



Fueling Expected Inflation

Maintaining expectations of a low, stable inflation rate is essential to achieving the goals of monetary policy. But how, exactly, do households and firms form inflation expectations? It seems reasonable that rapidly rising prices for frequently purchased goods would attract more notice than stable prices for goods purchased less frequently. Recent correlations between increases in gasoline prices and in inflation expectations provide an example. Federal Reserve Chairman Bernanke cited this risk in his July 15 Monetary Policy Report to the Congress: "...the currently high level of inflation, if sustained, might lead the public to revise up its expectations for longer-term inflation. If that were to occur, and those revised expectations were to become embedded in the domestic wage- and price-setting process, we could see an unwelcome rise in actual inflation over the longer term. A critical responsibility of monetary policy makers is to prevent that process from taking hold."¹

During 2008, through June, the U.S. all-items CPI increased at a 5.4 percent rate, while the chain-price index for personal consumption expenditures (PCE) increased at a 3.3 percent pace. The comparable "core" measures that exclude food and energy increased at 2.3 percent and 1.9 percent rates, respectively. By some measures, inflation expectations increased as well. In the University of Michigan's household survey, the median expected inflation rate for the next 12 months increased from 3.4 percent in the December 2007 survey to 5.1 percent in the July 2008 survey, its second-highest level since 1981, just below May's 5.2 percent figure. Although the survey's median expected inflation rate for the next 5 to 10 years changed little, from 3.1 percent in December to 3.2 percent in July, it is at its second-highest level since 1995, just below May and June's 3.4 percent figures. These increases seem incongruous with the 1.9 percent rate of increase of the chain-price index for core PCE, the FOMC's preferred inflation measure.

Linkages between commodity prices and inflation expectations also are a concern in Europe. In the United Kingdom, the all-items CPI increased 0.7 percent in June and is 3.8 percent

higher than one year earlier, the largest year-over-year increase since June 1992. The core CPI, however, was up only 1.6 percent year-over-year. According to the YouGov/Citicorp survey, inflation expected during the next 12 months jumped to 4.6 percent in June from 4.1 percent in May. Similarly, inflation expected for the next 50 years (inferred from inflation-indexed gilt bonds) rose to 4 percent. In the euro area, June consumer price inflation was at a 4 percent annual rate, double the European Central Bank's (ECB) desired rate; on July 3, the ECB raised its benchmark interest rate to 4.25 percent. Press reports cited concern that inflation expectations were increasing.

Increases in gasoline prices are shown in the table. The retail price of gasoline in the United States increased 30 percent during the first half of 2008, while gasoline prices in the United Kingdom and the euro area increased between 8 percent and 15 percent. The relatively higher taxes in Europe, accounting for more than half the retail price, buffer gasoline's retail price against increases in the cost of crude oil.

Recent increases in inflation expectations appear to more strongly reflect rising commodity prices, rather than core inflation rates or policymakers' longer-term inflation goals. Europe's lesser rate of increase in gasoline prices perhaps provides the ECB and the Bank of England a bit more policymaking flexibility. The much larger increase in the United States suggests more difficult circumstances for the Federal Reserve.

—Richard G. Anderson and Charles S. Gascon

¹ Chairman Ben S. Bernanke, Semiannual Monetary Policy Report to the Congress, before the Committee on Banking, Housing, and Urban Affairs, U.S. Senate, July 15, 2008.

Retail Gasoline Prices

	Belgium	France	Germany	Italy	Netherlands	U.K.	U.S.
Increase per gallon, in each country's own currency, January 7 to July 14, 2008							
	10%	8%	10%	11%	9%	15%	30%
Tax component per gallon, in U.S. dollars, as of July 14, 2008							
Retail price with taxes	\$9.40	\$8.95	\$9.27	\$9.23	\$10.16	\$9.02	\$4.34
Retail price without taxes	\$4.18	\$3.83	\$3.85	\$4.29	\$4.53	\$3.87	\$3.94
Tax share of retail price	55.5%	57.2%	58.5%	53.5%	55.4%	57.1%	9.2%

SOURCE: Energy Information Agency, FRB H.10, and authors' calculations.

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

We welcome your comments addressed to:

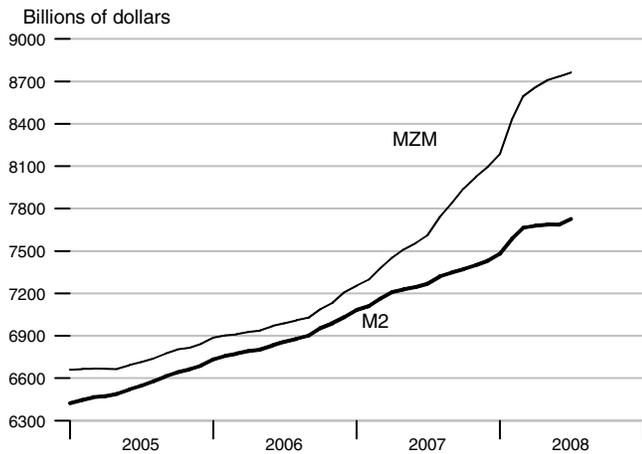
Editor, *Monetary Trends*
Research Division
Federal Reserve Bank of St. Louis
P.O. Box 442
St. Louis, MO 63166-0442

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

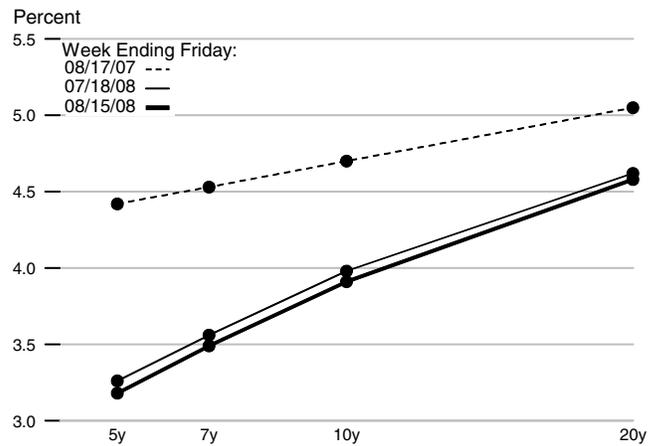
or to:

