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Are Inflation Expectations Rising from the Ashes?

The University of Michigan's Survey of Consumers reported a drastic decline in consumer confidence following the devastating effects of Hurricane Katrina. This crumbling confidence was widely reported, and its significance as an indicator of economic weakness debated. Less well publicized was the large increase in expectations of future inflation that was also recorded in this survey. For example, at the end of August, just before Hurricane Katrina, respondents in the Michigan survey were expecting the inflation rate over the subsequent 12 months to be 3.1 percent. However, by the end of September, the same measure of inflation expectations was 4.3 percent. As the black line in the accompanying chart shows, this increase in inflation expectations is large by historical precedent and brings one-year-ahead inflation expectations to a level not seen since 1990.

Inflation expectations give a reading of how credible the public believes monetary policymakers are in their commitment to fight inflation; as a result these expectations are an important gauge used in the practice of monetary policy. That is, if the public believes monetary policymakers are credible in their stated goal of keeping inflation low and stable, then inflation expectations will stay low and stable. One reason credibility is important is that containing inflation expectations can be a first step in containing inflation itself. This is because expectations of higher future inflation might be negotiated into various sorts of pricing contracts, such as labor contracts, thereby creating the expected inflation.

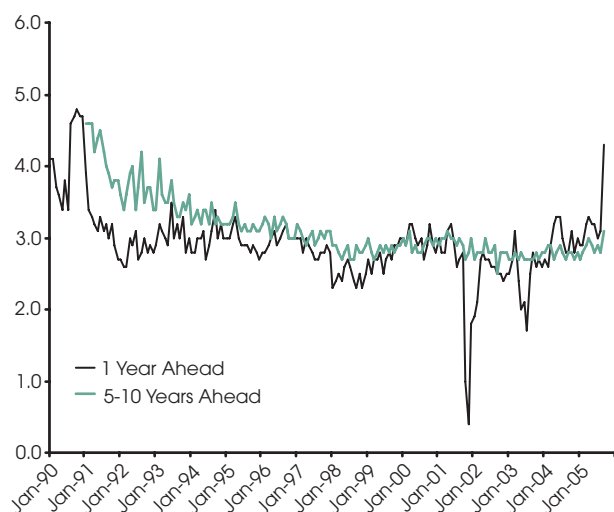
To interpret the rise in inflation expectations from the Michigan survey, a natural first question is, to what extent is this measure a reliable predictor of future inflation? After all, this survey is conducted by polling consumers who have no special expertise or sophistication in forecasting inflation, raising a legitimate question of how seriously one should take the results. However, economists N. Gregory Mankiw, Ricardo Reis, and Justin Wolfers have shown that, when evaluated over the past 20 years, the median survey response from the Michigan survey was at least as accurate of a forecast of future inflation as those produced by professional forecasters.¹

Given this, should monetary policymakers at the Federal Reserve be concerned that inflation expectations are getting out of control, suggesting they have been too slow to tighten policy in recent years? To evaluate this question, it is useful to look not just at expectations of inflation over the next year, but also over longer horizons. As the green line in the figure shows, expectations of inflation from the Michigan survey over the horizon of the next 5 to 10 years have increased only slightly in recent months and are not at abnormally high levels relative to those seen in the past several years. This divergence between shorter and longer horizon inflation expectations suggests that the rise in inflation expected over the next year is being driven by temporary factors, such as increases in energy prices, and not by a loss of confidence in the ability or resolve of Federal Reserve policymakers to control inflation more broadly. This is good news for the Federal Reserve, as it suggests the public is convinced policymakers are taking, and will continue to take, appropriate actions to keep inflation low over longer horizons.

—Jeremy M. Piger

¹N.G. Mankiw, R. Reis, and J. Wolfers, "Disagreement about Inflation Expectations," *NBER Macroeconomics Annual* 2003.

Short- and Long-Term Inflation Expectations from the University of Michigan's Survey of Consumers



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

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Conventions used in this publication:

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

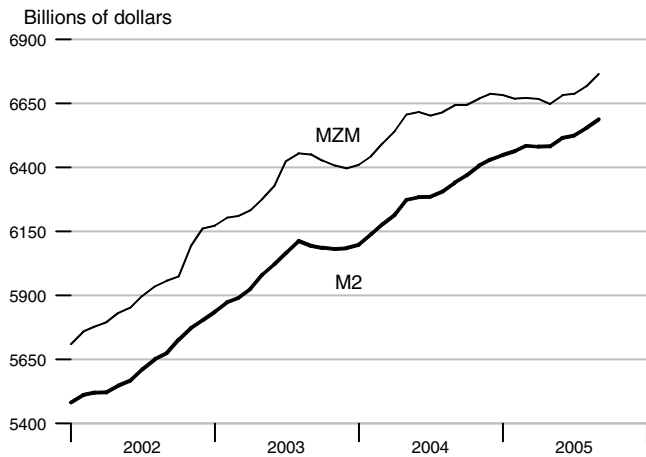
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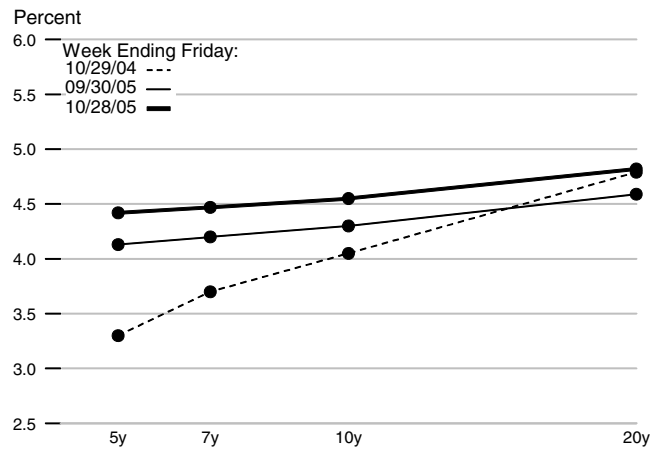
or to:

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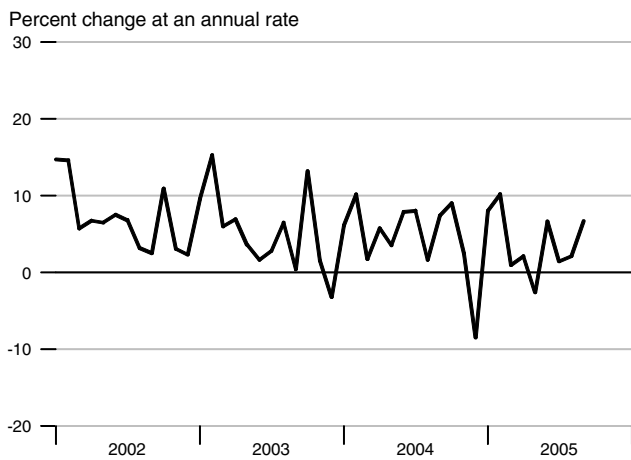
M2 and MZM



