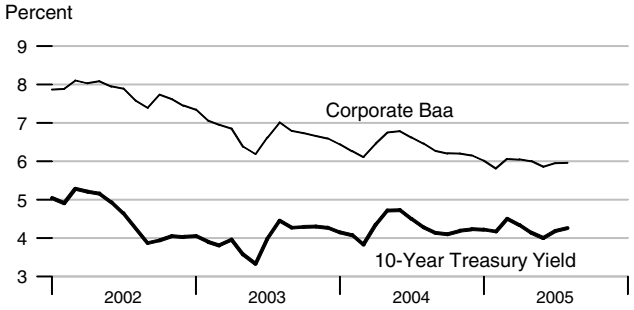
Short-Term Interest Rates



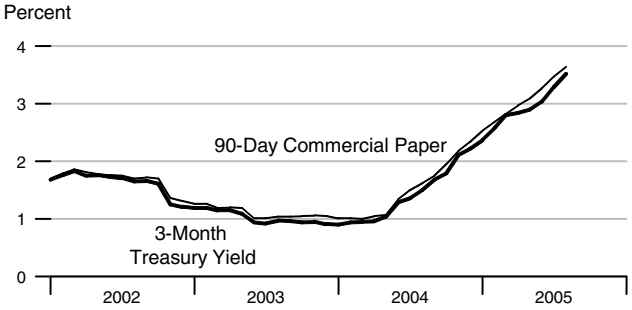
Long-Term Interest Rates



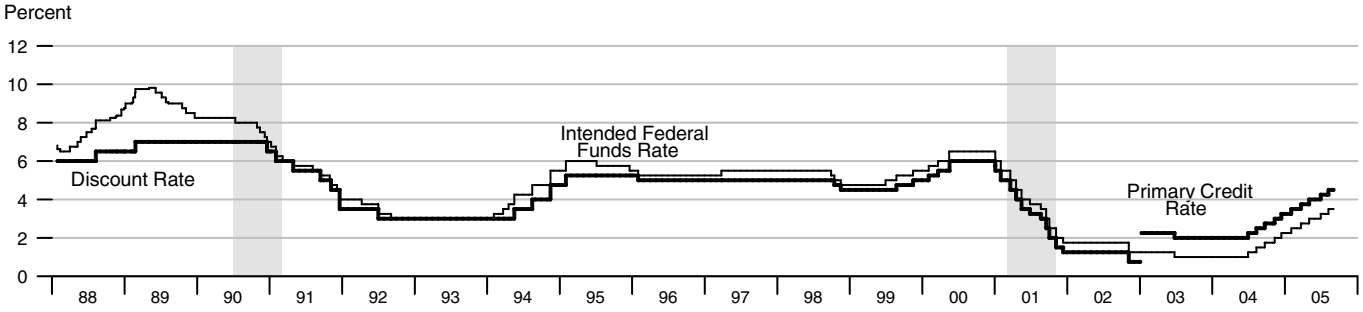
Long-Term Interest Rates



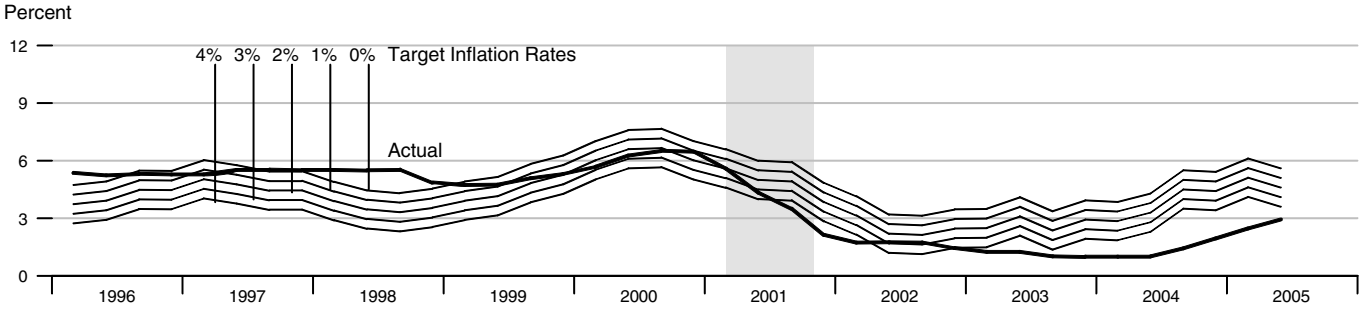
Short-Term Interest Rates



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



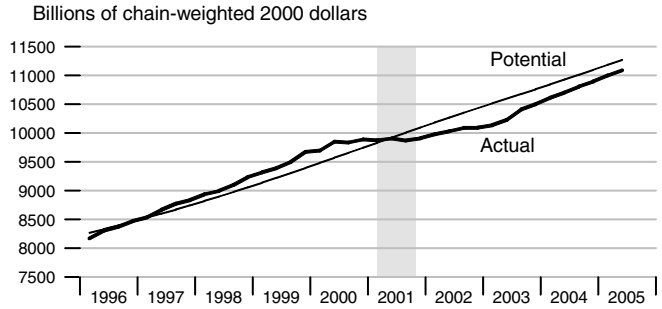
Federal Funds Rate and Inflation Targets



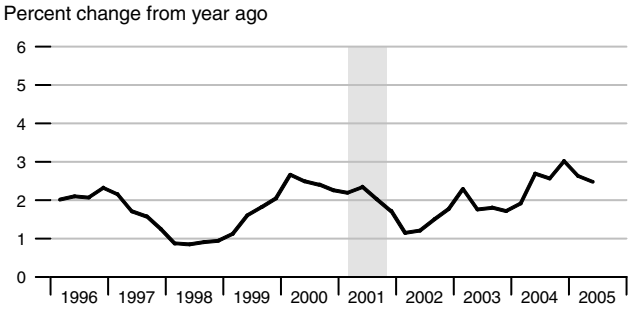
Calculated federal funds rate is based on Taylor's rule. See notes on page 19.