stlsFRED@stls.frb.org

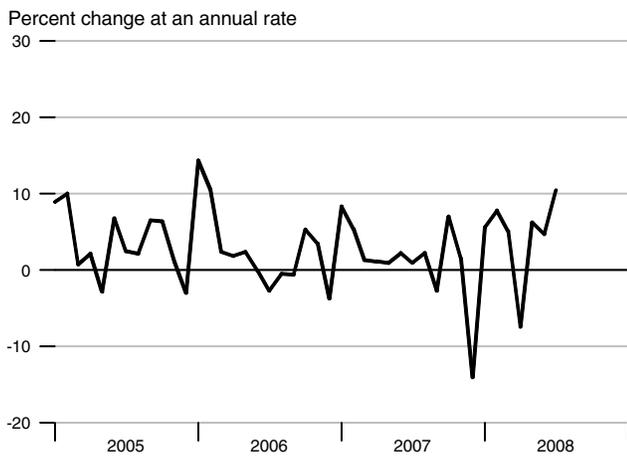
M2 and MZM



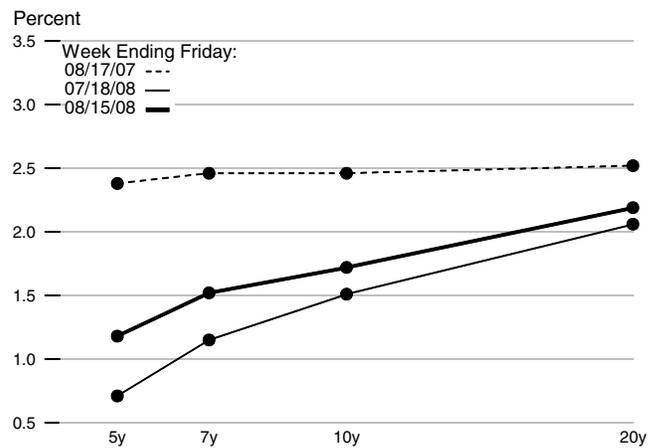
Treasury Yield Curve



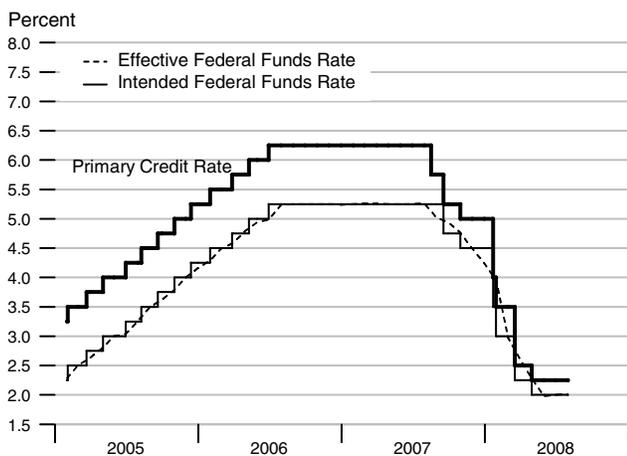
Adjusted Monetary Base



Real Treasury Yield Curve

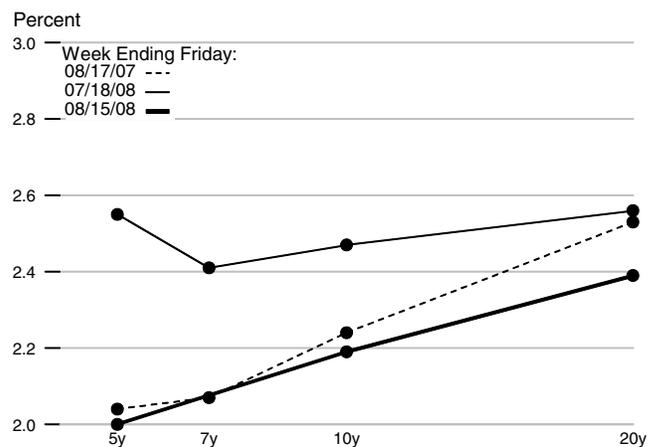


Reserve Market Rates



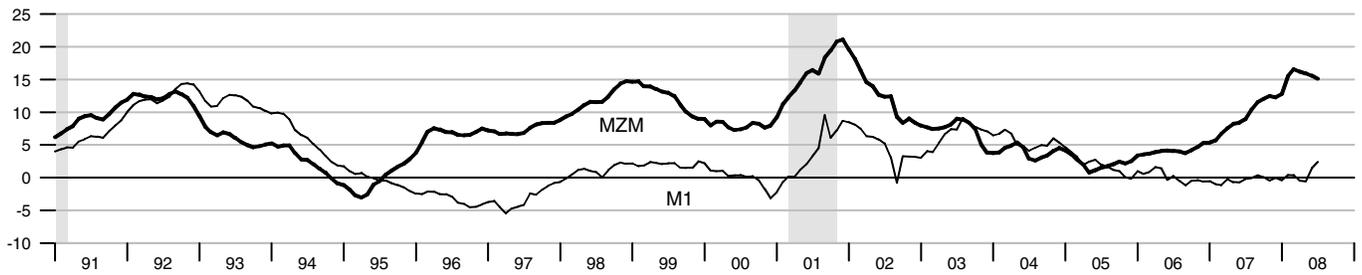
Data available as of July 2008.

Inflation-Indexed Treasury Yield Spreads



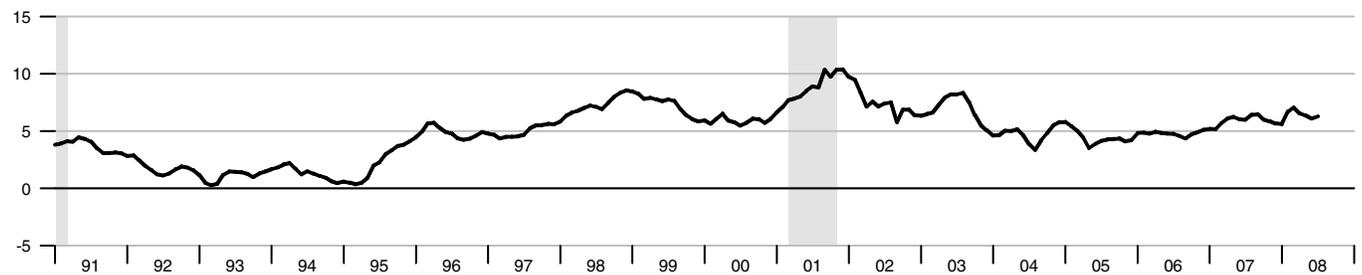
MZM and M1

Percent change from year ago



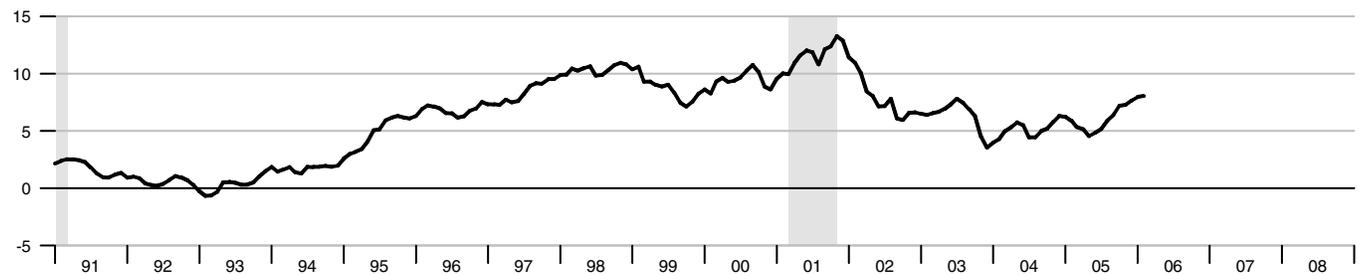
M2

Percent change from year ago



M3*

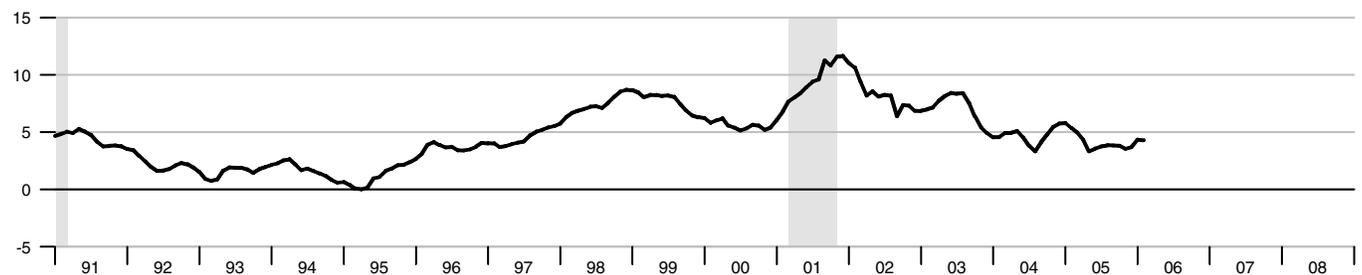
Percent change from year ago



*See table of contents for changes to the series.

Monetary Services Index - M2**

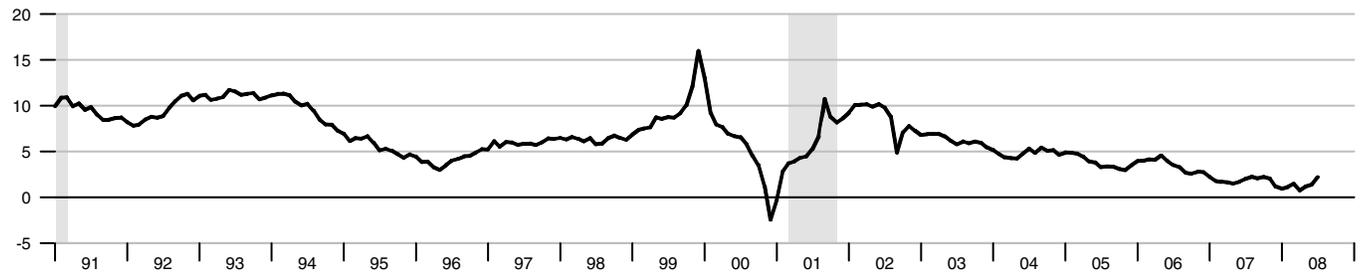
Percent change from year ago



**We will not update the MSI series until we revise the code to accommodate the discontinuation of M3.

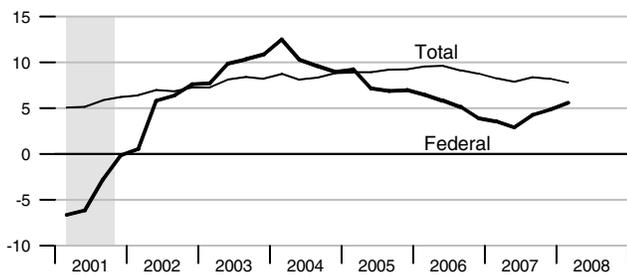
Adjusted Monetary Base

Percent change from year ago



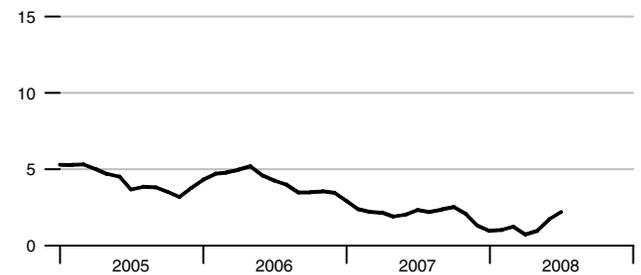
Domestic Nonfinancial Debt

Percent change from year ago



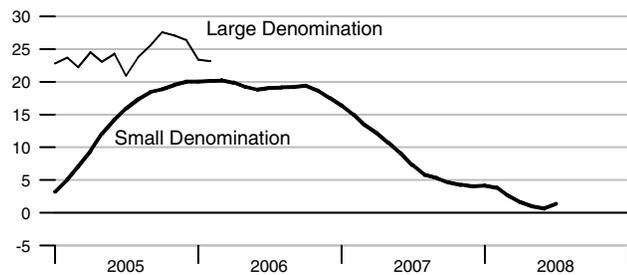
Currency Held by the Nonbank Public

Percent change from year ago



Time Deposits*

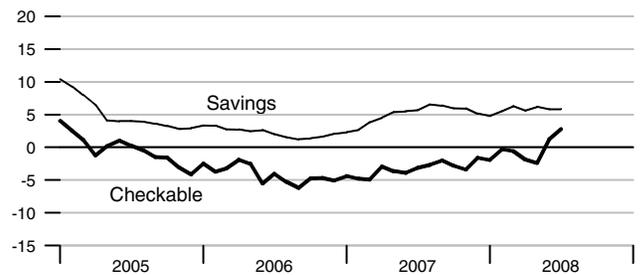
Percent change from year ago



*See table of contents for changes to the series.