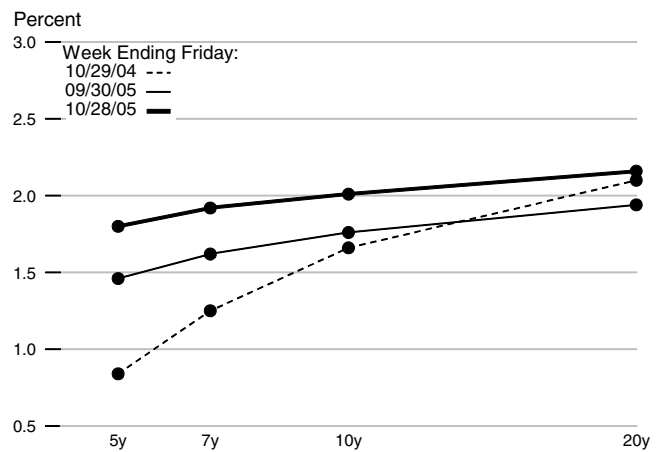
Treasury Yield Curve



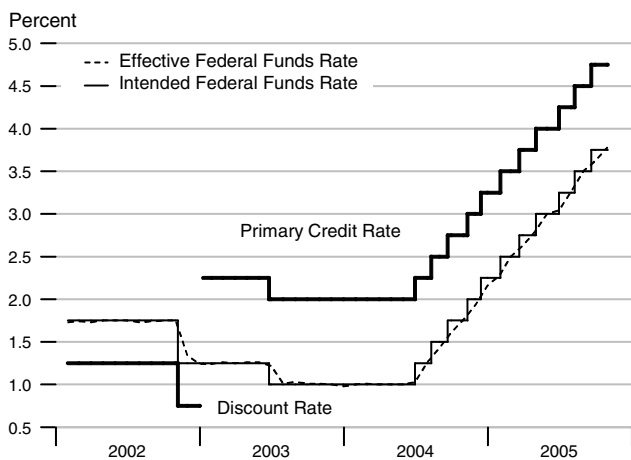
Adjusted Monetary Base



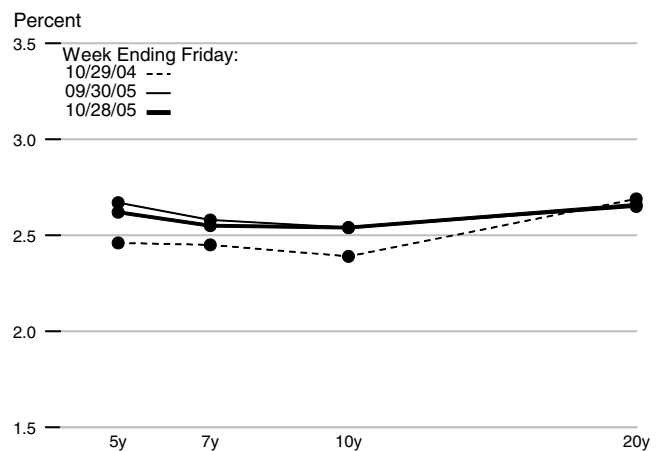
Real Treasury Yield Curve



Reserve Market Rates

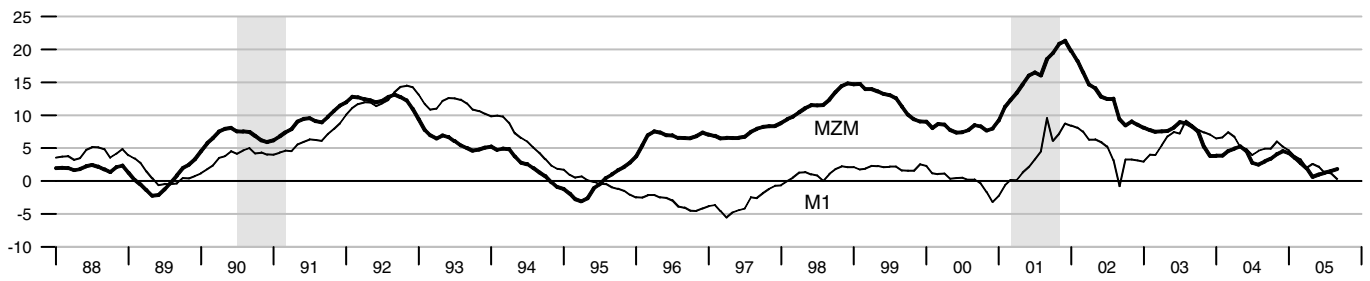


Inflation-Indexed Treasury Yield Spreads



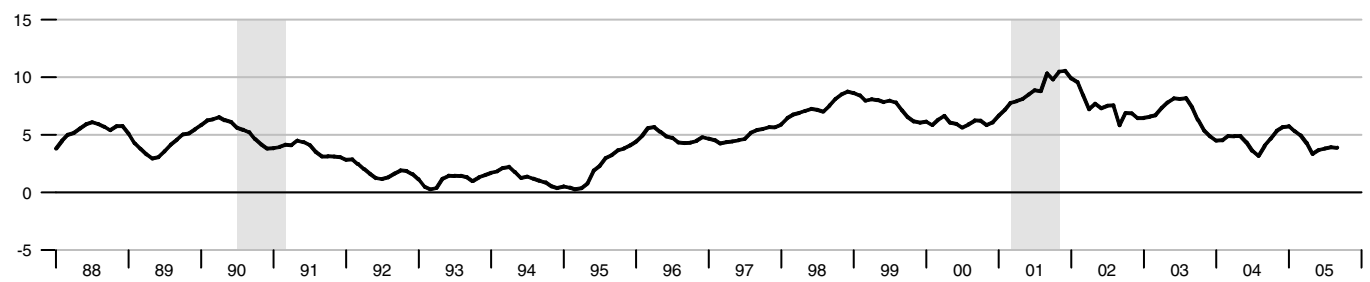
MZM and M1

Percent change from year ago



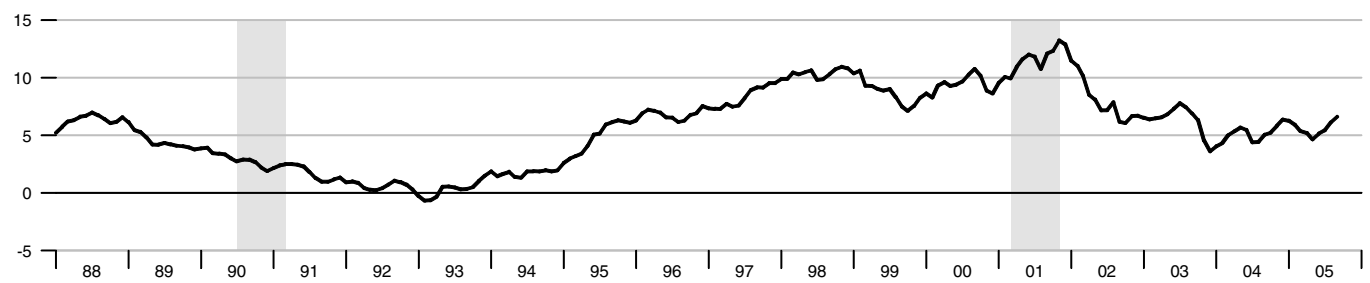
M2

Percent change from year ago



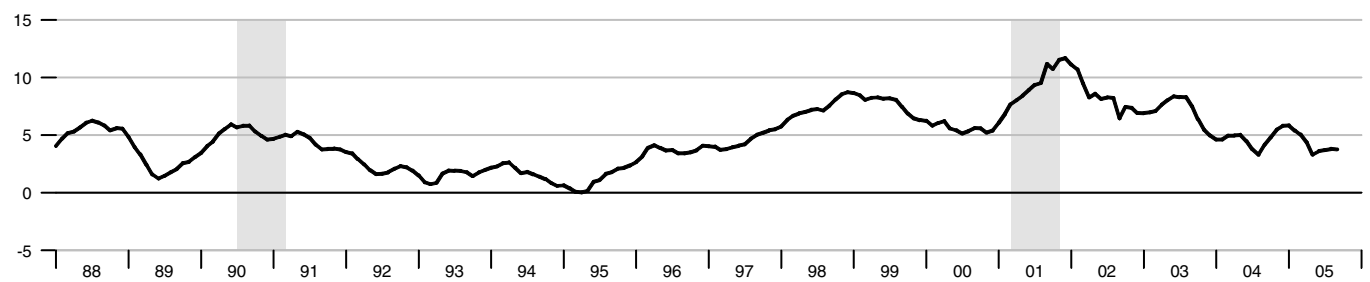
M3

Percent change from year ago



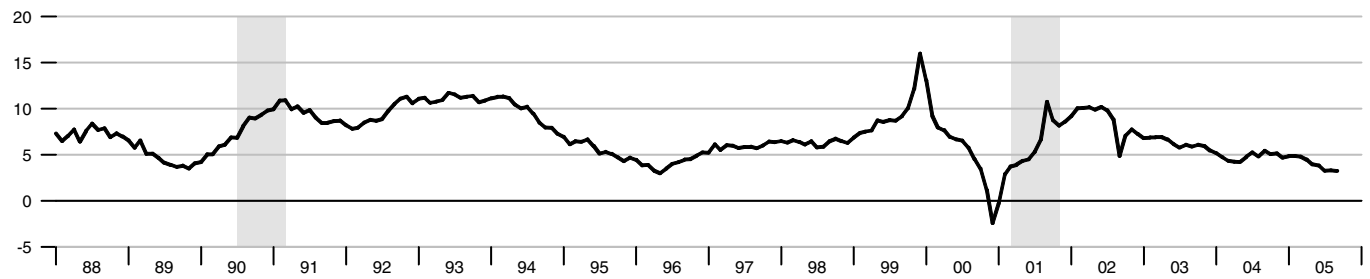
Monetary Services Index - M2

Percent change from year ago



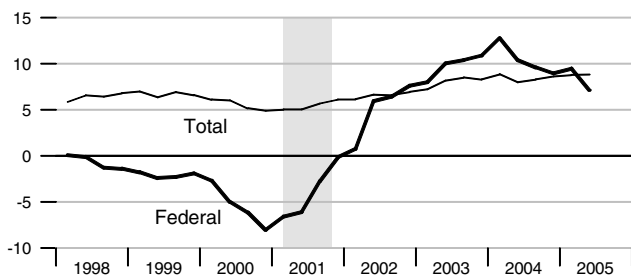
Adjusted Monetary Base

Percent change from year ago



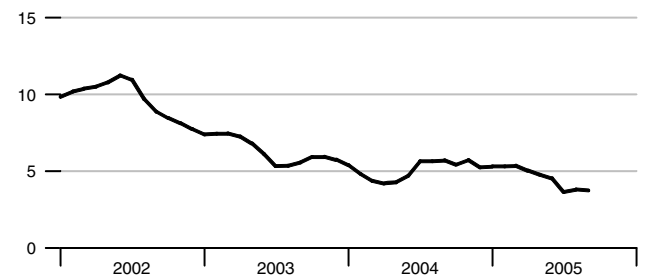
Domestic Nonfinancial Debt

Percent change from year ago



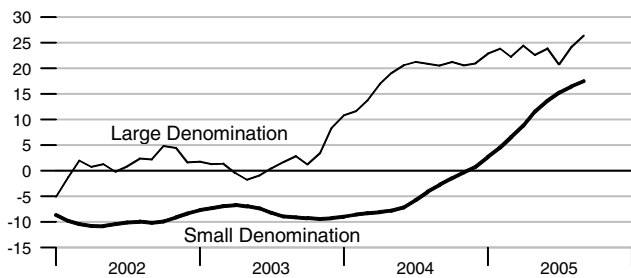