Components of Taylor's Rule

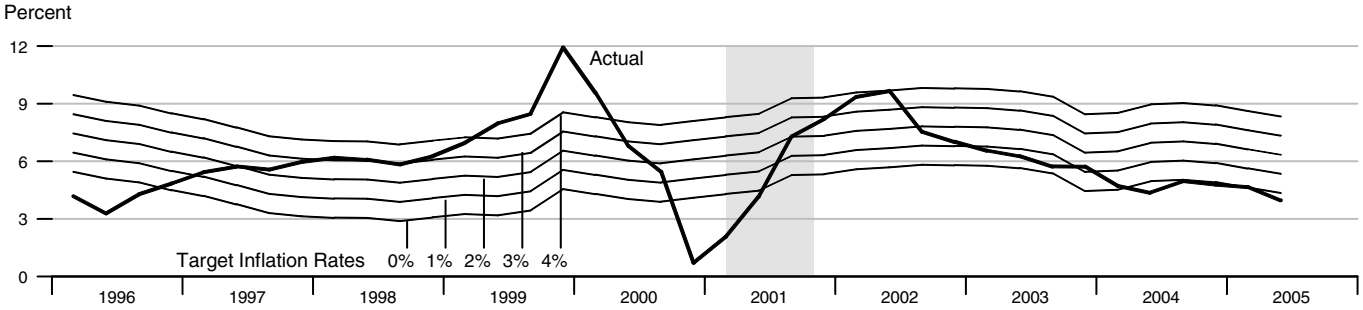
Actual and Potential Real GDP



PCE Inflation



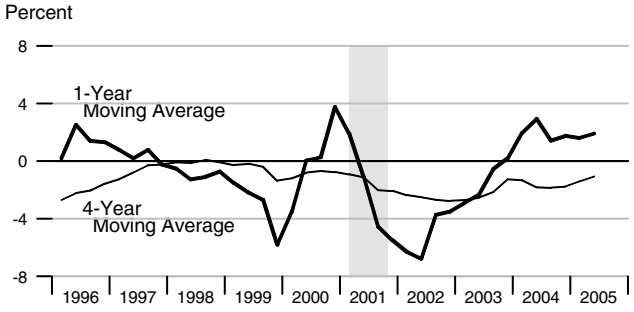
Monetary Base Growth* and Inflation Targets



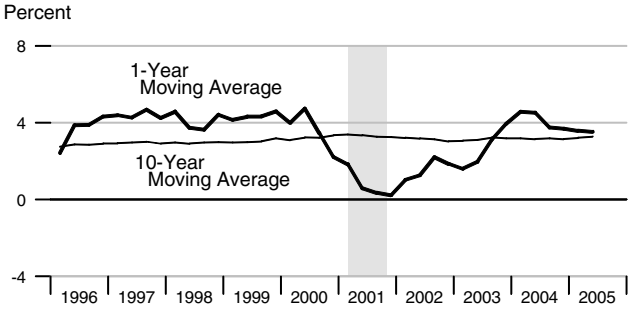
*Modified for the effects of sweeps programs on reserve demand.
Calculated base growth is based on McCallum's rule. Actual base growth is percent change from year ago. See notes on page 19.

Components of McCallum's Rule

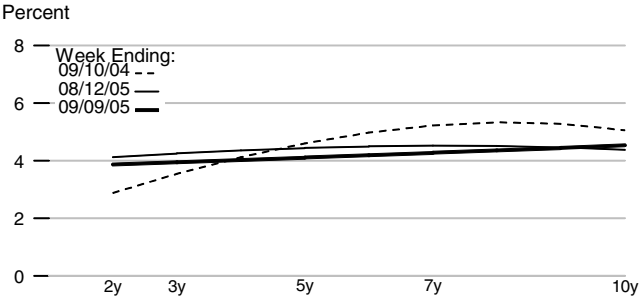
Monetary Base Velocity Growth



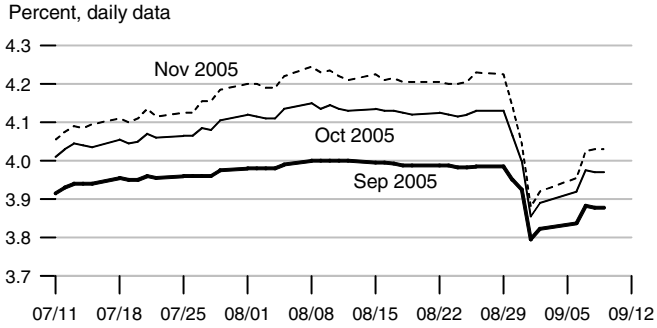
Real Output Growth



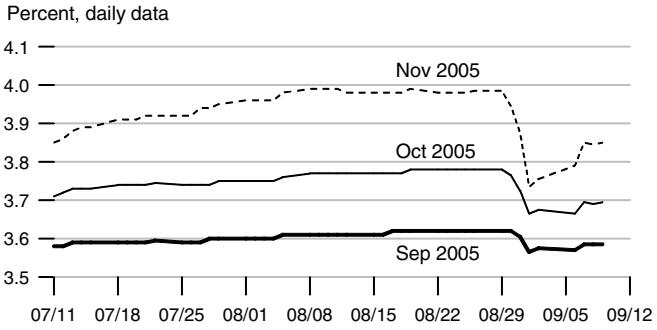
Implied One-Year Forward Rates



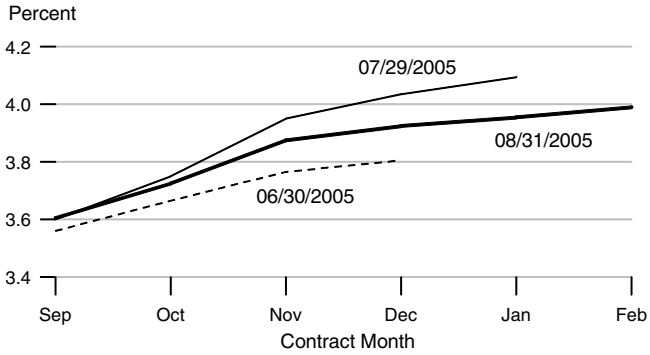
Rates on 3-Month Eurodollar Futures



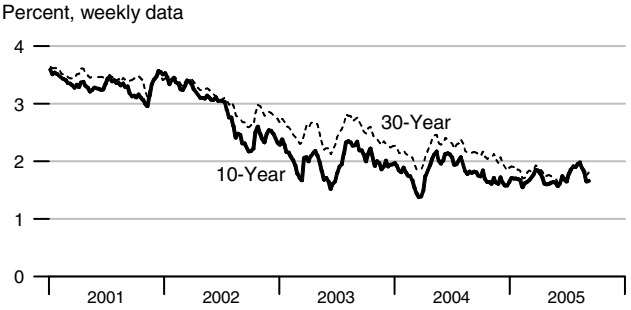
Rates on Selected Federal Funds Futures Contracts



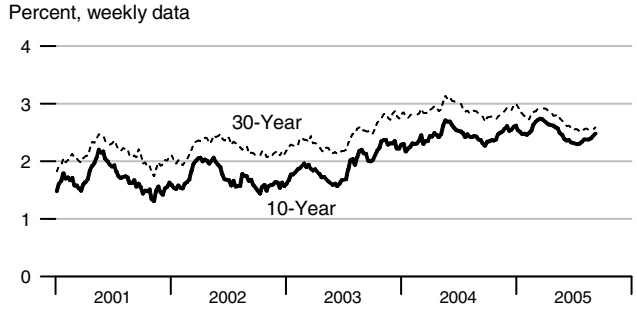
Rates on Federal Funds Futures on Selected Dates