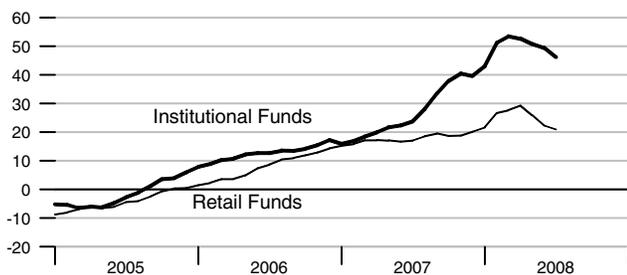
Checkable and Savings Deposits

Percent change from year ago



Money Market Mutual Fund Shares

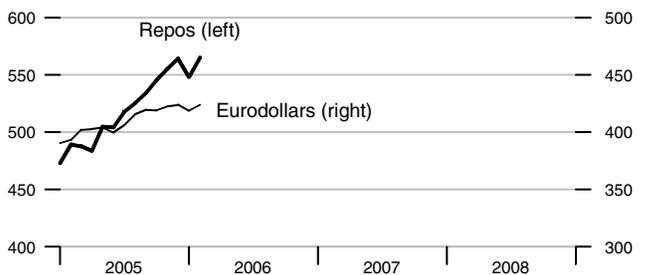
Percent change from year ago



Repurchase Agreements and Eurodollars*

Billions of dollars

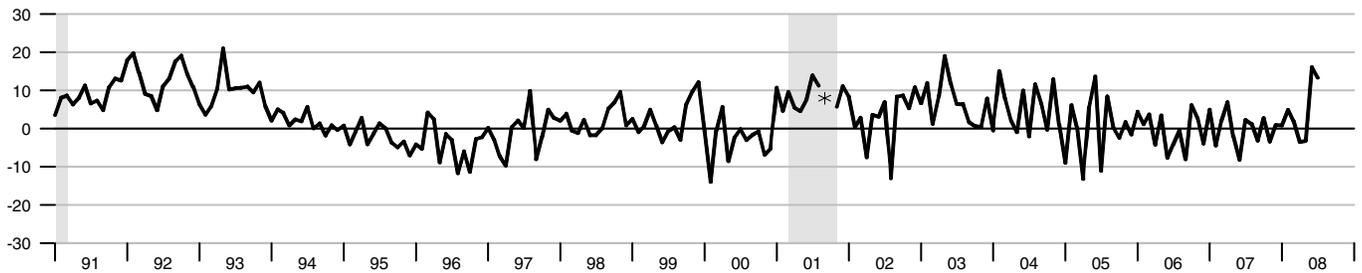
Billions of dollars



*See table of contents for changes to these series.

M1

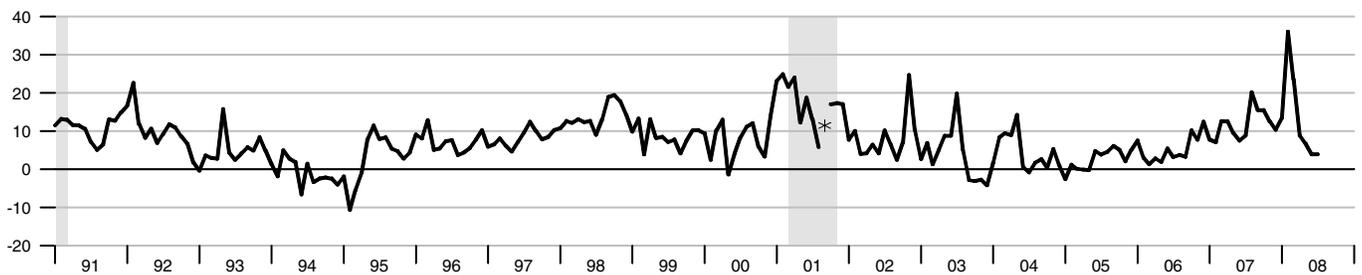
Percent change at an annual rate



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

M2M

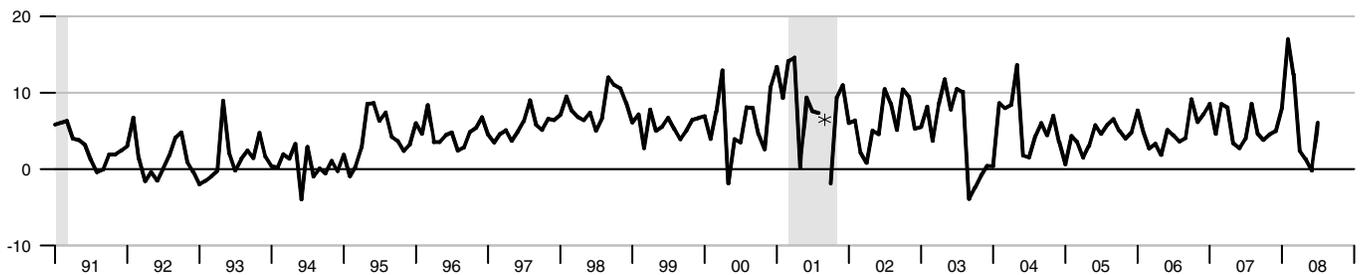
Percent change at an annual rate



*Actual value for September 2001 is 39.41 percent rate.

M2

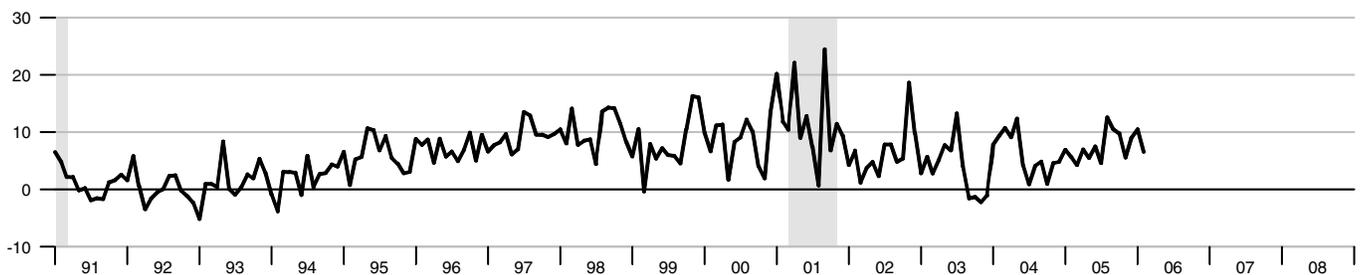
Percent change at an annual rate



*Actual value for September 2001 is 24.90 percent rate.

M3*

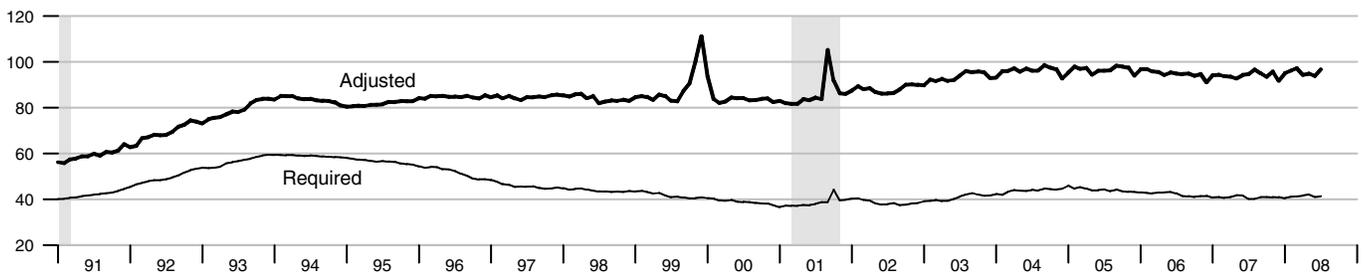
Percent change at an annual rate



*See table of contents for changes to the series.

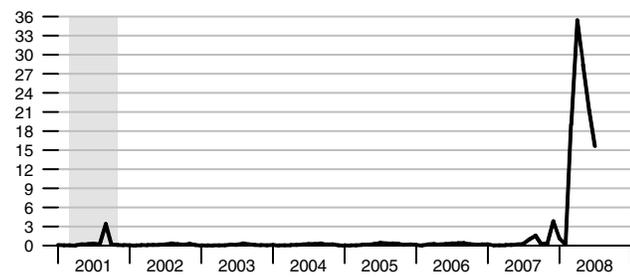
Adjusted and Required Reserves

Billions of dollars



Total Borrowings, nsa

Billions of dollars



* Total borrowings include loans to depository institutions for primary, secondary, seasonal credit, primary dealer credit facility, and other credit extensions, but exclude term auction credit.