Currency Held by the Nonbank Public

Percent change from year ago



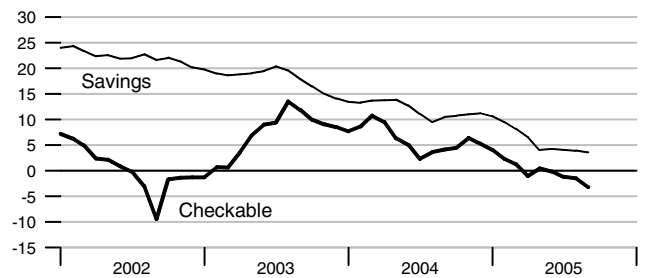
Time Deposits

Percent change from year ago



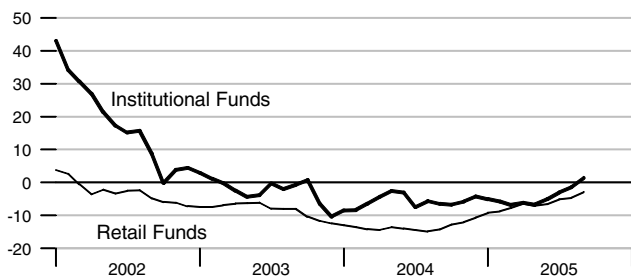
Checkable and Savings Deposits

Percent change from year ago



Money Market Mutual Fund Shares

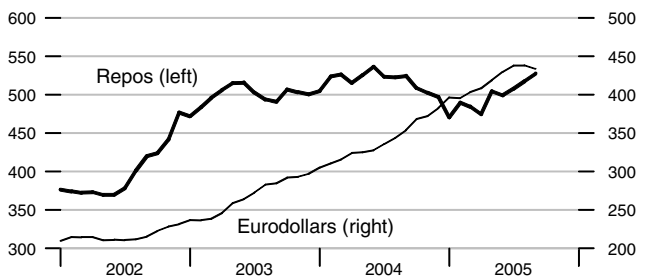
Percent change from year ago



Repurchase Agreements and Eurodollars

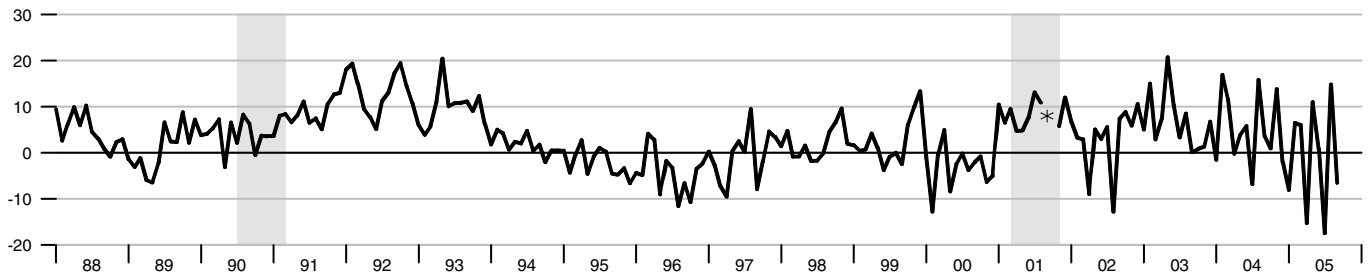
Billions of dollars

Billions of dollars



M1

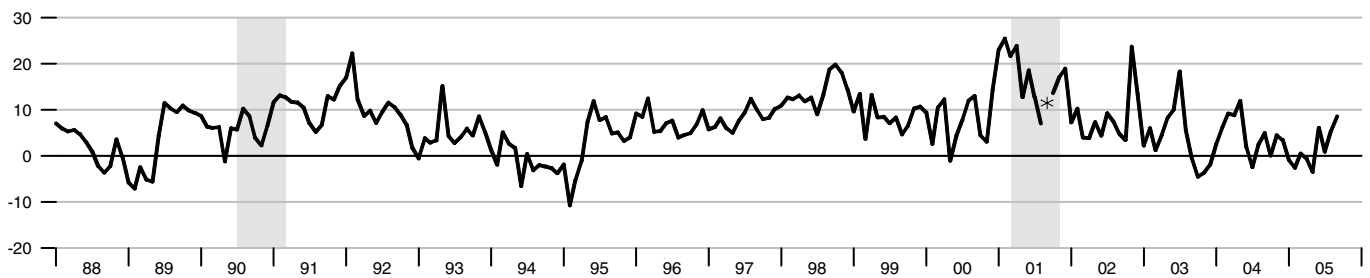
Percent change at an annual rate



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

M2M

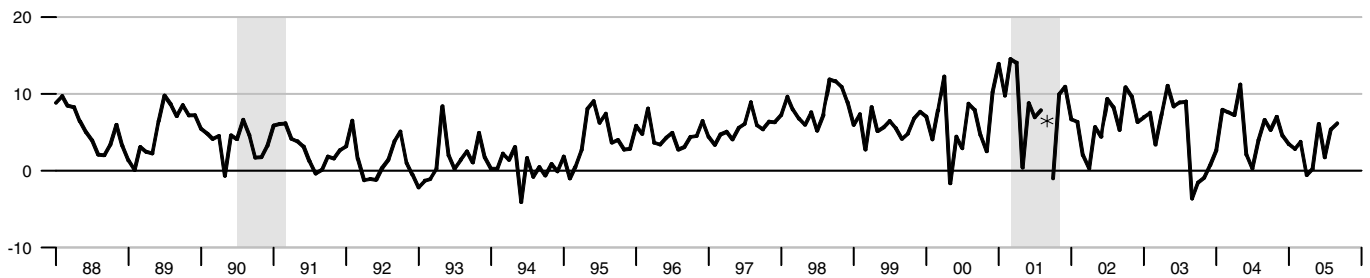
Percent change at an annual rate



*Actual value for September 2001 is 39.41 percent rate.

M2

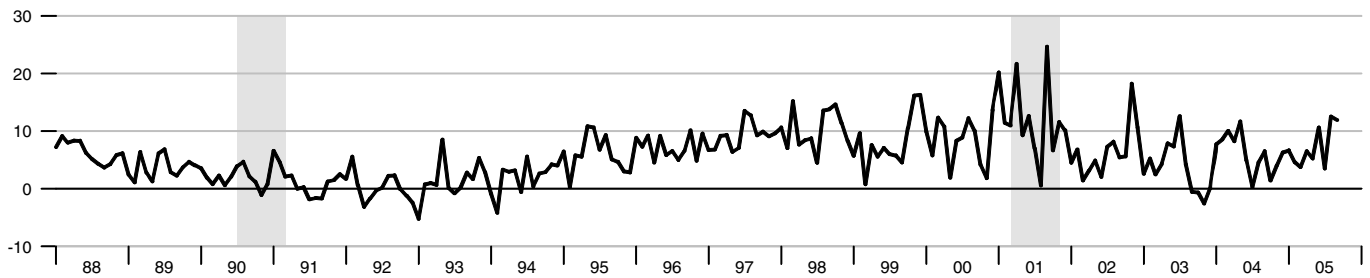
Percent change at an annual rate



*Actual value for September 2001 is 24.90 percent rate.