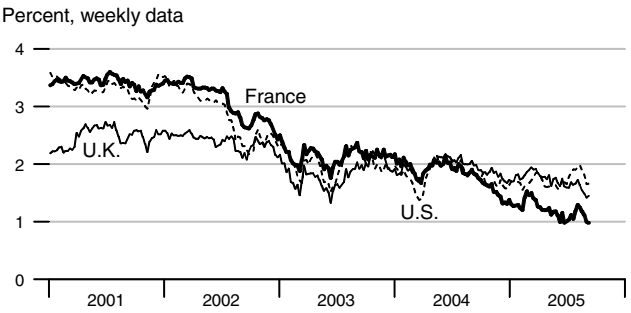
Inflation-Indexed Treasury Securities



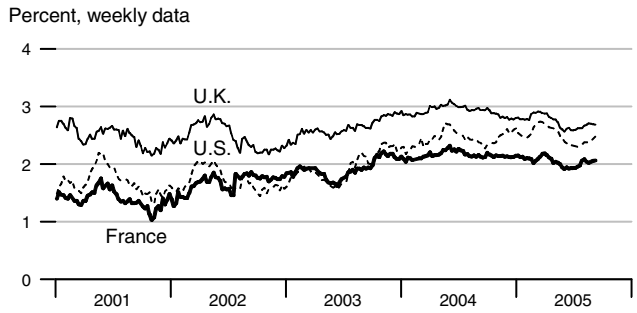
Inflation-Indexed Treasury Yield Spreads