Excess Reserves plus RCB Contracts

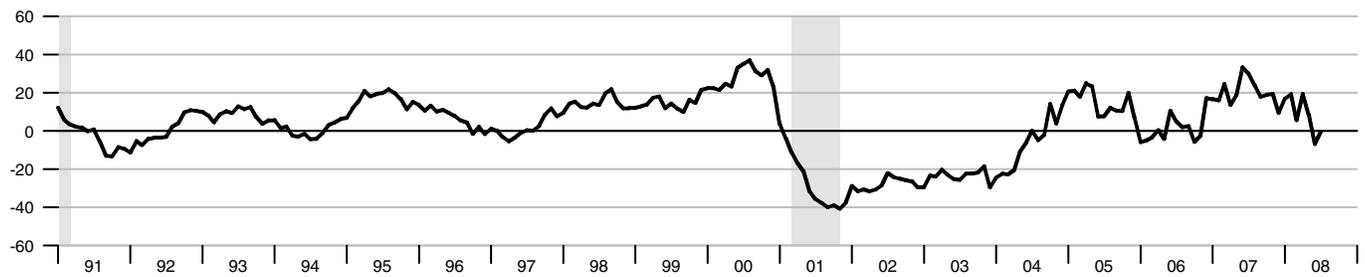
Billions of dollars



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

Nonfinancial Commercial Paper

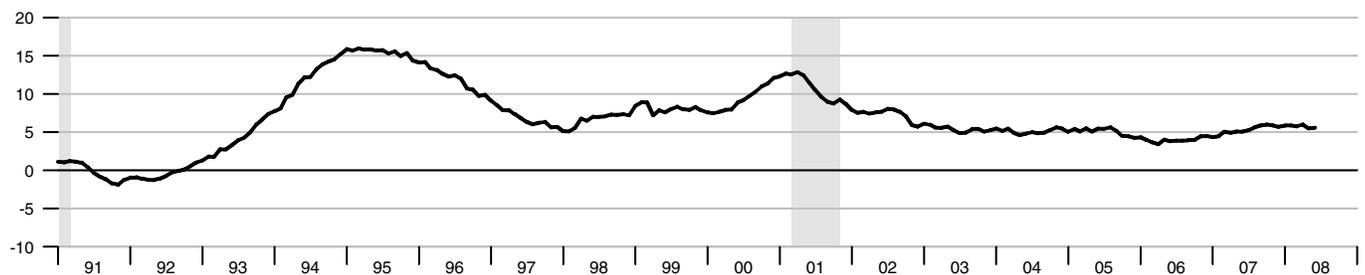
Percent change from year ago



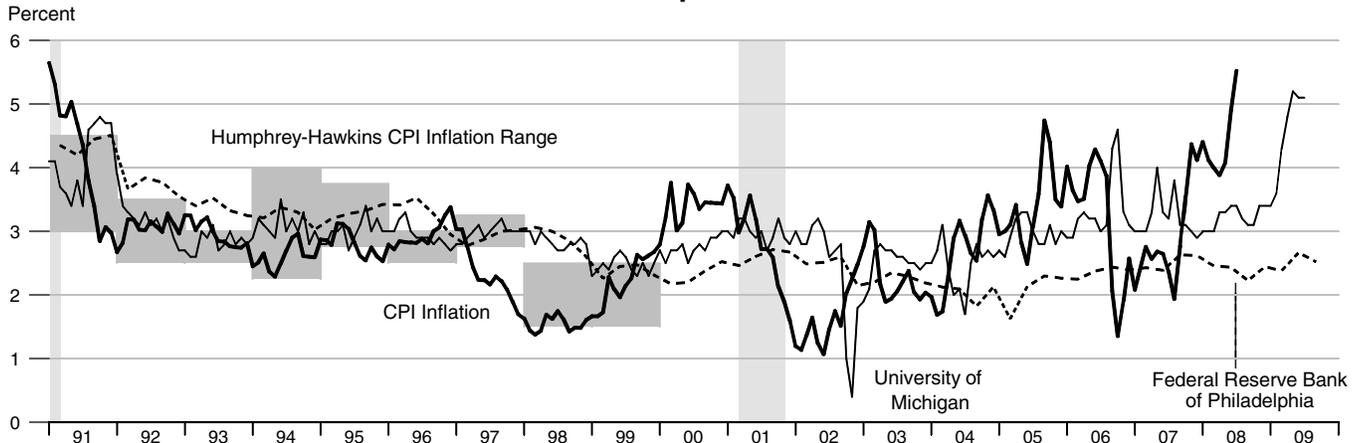
As of April 10, 2006, the Federal Reserve Board made major changes to its commercial paper calculations. For more information, please refer to <http://www.federalreserve.gov/releases/cp/about.htm>.

Consumer Credit

Percent change from year ago



CPI Inflation and 1-Year-Ahead CPI Inflation Expectations

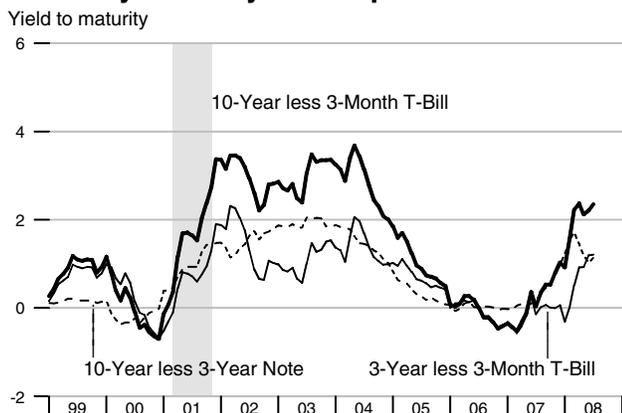


The shaded region shows the Humphrey-Hawkins CPI inflation range. Beginning in January 2000, the Humphrey-Hawkins inflation range was reported using the PCE price index and therefore is not shown on this graph.

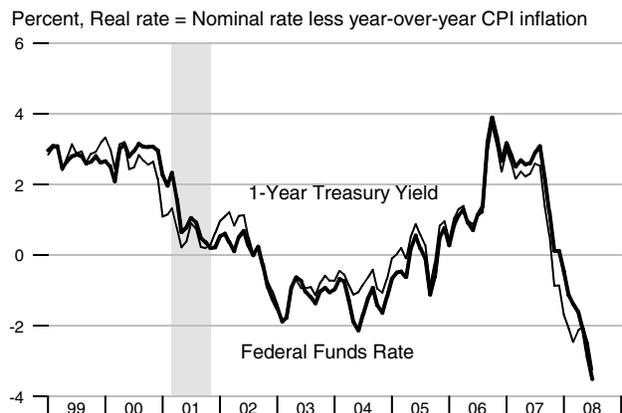
10-Year Ahead PCE Inflation Expectations and Realized Inflation