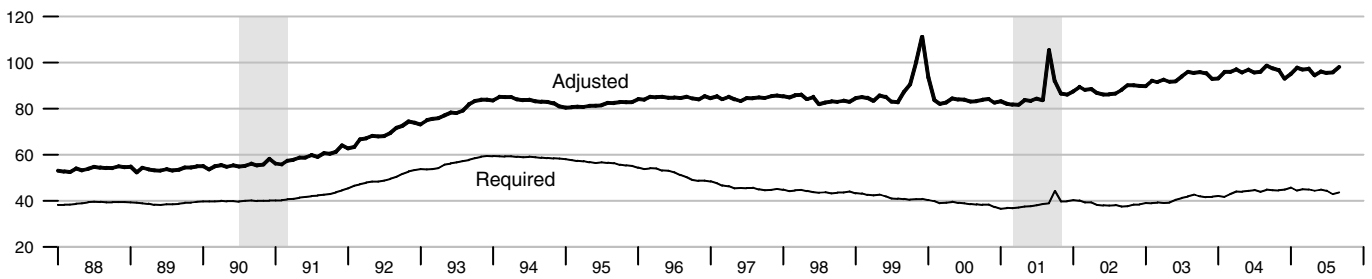
M3

Percent change at an annual rate



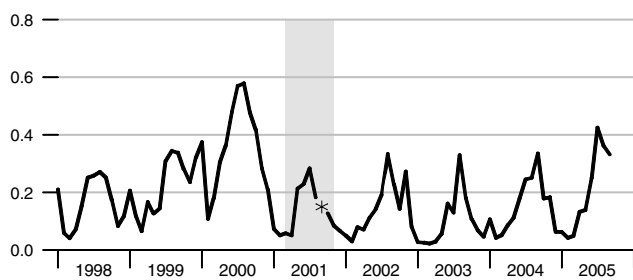
Adjusted and Required Reserves

Billions of dollars



Total Borrowings, nsa

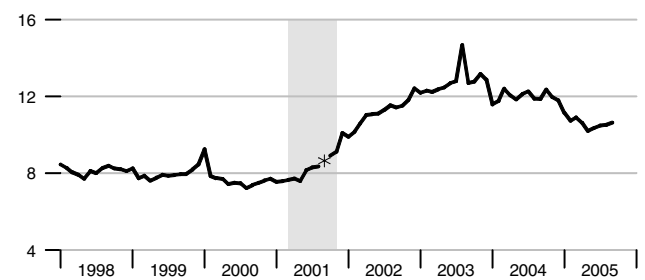
Billions of dollars



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

Excess Reserves plus RCB Contracts

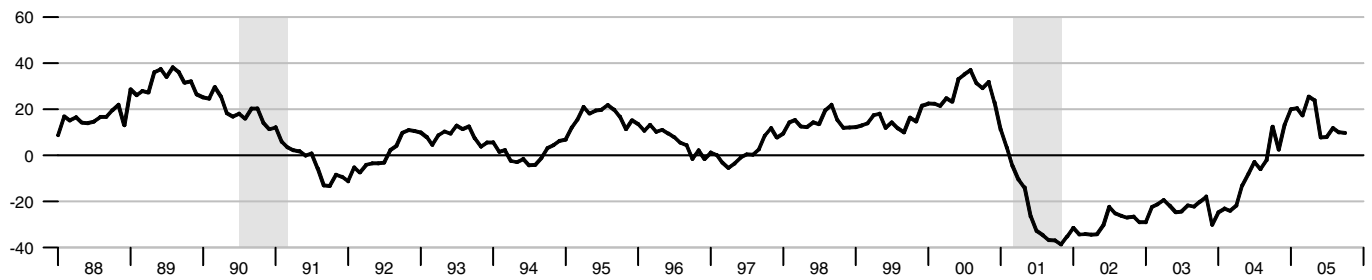
Billions of dollars



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

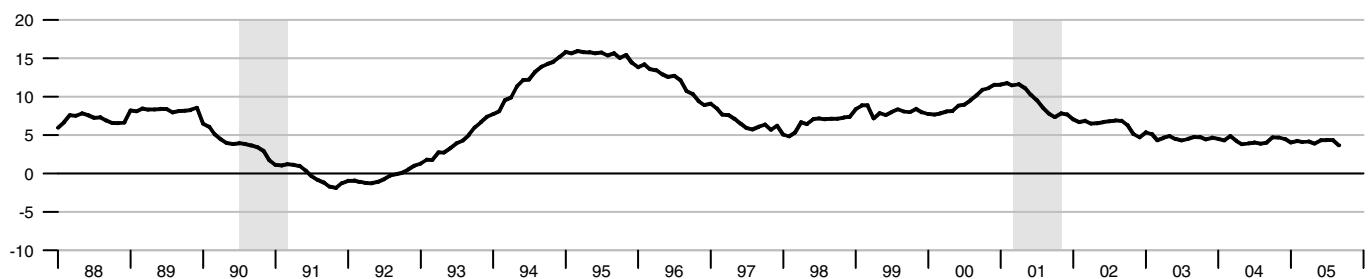
Nonfinancial Commercial Paper

Percent change from year ago

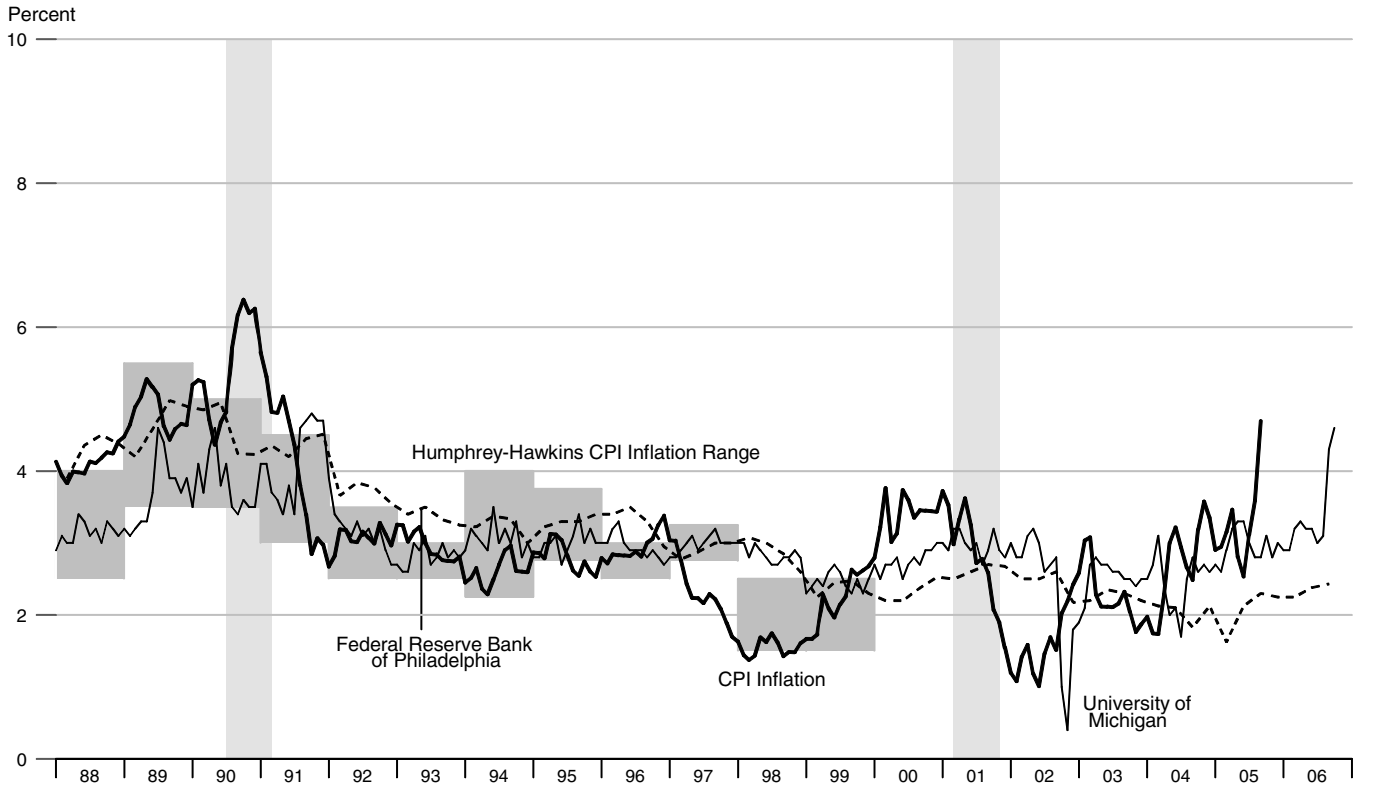


Consumer Credit

Percent change from year ago

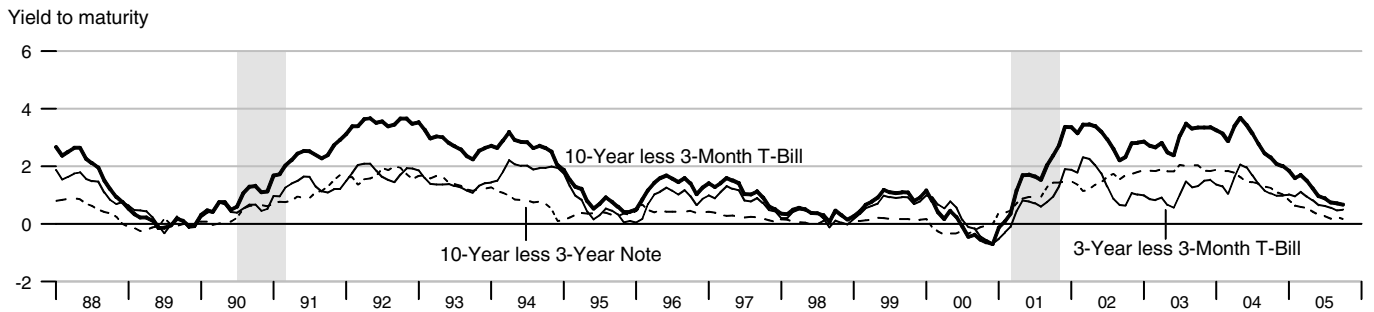


Inflation and Inflation Expectations

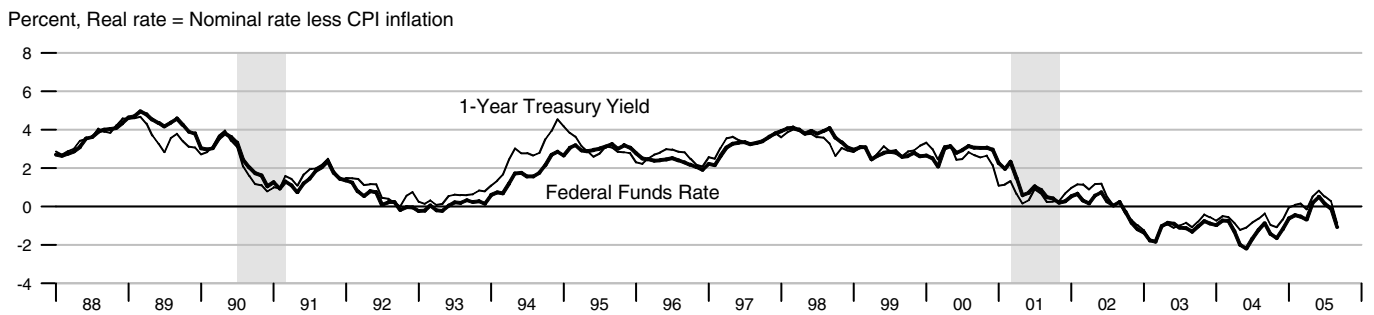


The shaded region shows the Humphrey-Hawkins CPI inflation range. Beginning in January 2000, the Humphrey-Hawkins inflation range was reported using the PCE price index and therefore is not shown on this graph. See notes on page 19.