Inflation-Indexed 10-Year Government Notes

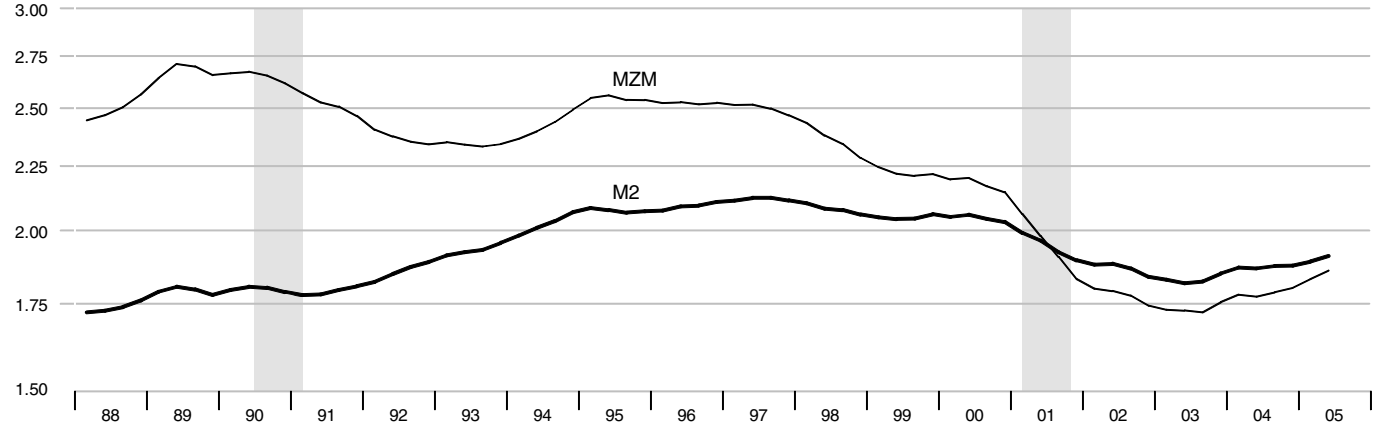


Inflation-Indexed 10-Year Government Yield Spreads



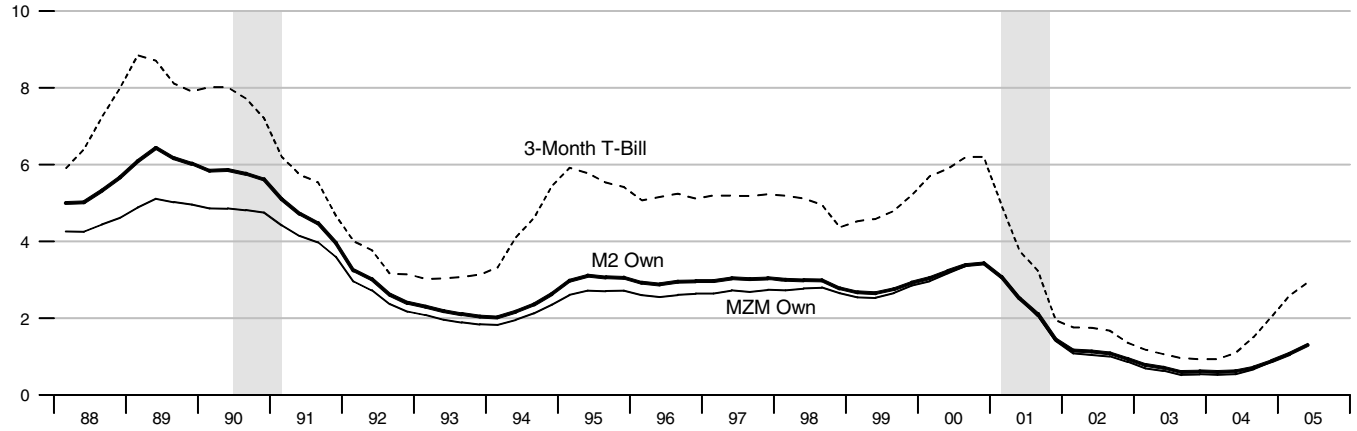
Velocity

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



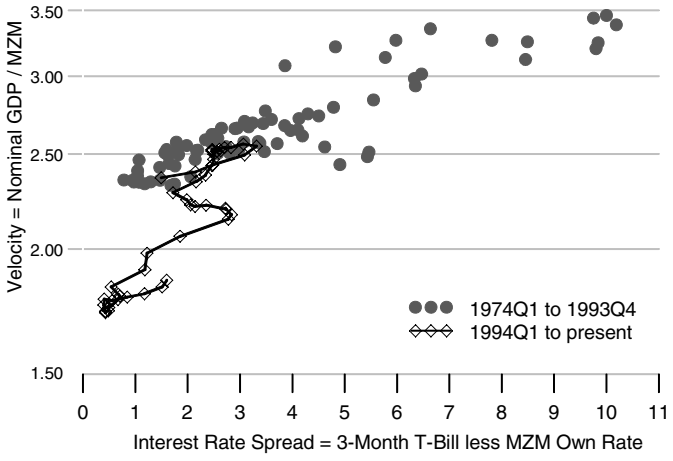
Interest Rates

Percent



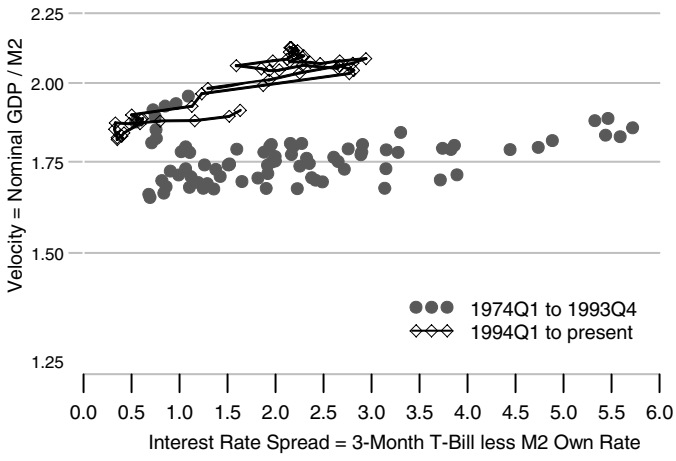
MZM Velocity and Interest Rate Spread

Ratio Scale



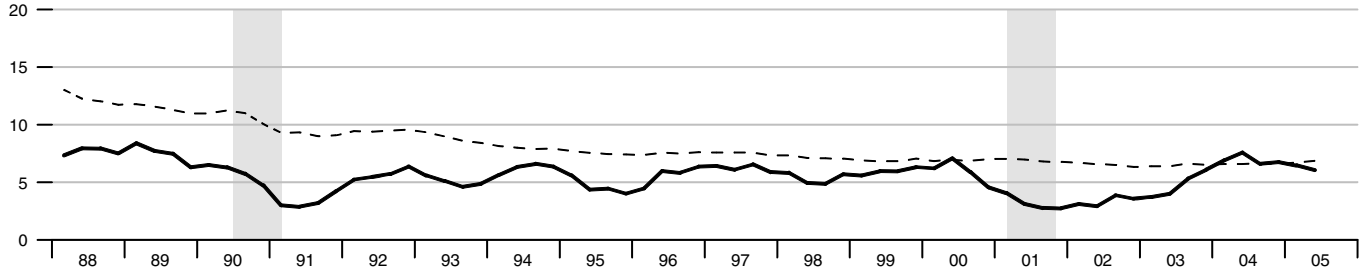
M2 Velocity and Interest Rate Spread

Ratio Scale



Gross Domestic Product

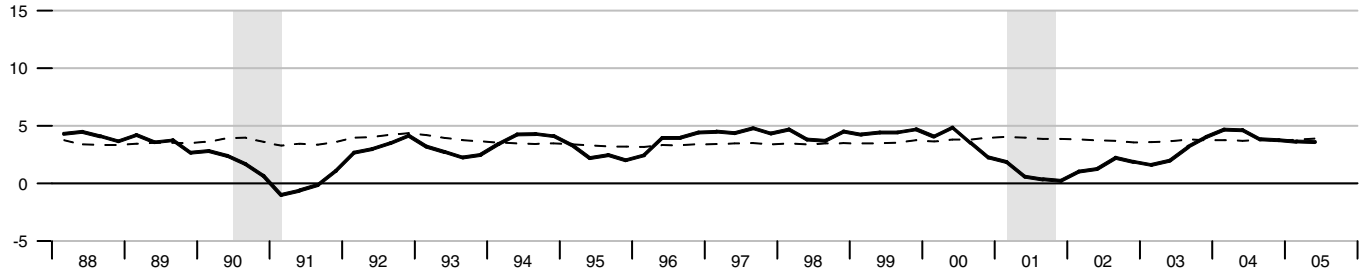
Percent change from year ago



Dashed lines indicate 10-year moving averages.

Real Gross Domestic Product

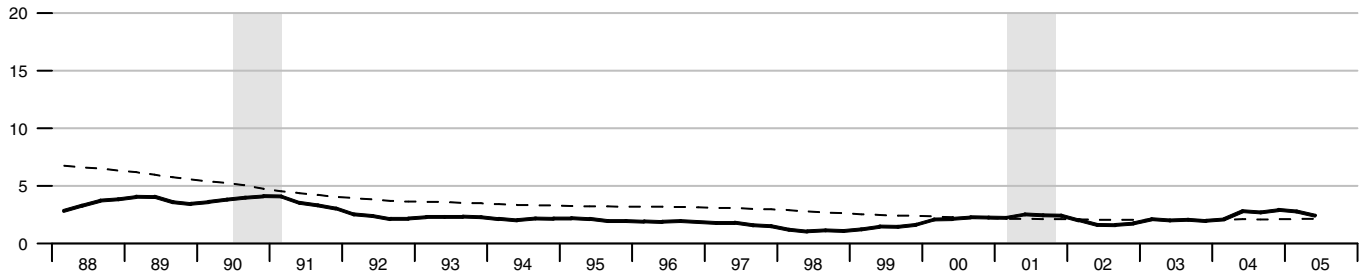
Percent change from year ago



Dashed lines indicate 10-year moving averages.

Gross Domestic Product Price Index

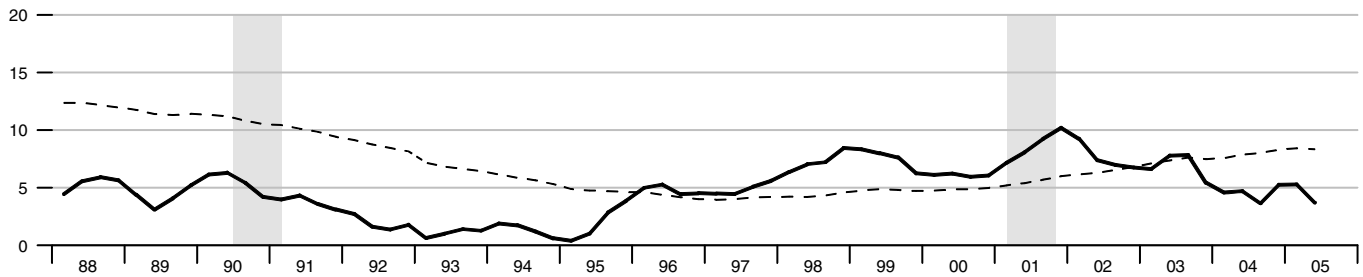
Percent change from year ago



Dashed lines indicate 10-year moving averages.