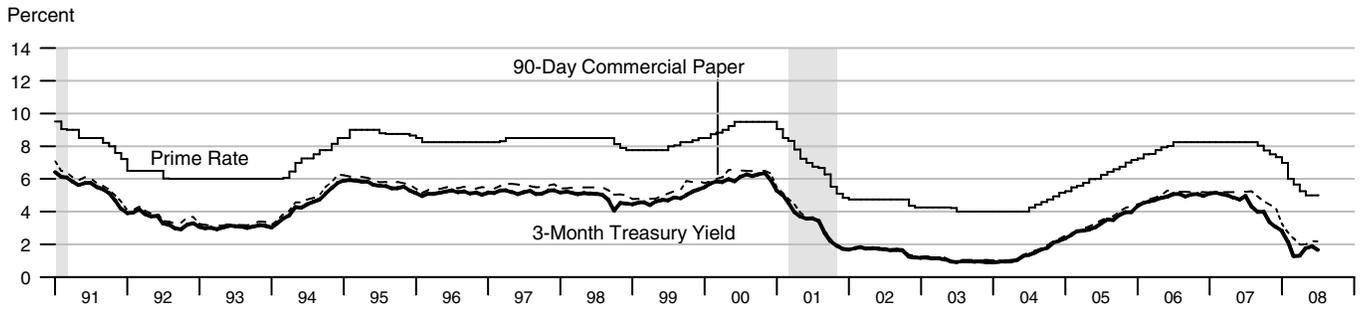
Treasury Security Yield Spreads



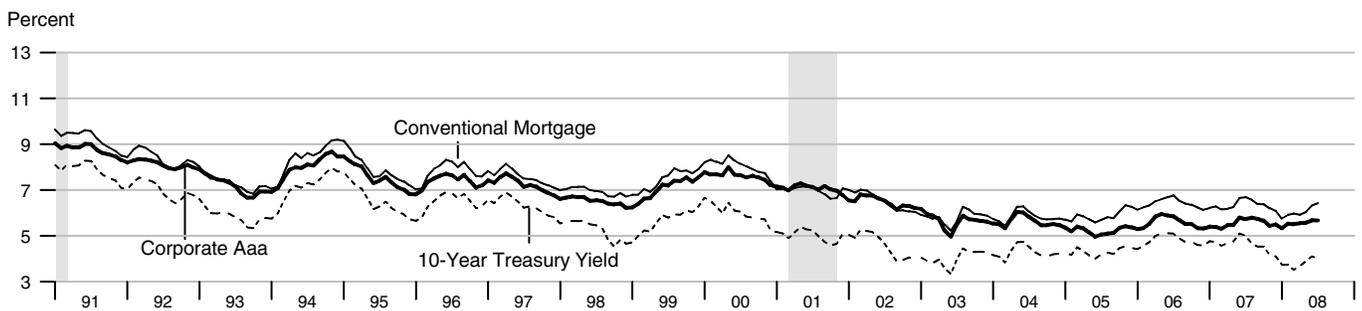
Real Interest Rates



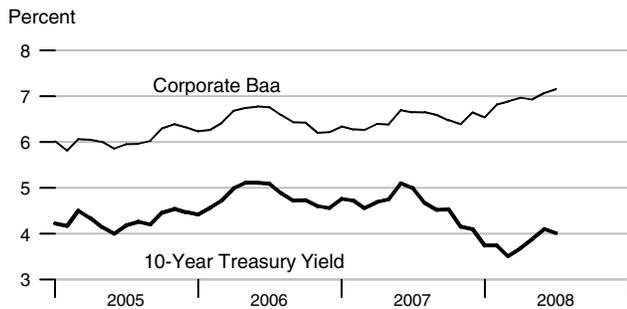
Short-Term Interest Rates



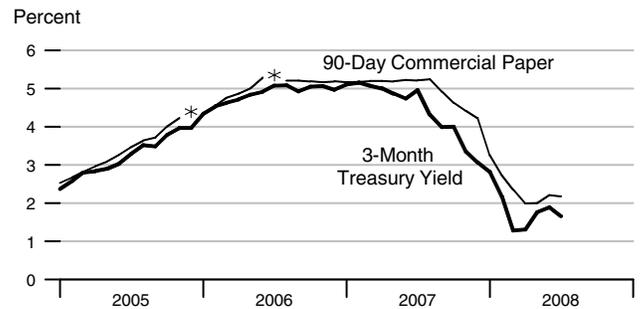
Long-Term Interest Rates



Long-Term Interest Rates

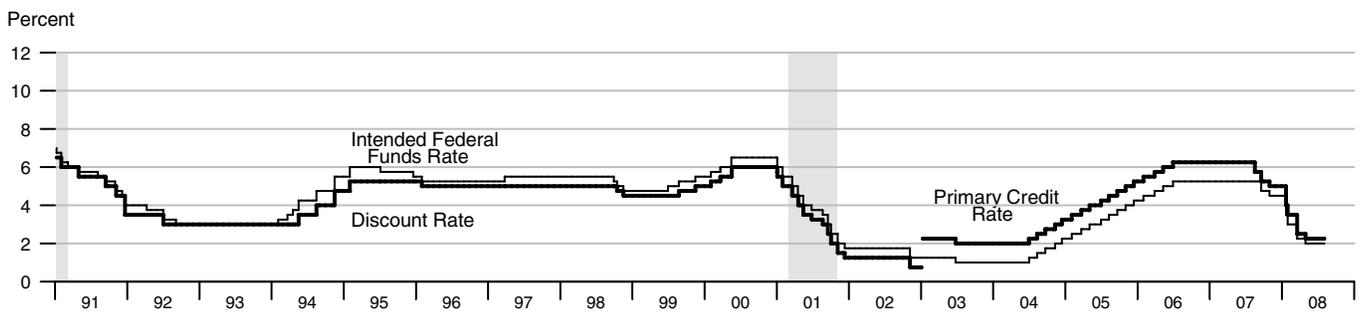


Short-Term Interest Rates



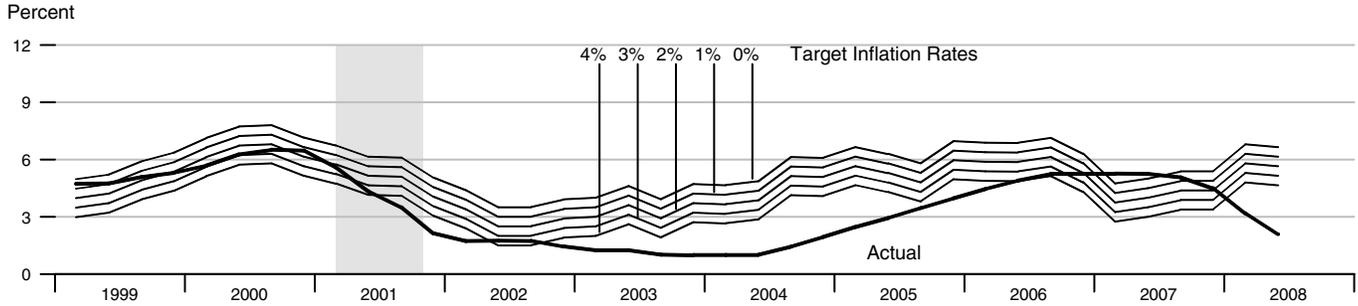
*90-Day Commercial Paper data are not available for December 2005, January 2006, and July 2006.

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



Data available as of July 2008.

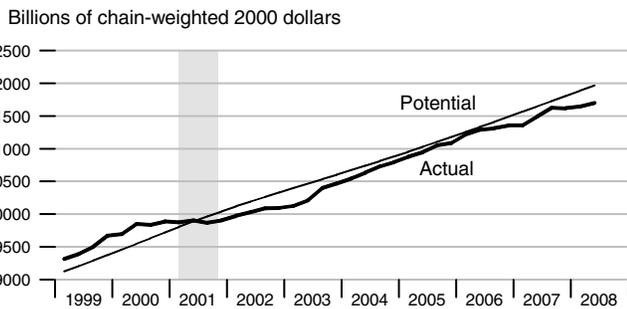
Federal Funds Rate and Inflation Targets



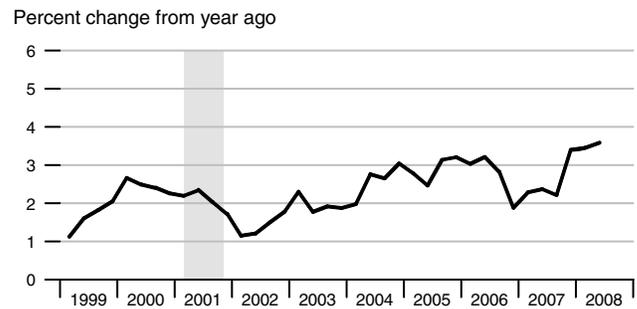
Calculated federal funds rate is based on Taylor's rule. See notes on page 19.

Components of Taylor's Rule

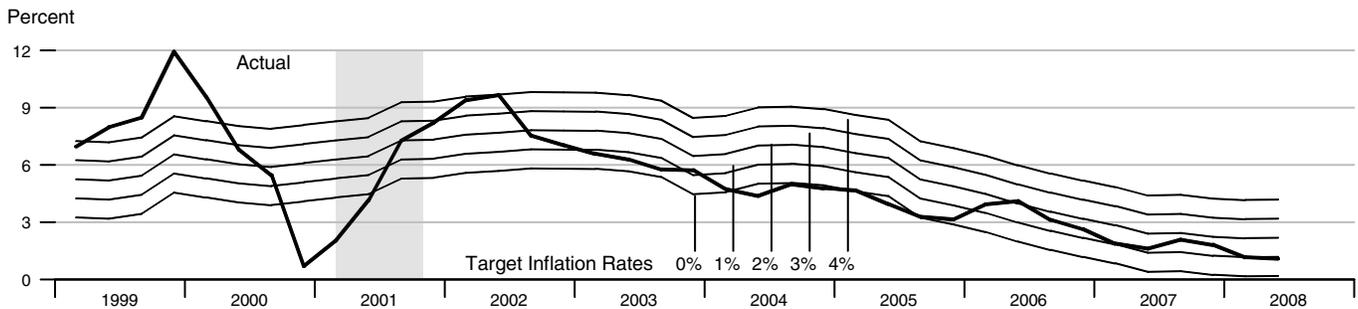
Actual and Potential Real GDP



PCE Inflation



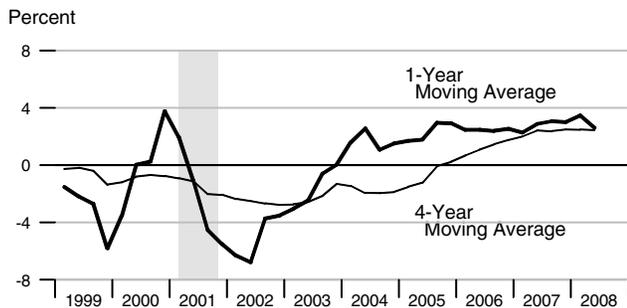
Monetary Base Growth* and Inflation Targets



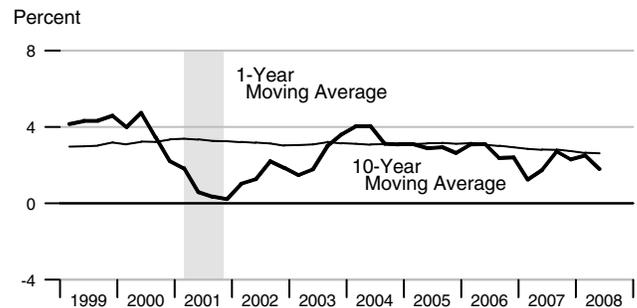
*Modified for the effects of sweeps programs on reserve demand. Calculated base growth is based on McCallum's rule. Actual base growth is percent change from year ago. See notes on page 19.