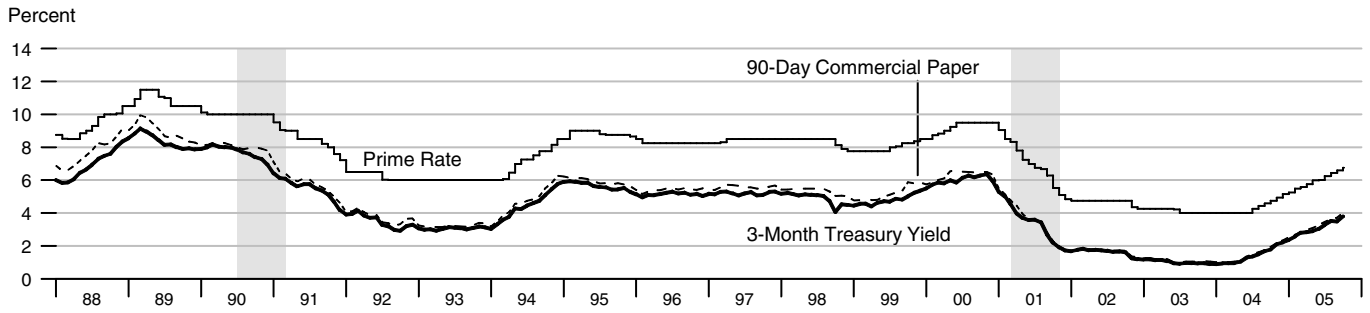
Treasury Security Yield Spreads



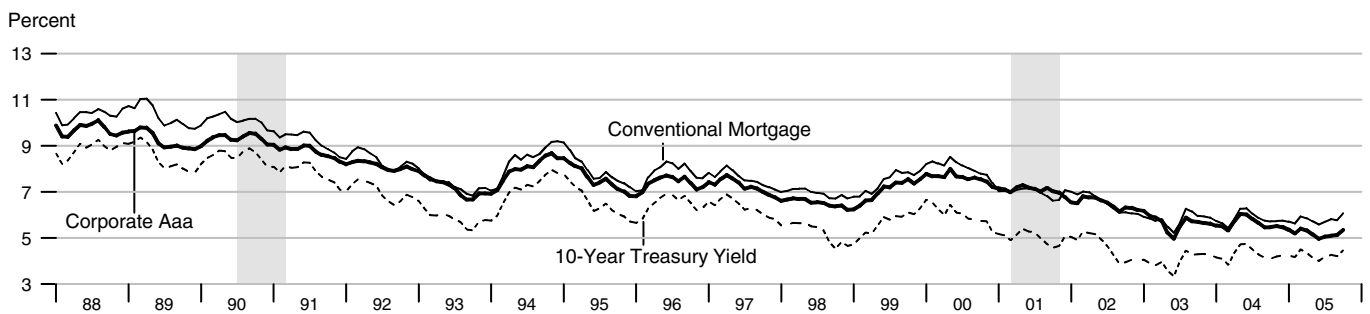
Real Interest Rates



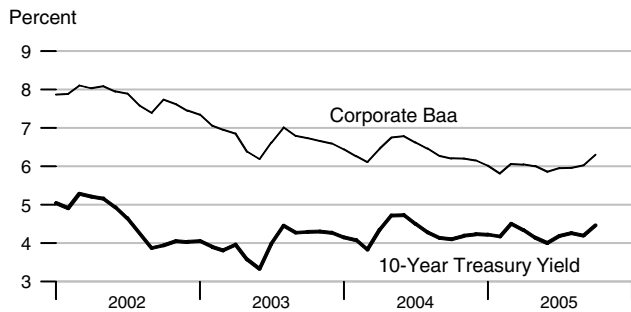
Short-Term Interest Rates



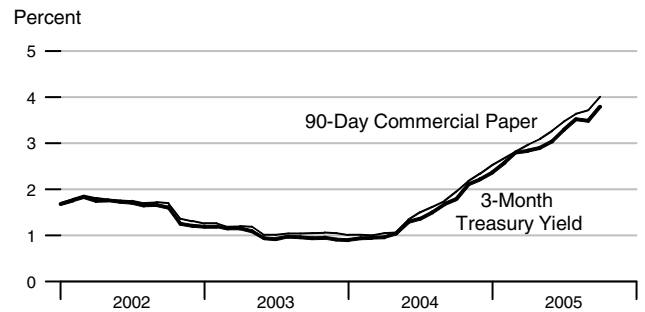
Long-Term Interest Rates



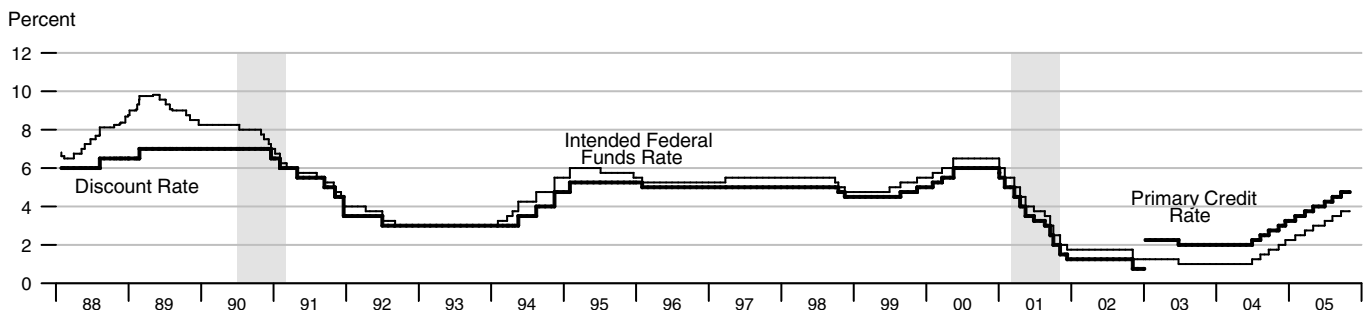
Long-Term Interest Rates



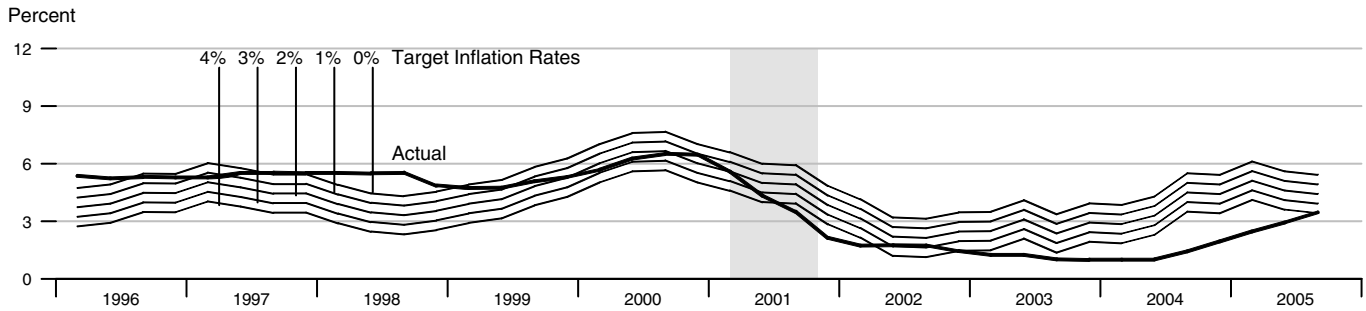
Short-Term Interest Rates



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



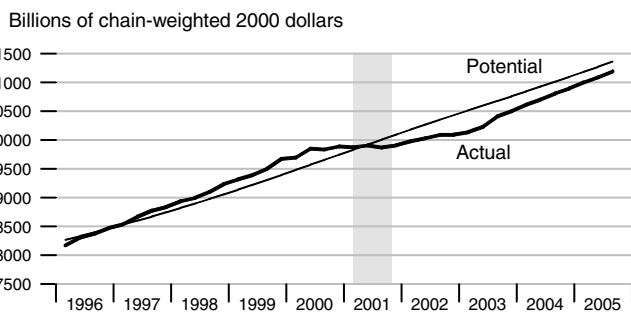
Federal Funds Rate and Inflation Targets



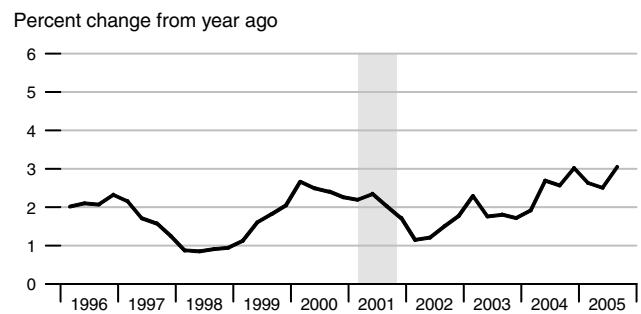
Calculated federal funds rate is based on Taylor's rule. See notes on page 19.

Components of Taylor's Rule

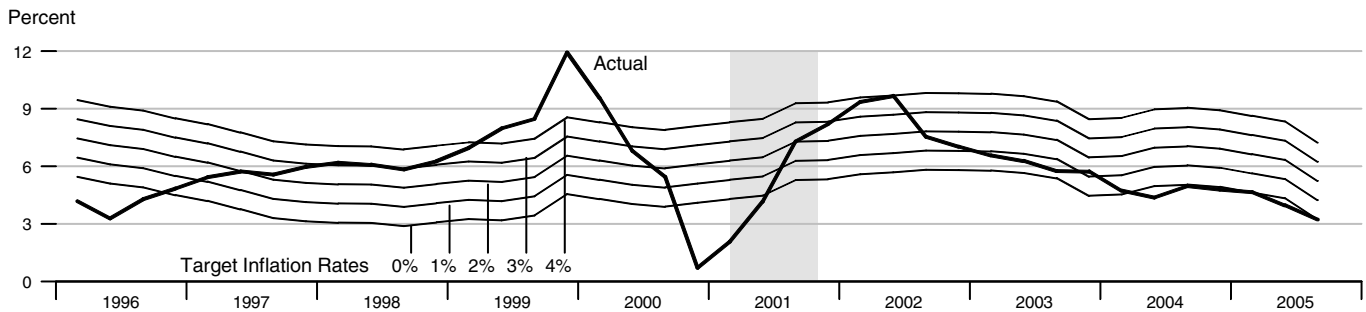
Actual and Potential Real GDP



PCE Inflation



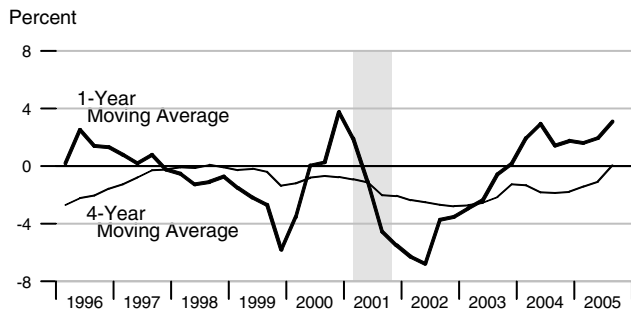
Monetary Base Growth* and Inflation Targets



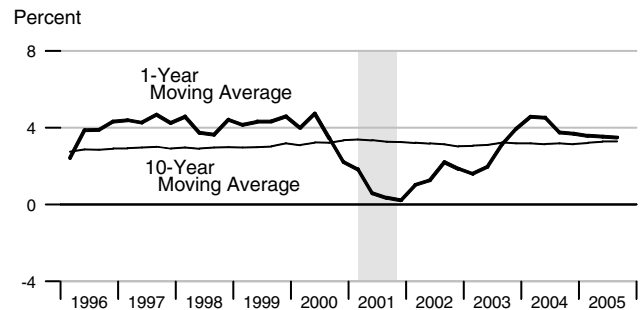
*Modified for the effects of sweeps programs on reserve demand. Calculated base growth is based on McCallum's rule. Actual base growth is percent change from year ago. See notes on page 19.

Components of McCallum's Rule

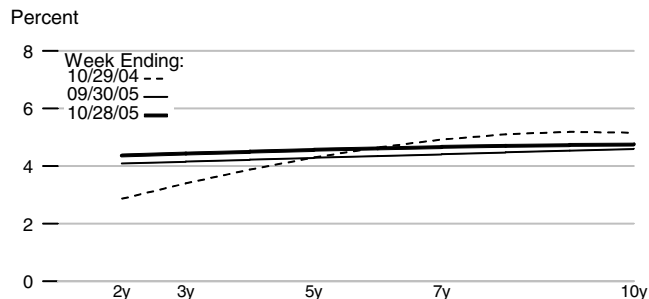
Monetary Base Velocity Growth



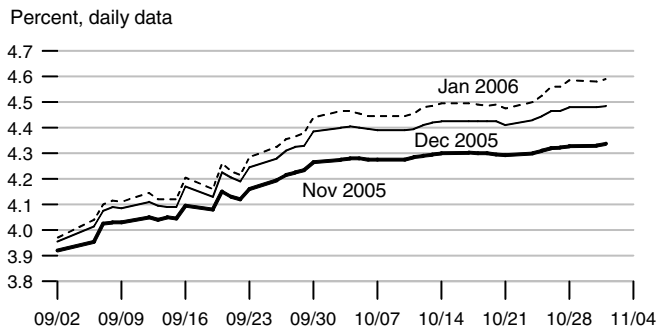
Real Output Growth



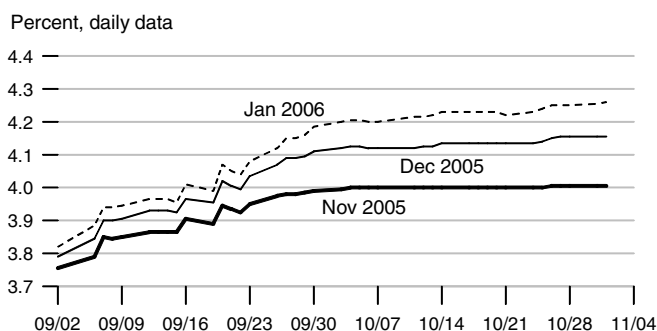
Implied One-Year Forward Rates



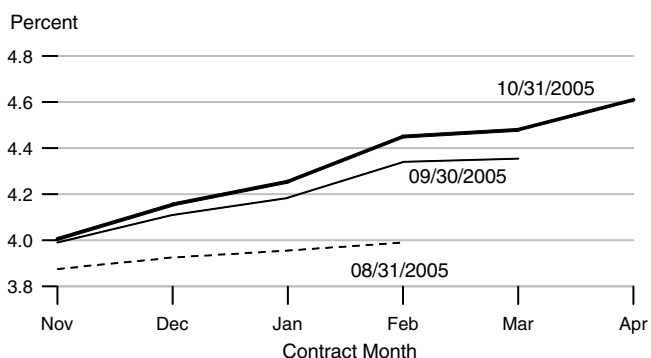
Rates on 3-Month Eurodollar Futures



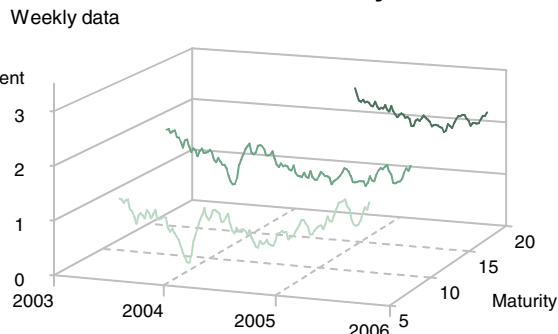
Rates on Selected Federal Funds Futures Contracts