M2

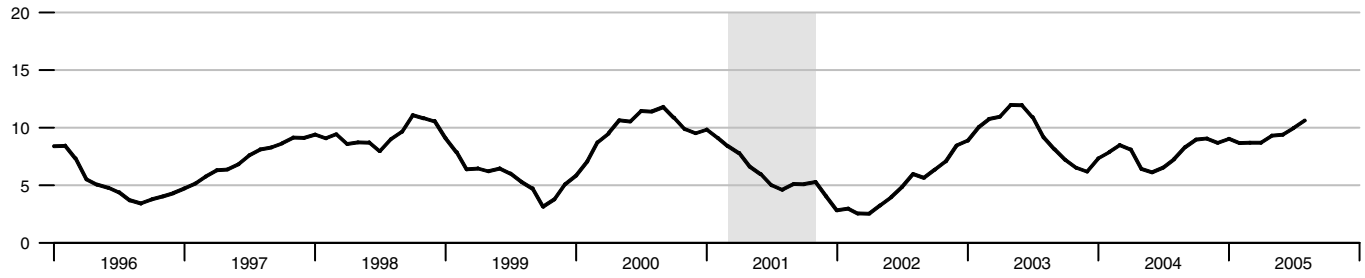
Percent change from year ago



Dashed lines indicate 10-year moving averages.

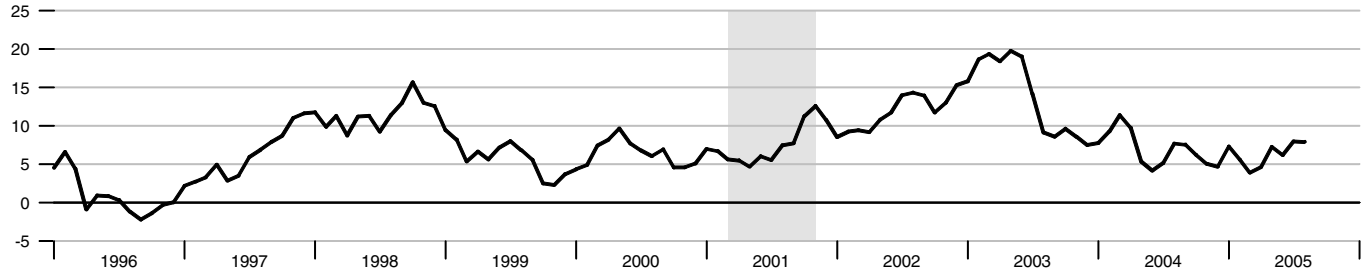
Bank Credit

Percent change from year ago



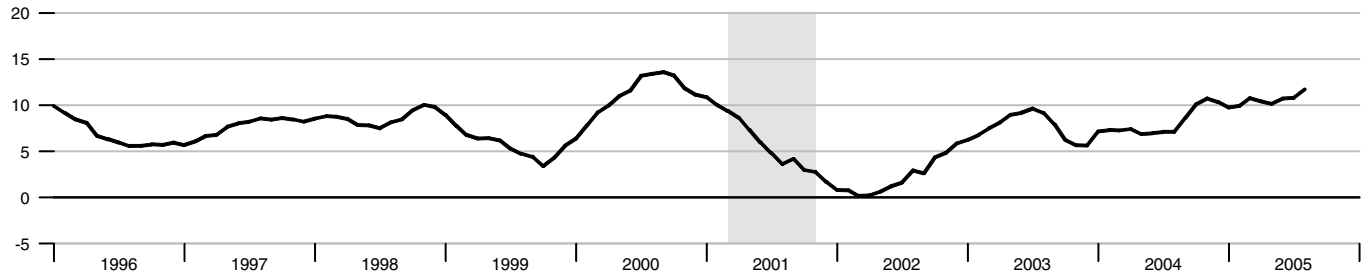
Investment Securities in Bank Credit at Commercial Banks

Percent change from year ago



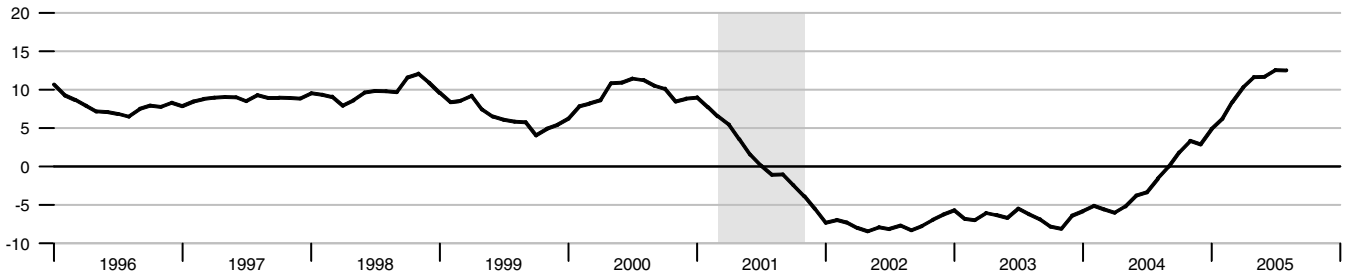
Total Loans and Leases in Bank Credit at Commercial Banks