Components of McCallum's Rule

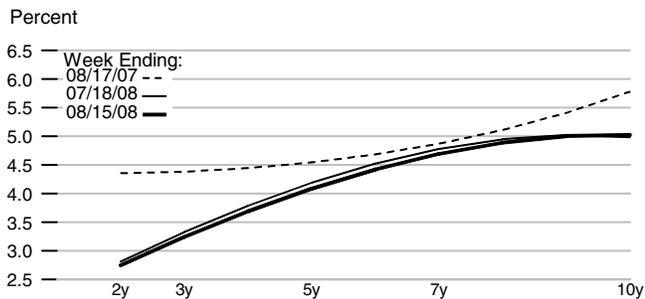
Monetary Base Velocity Growth



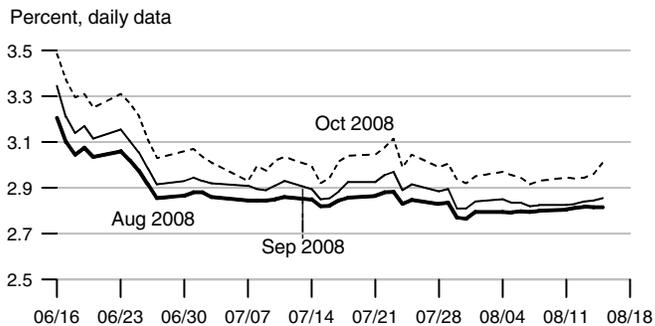
Real Output Growth



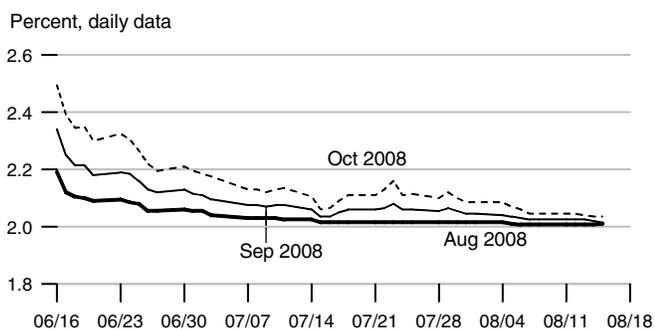
Implied One-Year Forward Rates



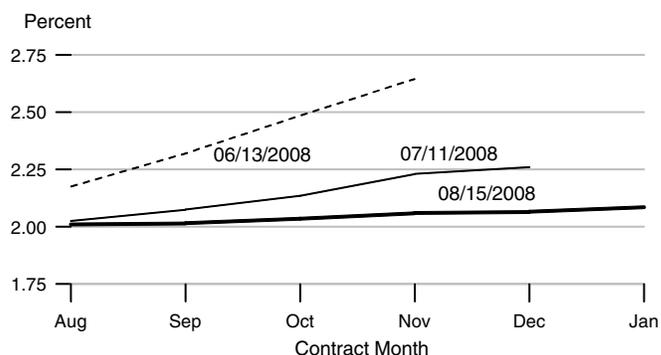
Rates on 3-Month Eurodollar Futures



Rates on Selected Federal Funds Futures Contracts

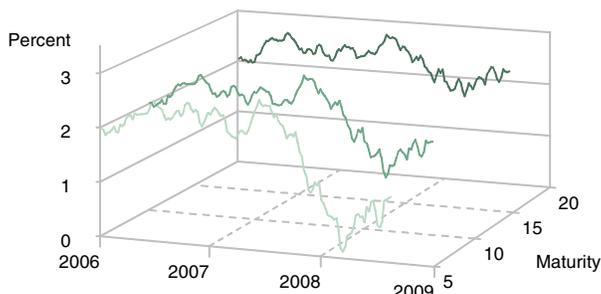


Rates on Federal Funds Futures on Selected Dates



Inflation-Indexed Treasury Securities

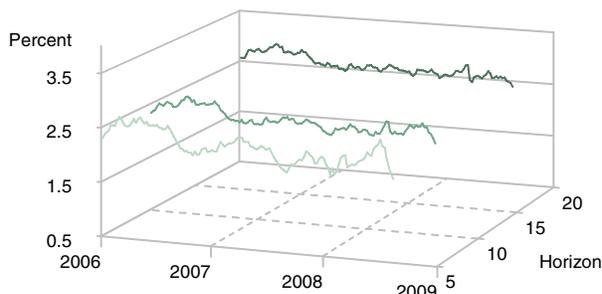
Weekly data



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

Inflation-Indexed Treasury Yield Spreads

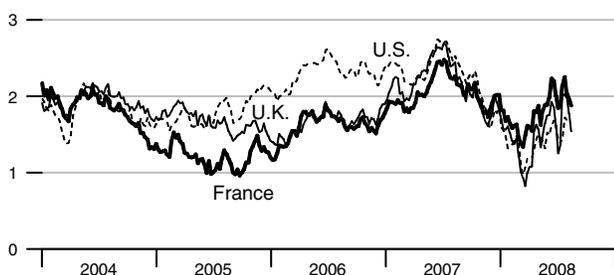
Weekly data



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

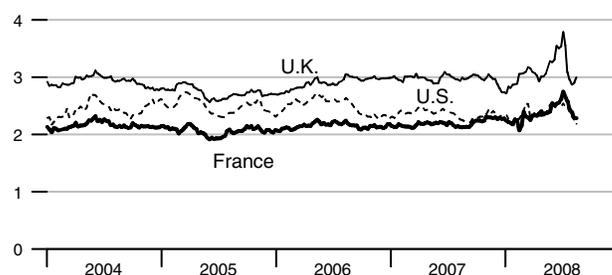
Inflation-Indexed 10-Year Government Notes

Percent, weekly data



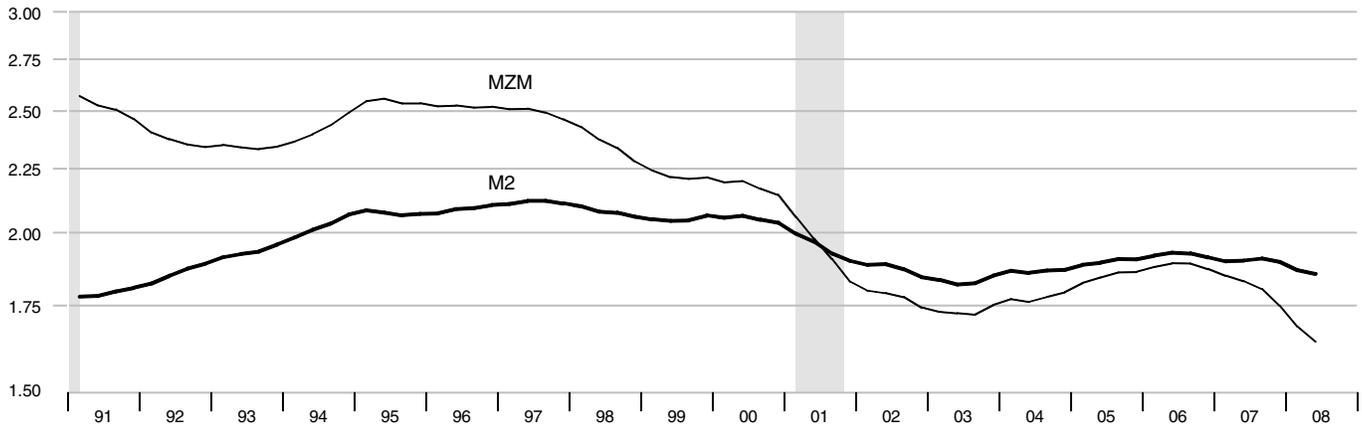
Inflation-Indexed 10-Year Government Yield Spreads

Percent, weekly data



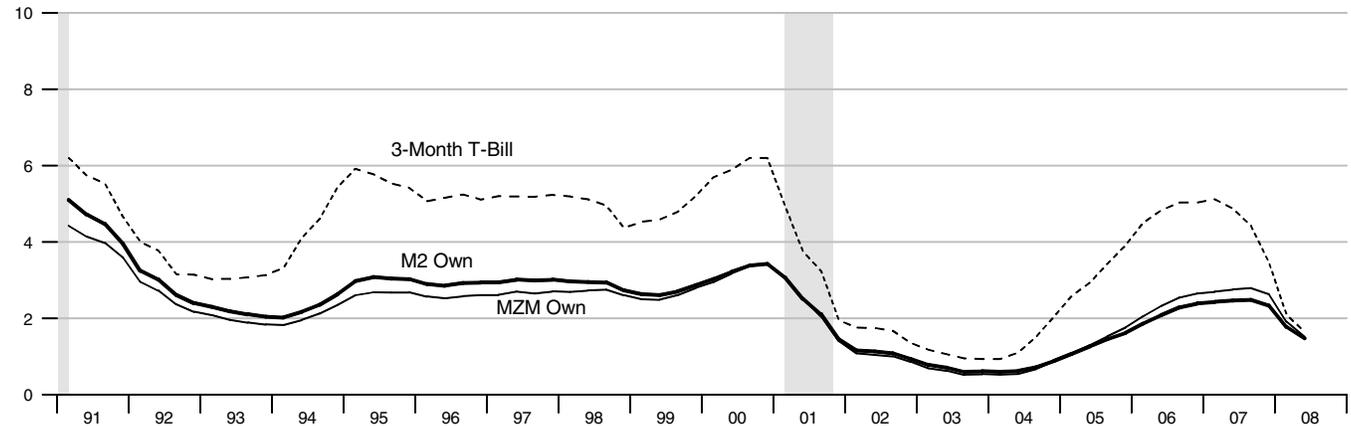
Velocity

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



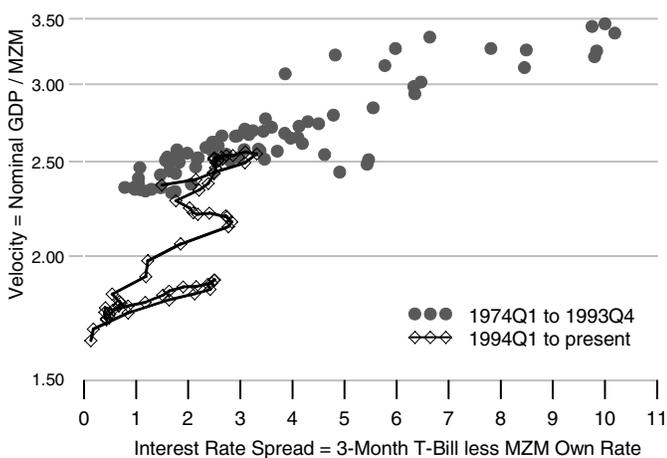
Interest Rates

Percent



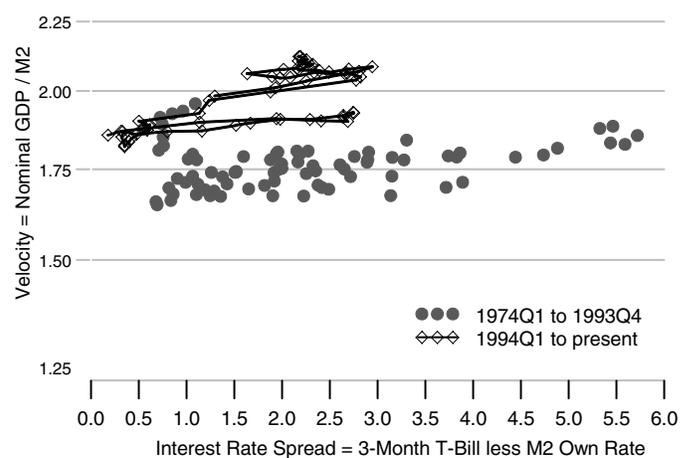
MZM Velocity and Interest Rate Spread

Ratio Scale



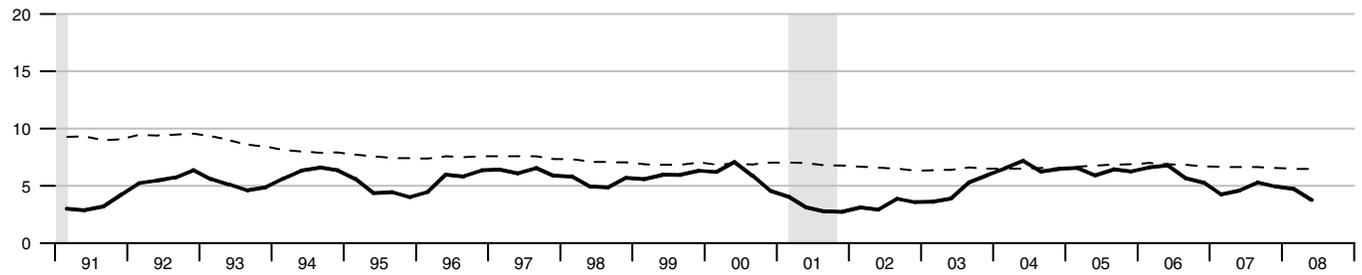
M2 Velocity and Interest Rate Spread

Ratio Scale



Gross Domestic Product

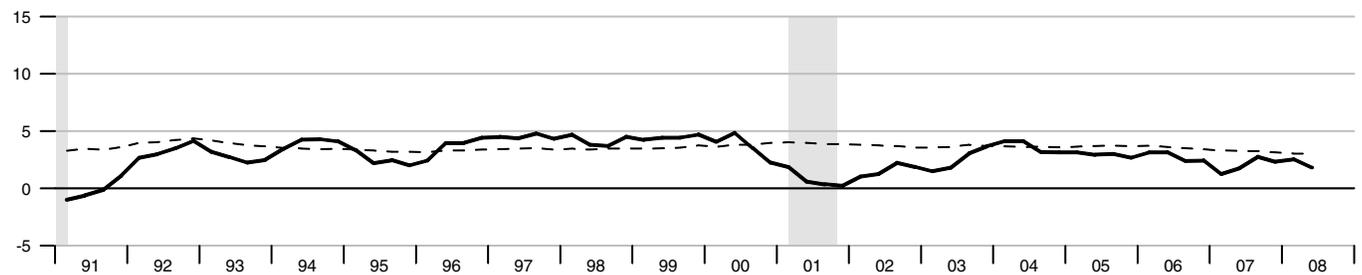
Percent change from year ago



Dashed lines indicate 10-year moving averages.