Rates on Federal Funds Futures on Selected Dates

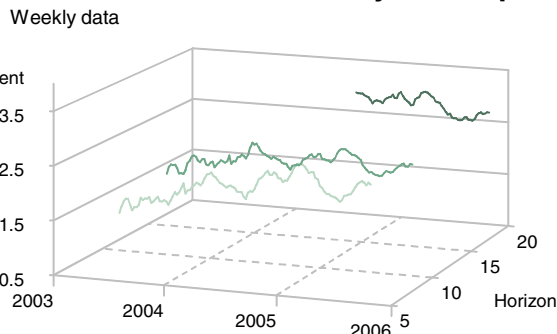


Inflation-Indexed Treasury Securities



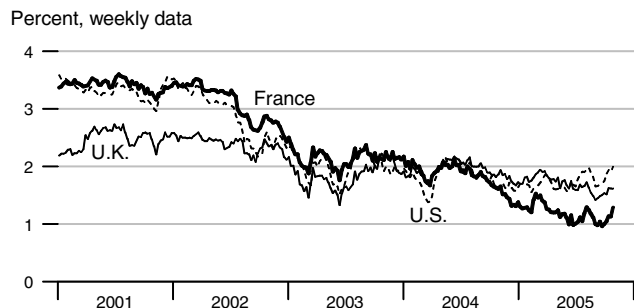
Note: Yields are inflation-indexed constant maturity U.S. Treasury securities

Inflation-Indexed Treasury Yield Spreads

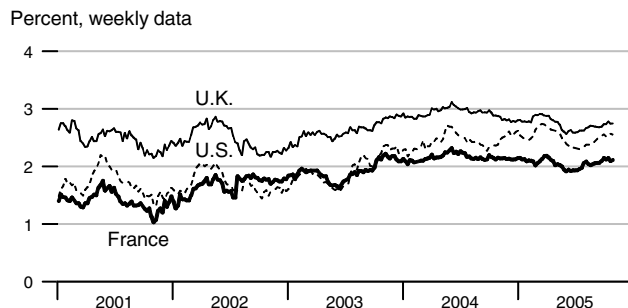


Note: Yield spread is between nominal and inflation-indexed constant maturity U.S. Treasury securities.