Percent change from year ago

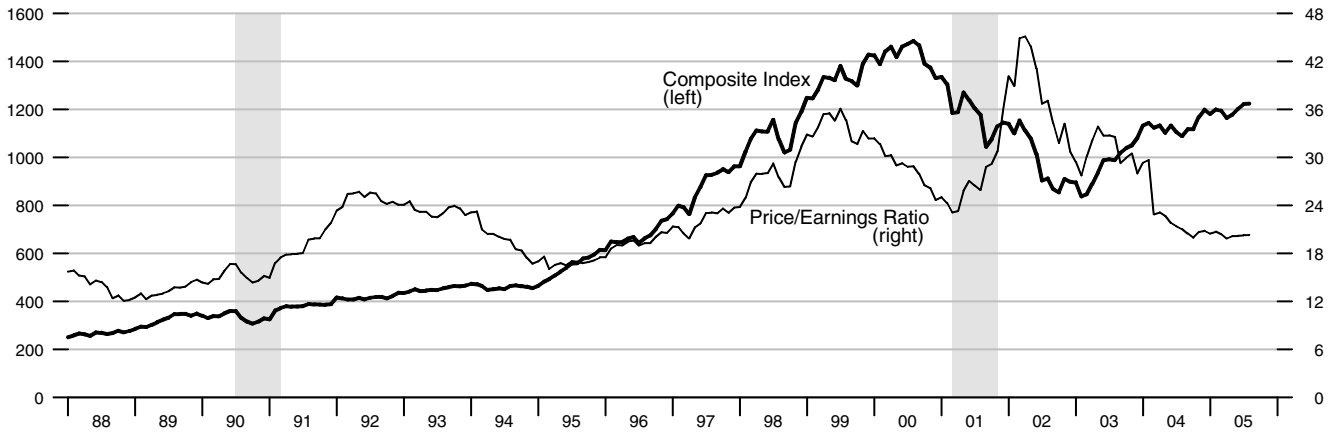


Commercial and Industrial Loans at Commercial Banks

Percent change from year ago



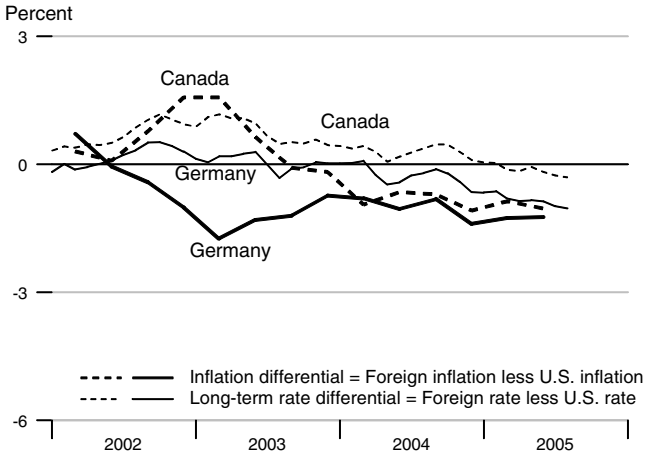
Standard & Poor's 500

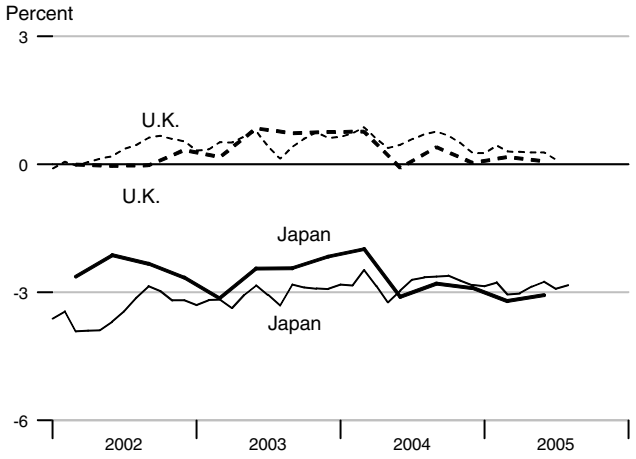


Recent Inflation and Long-Term Interest Rates

	Consumer Price Inflation Rates				Long-Term Government Bond Rates			
	Percent change from year ago				Percent			
	2004Q3	2004Q4	2005Q1	2005Q2	May05	Jun05	Jul05	Aug05
United States	2.69	3.37	3.00	2.93	4.14	4.00	4.18	4.26
Canada	1.99	2.29	2.13	1.90	4.08	3.82	3.92	3.95
France	2.28	2.08	1.70	1.69	3.38	3.20	3.27	.
Germany	1.88	1.98	1.74	1.70	3.30	3.13	3.20	3.23
Italy	2.23	1.98	1.92	1.84	3.55	3.41	3.44	3.45
Japan	-0.10	0.48	-0.20	-0.14	1.27	1.24	1.26	1.43
United Kingdom	3.09	3.41	3.17	3.01	4.42	4.28	4.29	.

Inflation and Long-Term Interest Rate Differentials





		Money Stock				Bank	Adjusted		
		M1	MZM	M2	M3	Credit	Monetary Base	Reserves	MSI M2
	2000	1103.484	4507.601	4798.883	6860.005	5025.434	607.106	84.308	248.592
	2001	1140.215	5223.438	5219.902	7646.741	5345.161	641.167	86.172	271.192
	2002	1196.344	5895.446	5615.409	8261.403	5597.663	697.092	88.158	293.905
	2003	1273.946	6332.382	6004.606	8788.514	6120.881	740.926	93.308	314.863
	2004	1344.897	6581.408	6277.338	9236.793	6596.292	776.704	96.061	329.521
2003	1	1235.469	6195.709	5866.596	8624.845	5956.376	726.940	91.196	307.669
	2	1268.185	6279.599	5976.326	8735.938	6136.557	738.451	92.117	313.329
	3	1292.370	6443.859	6091.199	8901.791	6186.959	744.331	95.163	319.343
	4	1299.762	6410.361	6084.306	8891.481	6203.631	753.981	94.758	319.110
2004	1	1319.929	6449.505	6138.564	9010.315	6427.353	761.427	95.031	322.050
	2	1339.324	6587.990	6257.514	9216.103	6558.648	771.146	96.600	328.380
	3	1350.520	6621.038	6311.119	9313.488	6643.487	782.780	96.796	331.396
	4	1369.814	6667.100	6402.157	9407.268	6755.681	791.464	95.817	336.259
2005	1	1371.475	6674.391	6466.010	9536.924	6992.411	798.241	96.641	339.386
	2	1369.607	6666.228	6493.256	9677.118	7157.493	802.630	96.014	340.517
2003	Jul	1286.252	6425.362	6066.982	8882.650	6195.251	741.577	93.999	318.073
	Aug	1295.355	6454.986	6112.528	8913.523	6180.085	745.581	95.966	320.432
	Sep	1295.502	6451.229	6094.087	8909.200	6185.541	745.834	95.523	319.525
	Oct	1296.390	6426.878	6086.156	8904.143	6161.799	754.020	95.892	319.138
	Nov	1297.815	6407.337	6081.566	8884.999	6198.335	754.971	95.410	318.966
	Dec	1305.081	6396.868	6085.195	8885.301	6250.758	752.952	92.971	319.227
2004	Jan	1303.448	6410.822	6098.708	8942.455	6321.057	756.790	93.206	320.065
	Feb	1321.799	6444.242	6139.032	9006.604	6441.662	763.195	95.937	322.045
	Mar	1334.540	6493.452	6177.951	9081.885	6519.339	764.295	95.950	324.039
	Apr	1334.317	6541.332	6215.194	9144.307	6539.618	767.951	97.095	326.106
	May	1338.617	6606.287	6273.248	9233.171	6548.497	770.211	95.779	329.200
	Jun	1345.039	6616.350	6284.101	9270.830	6587.830	775.275	96.927	329.835
	Jul	1337.428	6602.798	6285.668	9273.163	6600.084	780.464	95.691	330.135
	Aug	1355.047	6616.533	6306.493	9308.479	6630.303	781.527	96.023	331.099
	Sep	1359.084	6643.783	6341.195	9358.822	6700.073	786.349	98.674	332.954
	Oct	1360.163	6644.202	6369.273	9369.946	6713.972	792.248	97.558	334.510
	Nov	1375.791	6669.000	6406.537	9401.368	6759.229	793.878	96.828	336.486
	Dec	1373.489	6688.099	6430.660	9450.489	6793.843	788.267	93.065	337.780
2005	Jan	1364.253	6683.107	6449.147	9502.892	6892.519	793.540	95.087	338.607
	Feb	1371.620	6668.726	6464.360	9539.011	6999.074	800.277	97.805	339.268
	Mar	1378.551	6671.341	6484.524	9568.869	7085.639	800.906	97.030	340.282
	Apr	1361.008	6667.868	6481.467	9620.652	7108.302	802.312	97.379	340.184
	May	1373.462	6648.596	6482.762	9662.688	7157.589	800.580	94.522	339.892
	Jun	1374.351	6682.219	6515.539	9748.013	7206.587	804.998	96.142	341.476
	Jul	1353.567	6685.897	6523.394	9774.804	7258.476	806.077	95.555	342.008

*All values are given in billions of dollars.