Real Gross Domestic Product

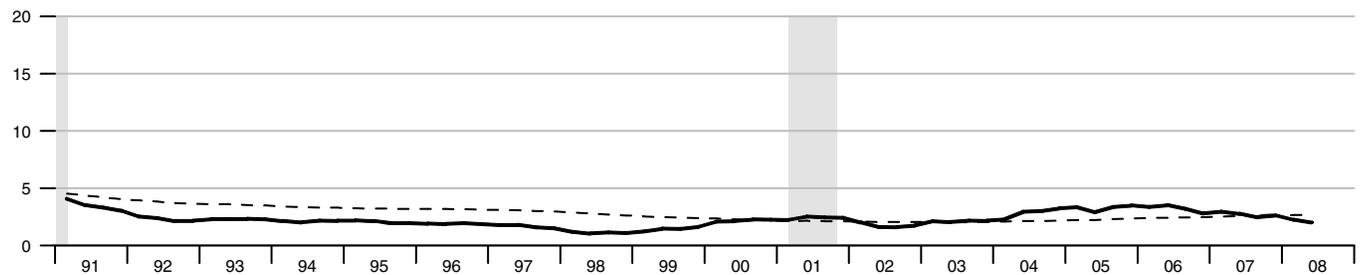
Percent change from year ago



Dashed lines indicate 10-year moving averages.

Gross Domestic Product Price Index

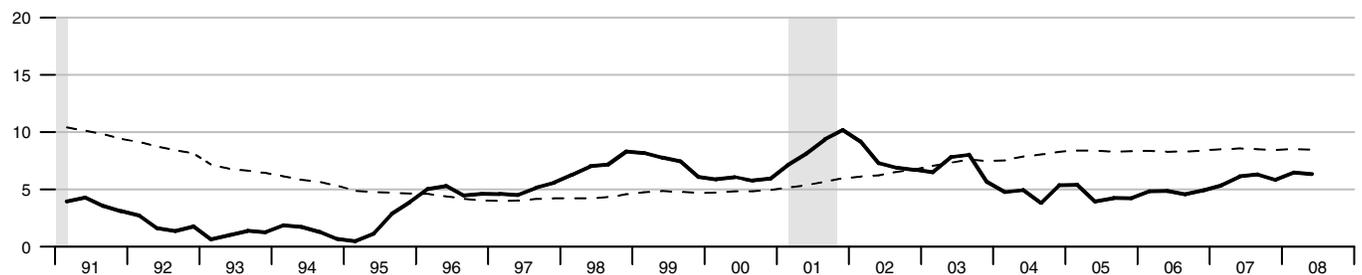
Percent change from year ago



Dashed lines indicate 10-year moving averages.

M2

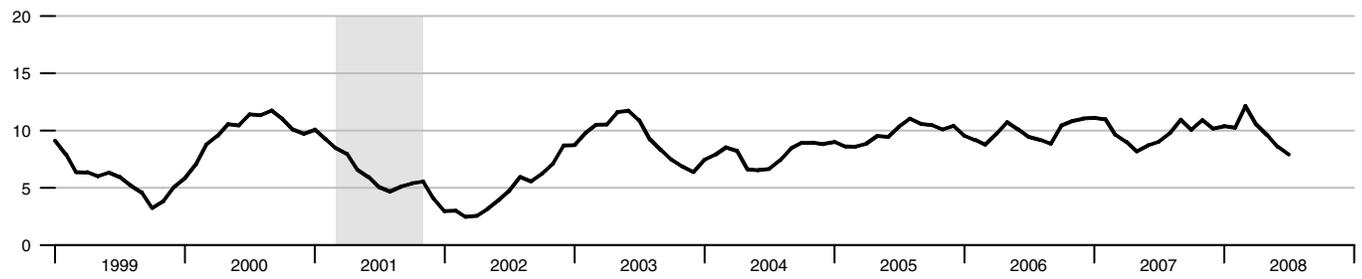
Percent change from year ago



Dashed lines indicate 10-year moving averages.

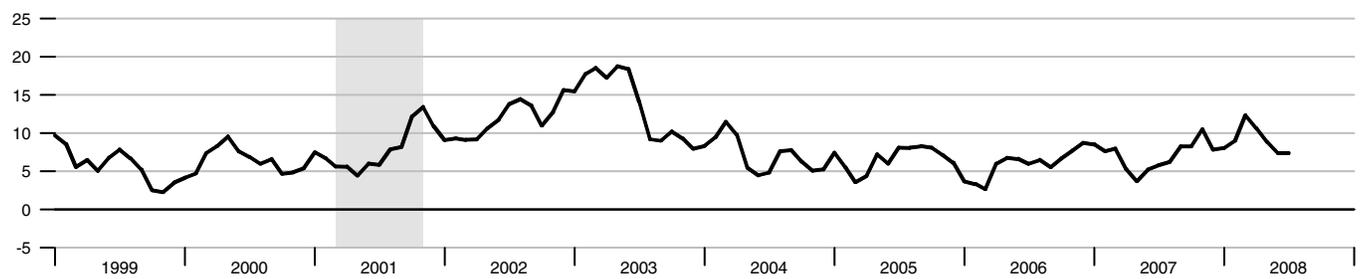
Bank Credit

Percent change from year ago



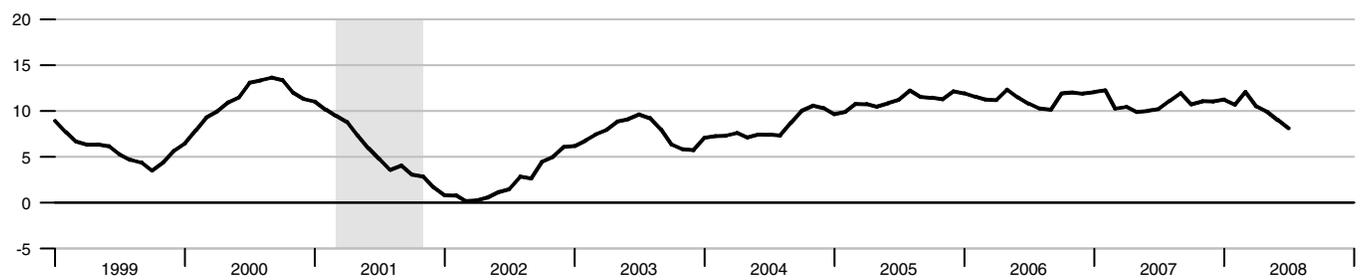
Investment Securities in Bank Credit at Commercial Banks

Percent change from year ago



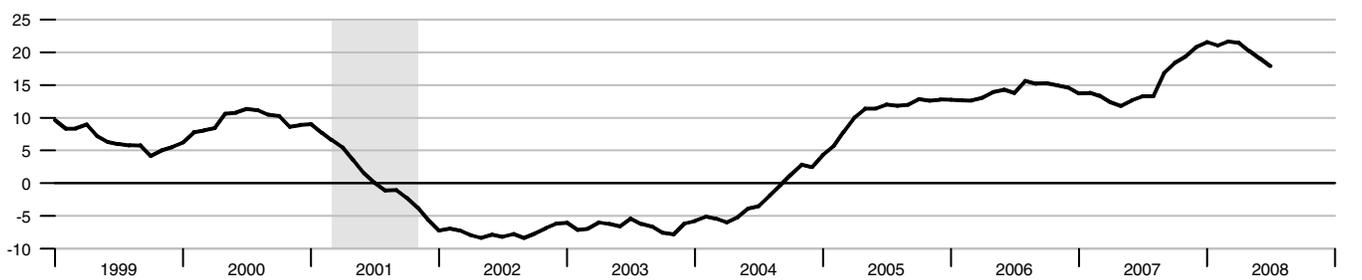
Total Loans and Leases in Bank Credit at Commercial Banks