Inflation-Indexed 10-Year Government Notes

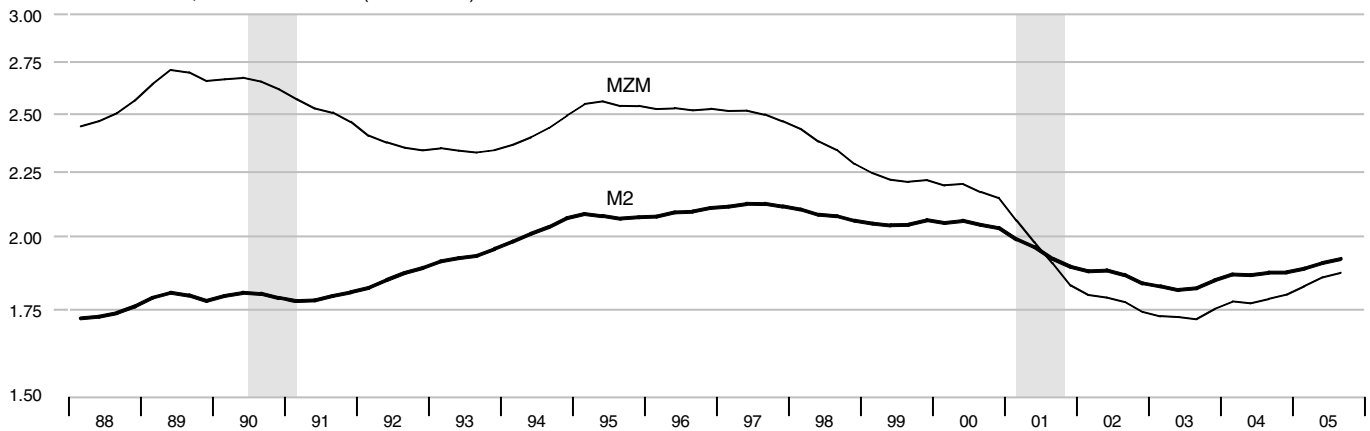


Inflation-Indexed 10-Year Government Yield Spreads



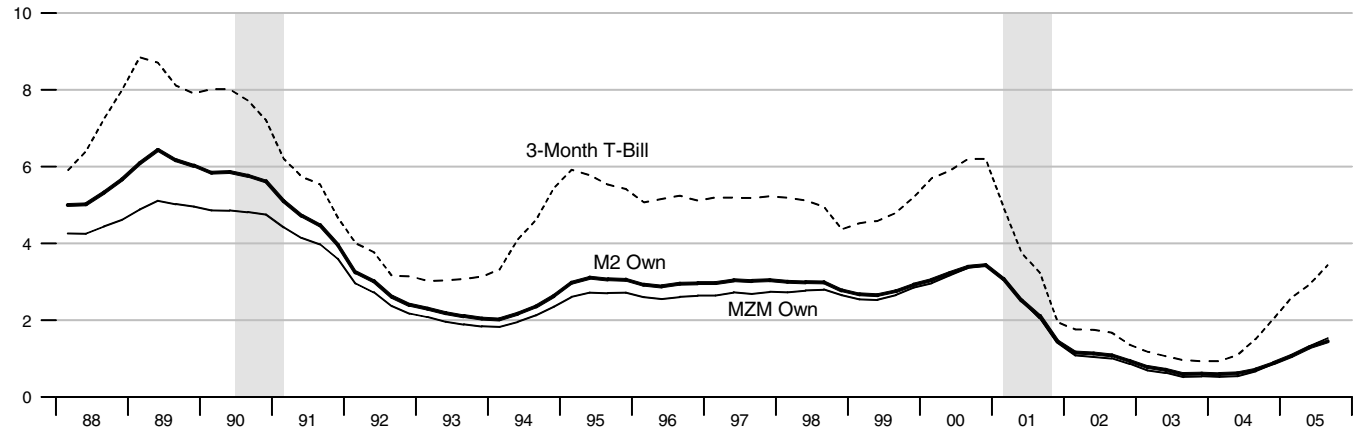
Velocity

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



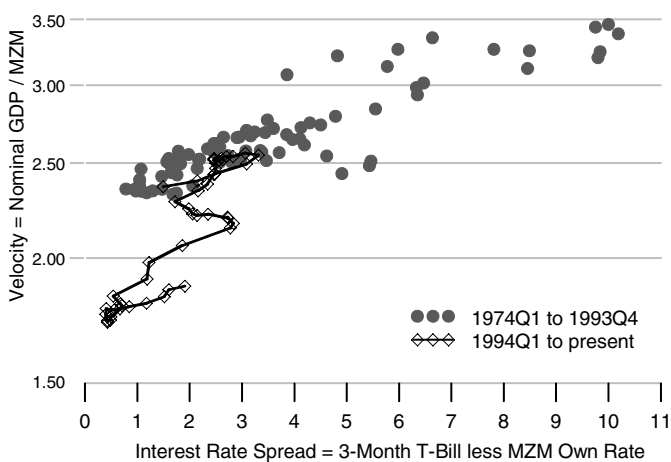
Interest Rates

Percent



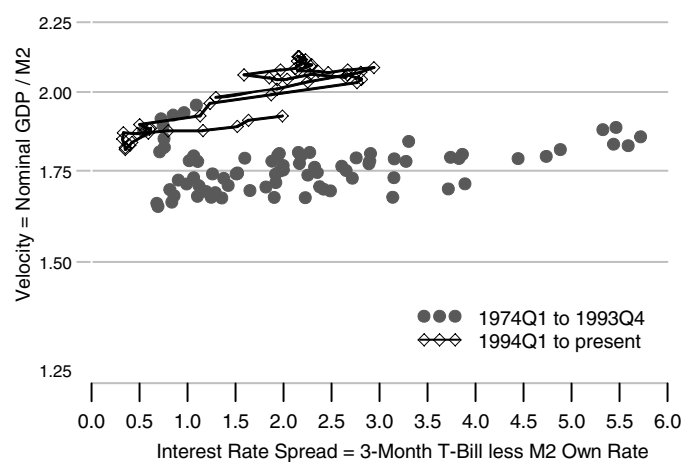
MZM Velocity and Interest Rate Spread

Ratio Scale



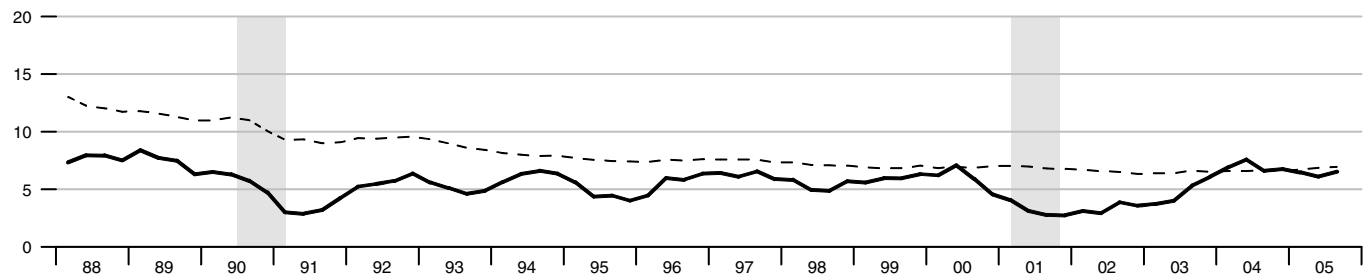
M2 Velocity and Interest Rate Spread

Ratio Scale



Gross Domestic Product

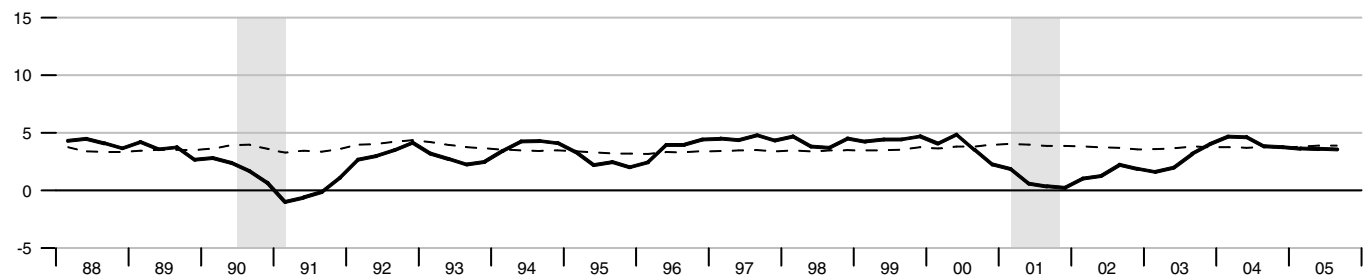
Percent change from year ago



Dashed lines indicate 10-year moving averages.

Real Gross Domestic Product

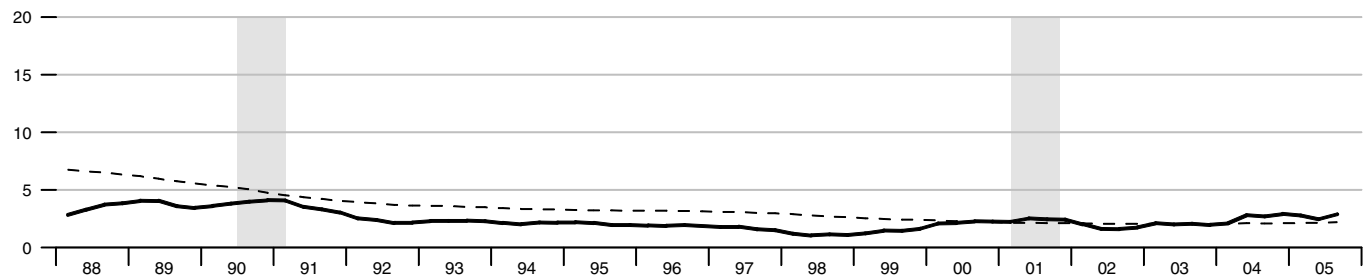
Percent change from year ago



Dashed lines indicate 10-year moving averages.

Gross Domestic Product Price Index

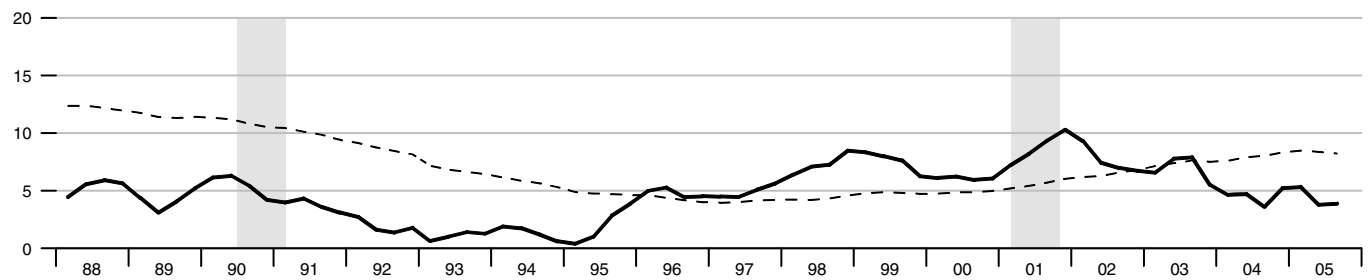
Percent change from year ago



Dashed lines indicate 10-year moving averages.

M2

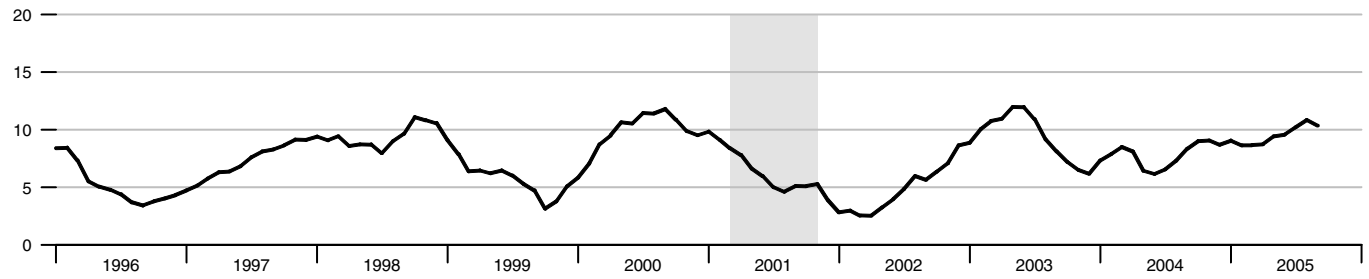
Percent change from year ago



Dashed lines indicate 10-year moving averages.

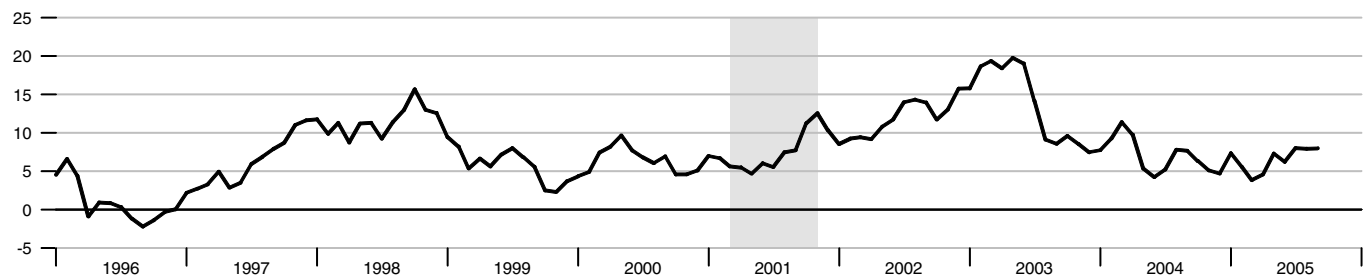
Bank Credit

Percent change from year ago



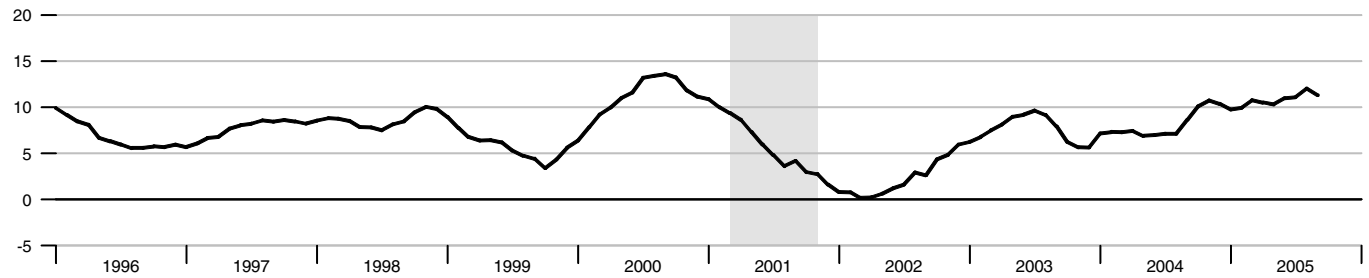
Investment Securities in Bank Credit at Commercial Banks

Percent change from year ago



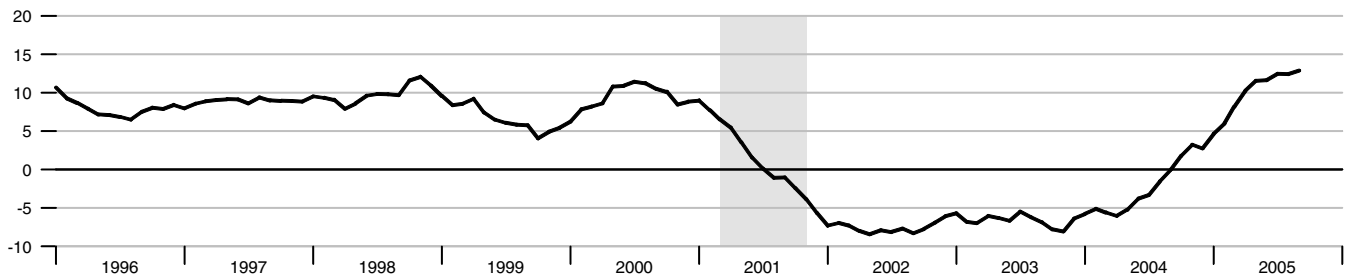
Total Loans and Leases in Bank Credit at Commercial Banks