		Federal Funds	Primary Credit Rate	Prime Rate	3-mo CDs	Treasury Yields 3-mo	3-yr	10-yr	Corporate Aaa Bonds	S & L Aaa Bonds	Conventional Mortgage
2000		6.24		9.23	6.46	6.00	6.22	6.03	7.62	5.58	8.06
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
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
2003	Aug	1.03	2.00	4.00	1.08	0.97	2.44	4.45	5.88	4.82	6.26
	Sep	1.01	2.00	4.00	1.08	0.96	2.23	4.27	5.72	4.63	6.15
	Oct	1.01	2.00	4.00	1.10	0.94	2.26	4.29	5.70	4.64	5.95
	Nov	1.00	2.00	4.00	1.11	0.95	2.45	4.30	5.65	4.50	5.93
	Dec	0.98	2.00	4.00	1.10	0.91	2.44	4.27	5.62	4.41	5.88
2004	Jan	1.00	2.00	4.00	1.06	0.90	2.27	4.15	5.54	4.42	5.74
	Feb	1.01	2.00	4.00	1.05	0.94	2.25	4.08	5.50	4.26	5.64
	Mar	1.00	2.00	4.00	1.05	0.95	2.00	3.83	5.33	4.11	5.45
	Apr	1.00	2.00	4.00	1.08	0.96	2.57	4.35	5.73	4.69	5.83
	May	1.00	2.00	4.00	1.20	1.04	3.10	4.72	6.04	4.93	6.27
	Jun	1.03	2.01	4.01	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		5.82

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

		M1	MZM	M2	M3
Percent change at an annual rate					
	2000	0.20	8.11	6.08	9.43
	2001	2.93	15.78	8.69	11.40
	2002	4.83	12.85	7.57	8.03
	2003	6.36	7.38	6.91	6.38
	2004	5.51	3.92	4.54	5.22
2003	1	7.97	7.77	6.84	6.59
	2	9.88	5.29	7.34	5.09
	3	7.39	10.37	7.58	7.67
	4	2.34	-2.07	-0.45	-0.28
2004	1	6.04	2.42	3.56	5.51
	2	6.00	8.62	7.82	9.39
	3	3.64	2.05	3.51	4.23
	4	5.52	2.74	5.69	3.75
2005	1	0.72	0.33	3.74	5.21
	2	-0.67	-0.56	1.68	5.44
2003	Jul	3.35	18.18	8.75	12.62
	Aug	8.43	5.52	8.99	4.32
	Sep	0.10	-0.72	-3.68	-0.45
	Oct	0.84	-4.53	-1.56	-0.48
	Nov	1.38	-3.64	-0.89	-2.38
	Dec	7.15	-1.87	0.82	0.30
2004	Jan	-2.02	2.56	2.62	7.88
	Feb	16.46	6.11	7.80	8.64
	Mar	11.63	9.22	7.69	10.25
	Apr	0.30	8.97	7.38	8.75
	May	3.49	11.85	11.20	11.68
	Jun	6.41	1.94	2.28	5.11
	Jul	-6.58	-2.42	0.34	0.48
	Aug	16.21	2.53	4.04	4.20
	Sep	3.87	4.97	6.66	6.22
	Oct	0.07	-0.09	5.07	1.14
	Nov	13.28	4.42	6.93	3.81
	Dec	-1.04	3.55	4.53	6.02
2005	Jan	-8.23	-1.32	2.70	6.13
	Feb	6.87	-2.55	2.81	4.40
	Mar	6.47	0.56	3.84	3.68
	Apr	-15.19	-0.72	-0.59	6.18
	May	10.30	-3.63	0.23	4.35
	Jun	-0.48	5.80	6.00	9.72
	Jul	-18.54	0.57	1.48	2.35

Definitions

M1: The sum of currency held outside the vaults of depository institutions, Federal Reserve Banks, and the U.S. Treasury; travelers checks; and demand and other checkable deposits issued by financial institutions (except demand deposits due to the Treasury and depository institutions), minus cash items in process of collection and Federal Reserve float.

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

M2: M1 plus savings deposits (including money market deposit accounts) and small-denomination (under $100,000) time deposits issued by financial institutions; and shares in retail money market mutual funds (funds with initial investments under $50,000), net of retirement accounts.

M3: M2 plus large-denomination ($100,000 or more) time deposits; repurchase agreements issued by depository institutions; Eurodollar deposits, specifically, dollar-denominated deposits due to nonbank U.S. addresses held at foreign offices of U.S. banks worldwide and all banking offices in Canada and the United Kingdom; and institutional money market mutual funds (funds with initial investments of $50,000 or more).

Bank Credit: All loans, leases, and securities held by commercial banks.

Domestic Nonfinancial Debt: Total credit market liabilities of the U.S. Treasury, federally sponsored agencies, state and local governments, households, and nonfinancial firms. End-of-period basis.

Adjusted Monetary Base: The sum of currency in circulation outside Federal Reserve Banks and the U.S. Treasury, deposits of depository financial institutions at Federal Reserve Banks, and an adjustment for the effects of changes in statutory reserve requirements on the quantity of base money held by depositories. This series is a spliced chain index; see Anderson and Rasche (1996a,b, 2001, 2003).

Adjusted Reserves: The sum of vault cash and Federal Reserve Bank deposits held by depository institutions and an adjustment for the effects of changes in statutory reserve requirements on the quantity of base money held by depositories. This spliced chain index is numerically larger than the Board of Governors' measure, which excludes vault cash not used to satisfy statutory reserve requirements and Federal Reserve Bank deposits used to satisfy required clearing balance contracts; see Anderson and Rasche (1996a, 2001, 2003).

Monetary Services Index: An index that measures the flow of monetary services received by households and firms from their holdings of liquid assets; see Anderson, Jones, and Nesmith (1997). Indexes are shown for the assets included in M2, with additional data at research.stlouisfed.org/msi/index.html.

Note: M1, M2, M3, Bank Credit, and Domestic Nonfinancial Debt are constructed and published by the Board of Governors of the Federal Reserve System. For details, see *Statistical Supplement to the Federal Reserve Bulletin*, tables 1.21 and 1.26. MZM, Adjusted Monetary Base, Adjusted Reserves, and Monetary Services Index are constructed and published by the Research Division of the Federal Reserve Bank of St. Louis.

Notes

Page 3: Readers are cautioned that, since early 1994, the level and growth of M1 have been depressed by retail sweep programs that reclassify transactions deposits (demand deposits and other checkable deposits) as savings deposits overnight, thereby reducing banks' required reserves; see Anderson and Rasche (2001) and research.stlouisfed.org/aggreg/swdata.html. **Primary Credit Rate**, **Discount Rate,** and **Intended Federal Funds Rate** shown in the chart **Reserve Market Rates** are plotted as of the date of the change, while the **Effective Federal Funds Rate** is plotted as of the end of the month. Interest rates in the table are monthly averages from the Board of Governors H.15 Statistical Release. The **Treasury Yield Curve** shows constant maturity yields calculated by the U.S. Treasury for securities with 3 months and 1, 2, 3, 5, 7, and 10 years to maturity. Daily data and descriptions are available at research.stlouisfed.org/fred2/. See also *Statistical Supplement to the Federal Reserve Bulletin*, table 1.35. The 30-year constant maturity series was discontinued by the Treasury as of February 18, 2002.

Page 5: **Checkable Deposits** is the sum of demand and other checkable deposits. **Savings Deposits** is the sum of money market deposit accounts and passbook and statement savings. **Time Deposits** have a minimum initial maturity of 7 days. **Large Time Deposits** are deposits of $100,000 or more. **Retail** and **Institutional Money Market Mutual Funds** are as included in M2 and the non-M2 component of M3, respectively.

Page 7: **Excess Reserves plus RCB (Required Clearing Balance) Contracts** equals the amount of deposits at Federal Reserve Banks held by depository institutions but not applied to satisfy statutory reserve requirements. (This measure excludes the vault cash held by depository institutions that is not applied to satisfy statutory reserve requirements.) **Consumer Credit** includes most short- and intermediate-term credit extended to individuals. See *Statistical Supplement to the Federal Reserve Bulletin*, table 1.55.

Page 8: **Inflation Expectations** measures include the quarterly Federal Reserve Bank of Philadelphia *Survey of Professional Forecasters*, the monthly University of Michigan Survey Research Center's *Surveys of Consumers*, and the annual Federal Open Market Committee (FOMC) range as reported to the Congress in the February 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

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

to five alternative target inflation rates, $\pi^* = 0, 1, 2, 3, 4$ percent, where ΔMB_t^* is the implied growth rate of the adjusted monetary base. The 10-year moving average growth of real GDP for a quarter t is calculated as the average quarterly growth during the previous 40 quarters, at an annual rate, by the formula $((y_t - y_{t-40})/40) \times 400$, where y_t is the log of real GDP. The 4-year moving average of base velocity growth is calculated similarly. To adjust the monetary base for the effect of retail-deposit sweep programs, we add to the monetary base an amount equal to 10 percent of the total amount swept, as estimated by the Federal Reserve Board staff. These estimates are imprecise, at best. Sweep program data are found at research.stlouisfed.org/aggreg/swdata.html.

Page 11: **Implied One-Year Forward Rates** are calculated by this Bank from Treasury constant maturity yields. Yields to maturity, $R(m)$, for securities with $m = 1,\ldots,$ 10 years to maturity are obtained by linear interpolation between

reported yields. These yields are smoothed by fitting the regression suggested by Nelson and Siegel (1987),

$$R(m) = a_0 + (a_1 + a_2)(1 - e^{-m/50})/(m/50) - a_2 \times e^{-m/50},$$

and forward rates are calculated from these smoothed yields using equation (a) in table 13.1 of Shiller (1990),

$$f(m) = [D(m)R(m) - D(m-1)] / [D(m) - D(m-1)],$$

where duration is approximated as $D(m) = (1 - e^{-R(m) \times m})/R(m)$. These rates are linear approximations to the true instantaneous forward rates; see Shiller (1990). For a discussion of the use of forward rates as indicators of inflation expectations, see Sharpe (1997). **Rates on 3-Month Eurodollar Futures** and **Rates on Selected Federal Funds Futures Contracts** trace through time the yield on three specific contracts. **Rates on Federal Funds Futures on Selected Dates** displays a single day's snapshot of yields for contracts expiring in the months shown on the horizontal axis. **Inflation-Indexed Treasury Securities** are yields on the most recently issued inflation-indexed securities of 10- and 30-year original maturities. **Inflation-Indexed 10-Year Government Notes** shows the yield of an inflation-indexed note that is scheduled to mature in approximately (but not greater than) 10 years. The current French note has a maturity date of 7/25/2015, 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.

References

Anderson, Richard G. and Robert H. Rasche (1996a). "A Revised Measure of the St. Louis Adjusted Monetary Base," Federal Reserve Bank of St. Louis *Review*, March/April, *78*(2), pp. 3-13.*

____ and ____(1996b). "Measuring the Adjusted Monetary Base in an Era of Financial Change," Federal Reserve Bank of St. Louis *Review*, November/December, *78*(6), pp. 3-37.*

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

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

____ , Barry E. Jones and Travis D. Nesmith (1997). "Special Report: The Monetary Services Indexes Project of the Federal Reserve Bank of St. Louis," Federal Reserve Bank of St. Louis *Review*, January/February, *79*(1), pp. 31-82.*

McCallum, Bennett T. (1988). "Robustness Properties of a Monetary Policy Rule," *Carnegie-Rochester Conference Series on Public Policy*, vol. 29, pp. 173-204.

____(1993). "Specification and Analysis of a Monetary Policy Rule for Japan," Bank of Japan *Monetary and Economic Studies*, November, pp. 1-45.

Motley, Brian (1988). "Should M2 Be Redefined?" Federal Reserve Bank of San Francisco *Economic Review*, Winter, pp. 33-51.

Nelson, Charles R. and Andrew F. Siegel (1987). "Parsimonious Modeling of Yield Curves," *Journal of Business*, October, pp. 473-89.

Poole, William (1991). Statement before the Subcommittee on Domestic Monetary Policy of the Committee on Banking, Finance and Urban Affairs, U.S. House of Representatives, November 6, 1991. Government Printing Office, Serial No. 102-82.

Sharpe, William F. (1997). *Macro-Investment Analysis*, on-line textbook available at www.stanford.edu/~wfsharpe/mia/mia.htm.

Shiller, Robert (1990). "The Term Structure of Interest Rates," *Handbook of Monetary Economics*, vol. 1, B. Friedman and F. Hahn, eds., pp. 627-722.

Taylor, John B. (1993). "Discretion versus Policy Rules in Practice," *Carnegie-Rochester Conference Series on Public Policy*, vol. 39, pp. 195-214.

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