Percent change from year ago

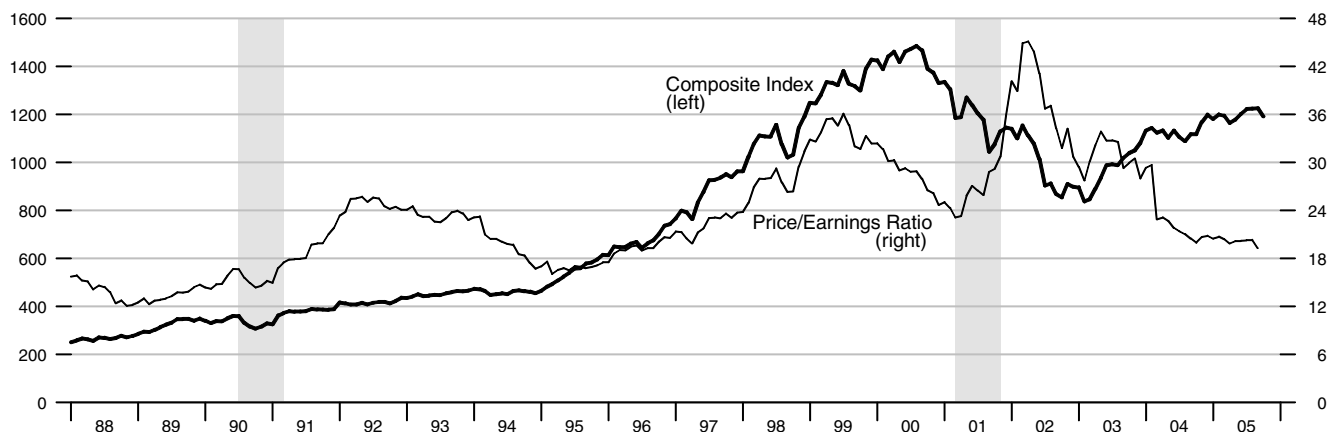


Commercial and Industrial Loans at Commercial Banks

Percent change from year ago



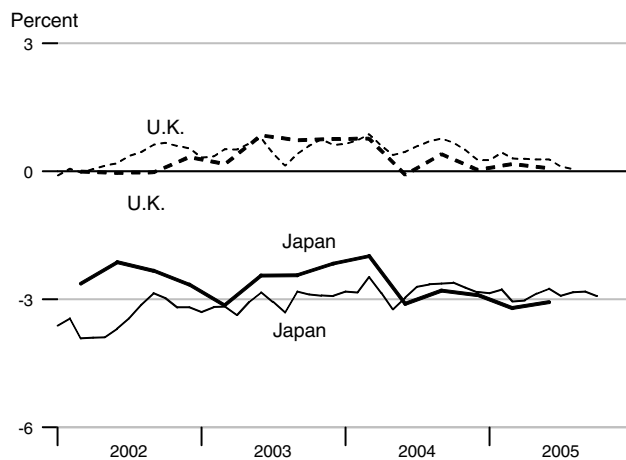
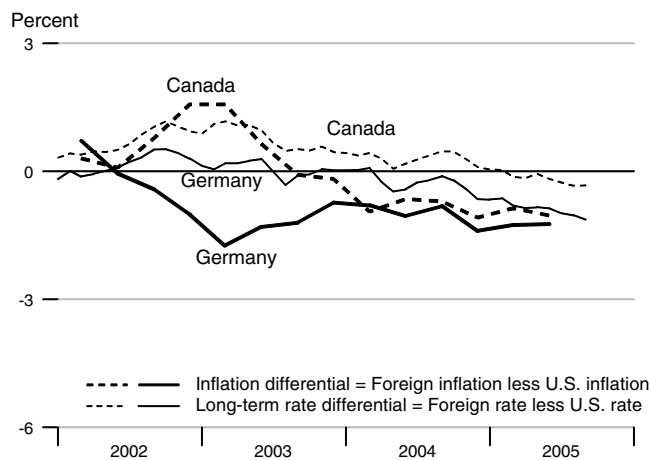
Standard & Poor's 500



Recent Inflation and Long-Term Interest Rates

	Consumer Price Inflation Rates				Long-Term Government Bond Rates			
	Percent change from year ago				Percent			
	2004Q4	2005Q1	2005Q2	2005Q3	Jul05	Aug05	Sep05	Oct05
United States	3.37	3.00	2.93	3.80	4.18	4.26	4.20	4.46
Canada	2.29	2.13	1.90	.	3.92	3.92	3.87	.
France	2.08	1.70	1.69	.	3.27	3.30	.	.
Germany	1.98	1.74	1.70	.	3.20	3.23	3.07	.
Italy	1.98	1.92	1.84	2.03	3.44	3.45	3.29	.
Japan	0.48	-0.20	-0.14	.	1.26	1.43	1.38	1.54
United Kingdom	3.41	3.17	3.01	.	4.29	4.31	.	.

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	5025.435	607.106	84.308	248.591
2001		1140.215	5223.438	5219.902	7646.741	5344.296	641.167	86.172	271.439
2002		1196.344	5895.446	5615.409	8261.403	5597.665	697.092	88.158	294.191
2003		1273.946	6332.382	6004.606	8788.514	6120.762	740.926	93.308	315.219
2004		1344.897	6581.409	6277.338	9236.793	6597.081	776.704	96.061	329.910
2003	1	1235.469	6195.709	5866.596	8624.845	5956.369	726.940	91.196	307.910
	2	1268.185	6279.599	5976.326	8735.938	6136.558	738.451	92.117	313.666
	3	1292.370	6443.859	6091.199	8901.791	6186.809	744.331	95.163	319.766
	4	1299.762	6410.361	6084.306	8891.481	6203.313	753.981	94.758	319.534
2004	1	1319.929	6449.505	6138.564	9010.315	6427.452	761.427	95.031	322.486
	2	1339.324	6587.990	6257.514	9216.103	6559.401	771.146	96.600	328.774
	3	1350.520	6621.038	6311.119	9313.488	6644.983	782.780	96.796	331.731
	4	1369.815	6667.102	6402.156	9407.267	6756.488	791.464	95.817	336.649
2005	1	1371.476	6674.393	6465.985	9536.906	6992.033	798.241	96.641	339.990
	2	1369.607	6666.259	6493.246	9677.149	7166.395	802.631	96.017	341.135
	3	1362.983	6723.352	6555.817	9877.414	7340.714	808.411	96.500	344.199
2003	Sep	1295.502	6451.229	6094.087	8909.200	6185.281	745.834	95.523	319.960
	Oct	1296.390	6426.878	6086.156	8904.143	6161.505	754.020	95.892	319.572
	Nov	1297.815	6407.337	6081.566	8884.999	6198.017	754.971	95.410	319.395
	Dec	1305.081	6396.868	6085.195	8885.301	6250.417	752.952	92.971	319.634
2004	Jan	1303.448	6410.822	6098.708	8942.455	6320.838	756.790	93.206	320.482
	Feb	1321.799	6444.242	6139.032	9006.604	6441.756	763.195	95.937	322.499
	Mar	1334.540	6493.452	6177.951	9081.885	6519.763	764.295	95.950	324.478
	Apr	1334.317	6541.332	6215.194	9144.307	6540.096	767.951	97.095	326.515
	May	1338.617	6606.287	6273.248	9233.171	6549.076	770.211	95.779	329.610
	Jun	1345.039	6616.350	6284.101	9270.830	6589.032	775.275	96.927	330.197
	Jul	1337.428	6602.798	6285.668	9273.163	6601.481	780.464	95.691	330.486
	Aug	1355.047	6616.533	6306.493	9308.479	6631.785	781.527	96.023	331.433
	Sep	1359.084	6643.783	6341.195	9358.822	6701.682	786.349	98.674	333.274
	Oct	1360.163	6644.202	6369.273	9369.946	6715.522	792.248	97.558	334.886
	Nov	1375.791	6669.000	6406.537	9401.368	6760.040	793.878	96.828	336.880
	Dec	1373.491	6688.104	6430.657	9450.486	6793.901	788.267	93.065	338.181
2005	Jan	1364.258	6683.116	6449.132	9502.881	6892.991	793.540	95.087	339.216
	Feb	1371.622	6668.727	6464.333	9538.993	6998.753	800.277	97.805	339.882
	Mar	1378.549	6671.335	6484.491	9568.845	7084.356	800.906	97.030	340.873
	Apr	1361.001	6667.870	6481.436	9620.643	7111.894	802.312	97.379	340.791
	May	1373.452	6648.611	6482.733	9662.698	7166.340	800.580	94.524	340.504
	Jun	1374.367	6682.296	6515.569	9748.105	7220.951	805.002	96.148	342.110
	Jul	1354.355	6687.349	6525.086	9776.674	7275.405	805.964	95.585	342.722
	Aug	1371.036	6717.428	6554.359	9878.661	7350.709	807.389	95.815	344.070
	Sep	1363.559	6765.279	6588.007	9976.907	7396.027	811.879	98.101	345.806

*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			
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
	3	3.46	4.43	6.43	3.74	3.43	3.98	4.21	5.09	4.28	5.76
2003	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	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		6.07

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

		M1	MZM	M2	M3
Percent change at an annual rate					
2000		0.18	8.09	6.07	9.41
2001		3.33	15.88	8.77	11.47
2002		4.92	12.87	7.58	8.04
2003		6.49	7.41	6.93	6.38
2004		5.57	3.93	4.54	5.10
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2003	1	8.38	7.85	6.90	6.69
	2	10.59	5.42	7.48	5.15
	3	7.63	10.46	7.69	7.59
	4	2.29	-2.08	-0.45	-0.46
2004	1	6.21	2.44	3.57	5.35
	2	5.88	8.59	7.75	9.14
	3	3.34	2.01	3.43	4.23
	4	5.71	2.78	5.77	4.03
2005	1	0.49	0.44	3.99	5.51
	2	-0.55	-0.49	1.69	5.88
	3	-1.93	3.43	3.85	8.28
<hr/>					
2003	Sep	0.14	-0.70	-3.62	-0.58
	Oct	0.82	-4.53	-1.56	-0.68
	Nov	1.32	-3.65	-0.91	-2.58
	Dec	6.72	-1.96	0.72	0.04
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2004	Jan	-1.50	2.62	2.66	7.72
	Feb	16.89	6.26	7.93	8.61
	Mar	11.57	9.16	7.61	10.03
	Apr	-0.20	8.85	7.23	8.25
	May	3.87	11.92	11.21	11.66
	Jun	5.76	1.83	2.08	4.89
	Jul	-6.79	-2.46	0.30	0.30
	Aug	15.81	2.50	3.98	4.57
	Sep	3.58	4.94	6.60	6.49
	Oct	0.95	0.08	5.31	1.43
	Nov	13.79	4.48	7.02	4.02
	Dec	-2.01	3.44	4.52	6.27
<hr/>					
2005	Jan	-8.07	-0.89	3.45	6.65
	Feb	6.48	-2.58	2.83	4.56
	Mar	6.06	0.47	3.74	3.76
	Apr	-15.28	-0.62	-0.57	6.50
	May	10.98	-3.47	0.24	5.25
	Jun	0.80	6.08	6.08	10.61
	Jul	-17.47	0.91	1.75	3.52
	Aug	14.78	5.40	5.38	12.52
	Sep	-6.54	8.55	6.16	11.93

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/.