Percent change from year ago

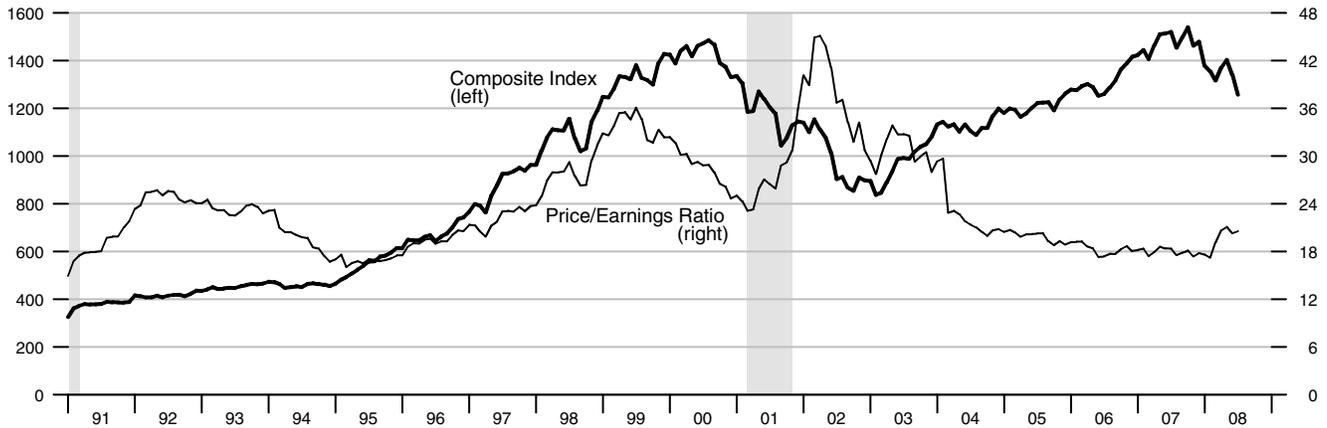


Commercial and Industrial Loans at Commercial Banks

Percent change from year ago



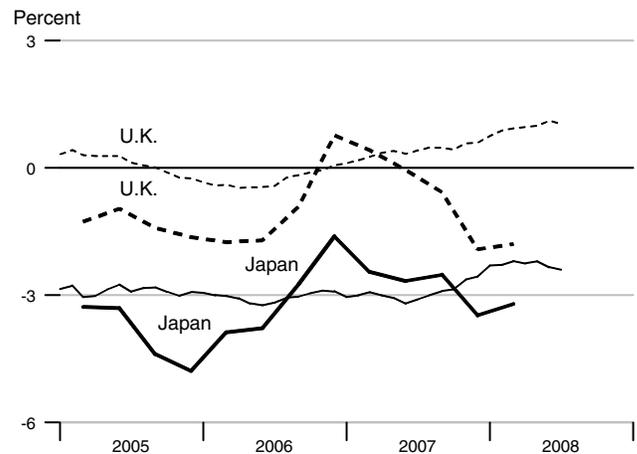
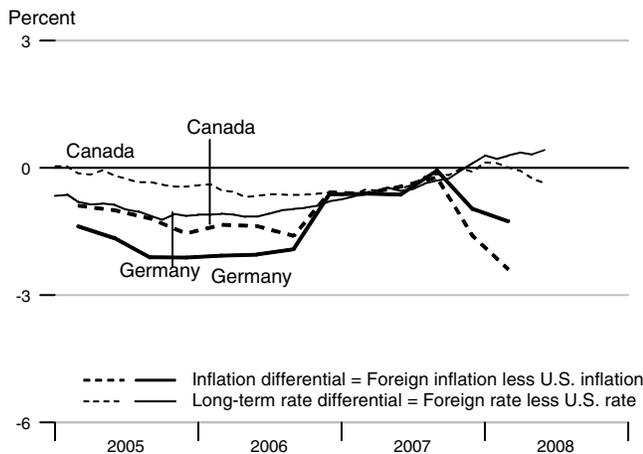
Standard & Poor's 500



Recent Inflation and Long-Term Interest Rates

	Consumer Price Inflation Rates				Long-Term Government Bond Rates			
	Percent change from year ago				Percent			
	2007Q3	2007Q4	2008Q1	2008Q2	Apr08	May08	Jun08	Jul08
United States	2.36	4.01	4.17	4.29	3.68	3.88	4.10	4.01
Canada	2.13	2.41	1.78	.	3.61	3.63	3.74	.
France	1.27	2.34	2.95	.	4.27	4.41	.	.
Germany	2.30	3.04	2.92	.	4.04	4.20	4.52	.
Italy	1.64	2.36	3.06	3.57	4.53	4.70	5.11	.
Japan	-0.16	0.53	0.96	.	1.43	1.68	1.76	1.61
United Kingdom	1.78	2.09	2.38	.	4.64	4.87	5.21	5.05

Inflation and Long-Term Interest Rate Differentials



		Money Stock				Bank	Adjusted		MSI M2**
		M1	MZM	M2	M3*	Credit	Monetary Base	Reserves	
2003		1273.484	6327.288	5984.480	8787.321	6118.279	740.938	93.325	315.192
2004		1344.422	6578.702	6266.901	9234.718	6600.373	776.768	96.129	329.873
2005		1371.780	6725.614	6545.752	9786.477	7245.093	806.628	96.560	343.539
2006		1374.386	6999.280	6859.317	10270.74	7957.545	835.040	94.913	
2007		1369.124	7641.525	7264.433		8743.781	850.573	94.192	
2006	1	1381.850	6899.986	6755.413		7621.879	830.534	96.495	
	2	1379.956	6944.753	6809.844		7883.547	836.387	95.082	
	3	1367.253	7008.764	6879.594		8038.468	834.610	94.829	
	4	1368.486	7143.617	6992.417		8286.285	838.627	93.247	
2007	1	1369.550	7308.817	7117.233		8427.906	846.302	94.116	
	2	1372.536	7506.137	7227.054		8564.762	849.908	93.547	
	3	1367.745	7731.010	7312.569		8835.499	852.256	95.416	
	4	1366.666	8020.134	7400.876		9146.955	853.823	93.690	
2008	1	1371.412	8403.683	7576.924		9349.243	856.326	96.177	
	2	1374.440	8700.410	7684.995		9384.962	859.322	94.381	
2006	Jul	1370.673	6987.911	6858.026		7985.948	834.988	94.899	
	Aug	1370.114	7009.617	6878.679		8056.241	834.632	94.712	
	Sep	1360.973	7028.764	6902.077		8073.216	834.211	94.877	
	Oct	1367.925	7088.473	6954.655		8228.049	837.884	93.955	
	Nov	1371.000	7134.182	6990.345		8276.324	840.308	94.689	
	Dec	1366.533	7208.195	7032.252		8354.481	837.690	91.097	
2007	Jan	1372.151	7254.747	7082.238		8395.091	843.492	94.184	
	Feb	1367.095	7297.578	7109.479		8461.284	847.250	94.416	
	Mar	1369.403	7374.126	7159.983		8427.344	848.165	93.748	
	Apr	1377.268	7451.277	7208.117		8507.011	848.951	93.593	
	May	1374.853	7510.075	7228.259		8564.880	849.605	92.762	
	Jun	1365.486	7557.058	7244.786		8622.395	851.169	94.287	
	Jul	1368.016	7612.454	7268.715		8706.188	851.847	94.593	
	Aug	1369.408	7740.262	7320.395		8843.135	853.427	96.636	
	Sep	1365.810	7840.314	7348.598		8957.173	851.494	95.019	
	Oct	1368.906	7941.645	7372.043		9056.576	856.449	93.511	
	Nov	1365.037	8024.741	7399.969		9179.699	857.530	95.767	
	Dec	1366.056	8094.017	7430.617		9204.590	847.491	91.792	
2008	Jan	1366.988	8184.691	7480.146		9267.518	851.442	95.078	
	Feb	1372.530	8430.628	7586.109		9329.202	856.958	96.203	
	Mar	1374.719	8595.730	7664.517		9451.010	860.578	97.251	
	Apr	1370.731	8658.875	7679.773		9402.953	855.247	94.379	
	May	1367.133	8707.063	7688.176		9390.130	859.679	94.926	
	Jun	1385.457	8735.292	7687.036		9361.804	863.039	93.837	
	Jul	1400.873	8763.741	7725.929		9396.207	870.536	96.704	

Note: All values are given in billions of dollars. *See table of contents for changes to the series.

**We will not update the MSI series until we revise the code to accommodate the discontinuation of M3.

		Federal Funds	Primary Credit Rate	Prime Rate	3-mo CDs	Treasury Yields			Corporate Aaa Bonds	Municipal Aaa Bonds	Conventional Mortgage
						3-mo	3-yr	10-yr			
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
2006		4.96	5.96	7.96	5.15	4.85	4.77	4.79	5.59	4.15	6.41
2007		5.02	5.86	8.05	5.27	4.47	4.34	4.63	5.56	4.13	6.34
2006	1	4.46	5.43	7.43	4.72	4.50	4.58	4.57	5.39	4.29	6.24
	2	4.91	5.90	7.90	5.18	4.83	4.98	5.07	5.89	4.36	6.60
	3	5.25	6.25	8.25	5.39	5.03	4.87	4.90	5.68	4.13	6.56
	4	5.25	6.25	8.25	5.32	5.03	4.65	4.63	5.39	3.82	6.24
2007	1	5.26	6.25	8.25	5.31	5.12	4.68	4.68	5.36	3.91	6.22
	2	5.25	6.25	8.25	5.32	4.87	4.76	4.85	5.58	4.13	6.37
	3	5.07	5.93	8.18	5.42	4.42	4.41	4.73	5.75	4.27	6.55
	4	4.50	5.02	7.52	5.02	3.47	3.50	4.26	5.53	4.24	6.23
2008	1	3.18	3.67	6.21	3.23	2.09	2.17	3.66	5.46	4.39	5.88
	2	2.09	2.33	5.08	2.76	1.65	2.67	3.89	5.60	4.42	6.09
2006	Jul	5.24	6.25	8.25	5.46	5.08	5.07	5.09	5.85	4.41	6.76
	Aug	5.25	6.25	8.25	5.38	5.09	4.85	4.88	5.68	4.10	6.52
	Sep	5.25	6.25	8.25	5.34	4.93	4.69	4.72	5.51	3.87	6.40
	Oct	5.25	6.25	8.25	5.33	5.05	4.72	4.73	5.51	3.91	6.36
	Nov	5.25	6.25	8.25	5.32	5.07	4.64	4.60	5.33	3.81	6.24
	Dec	5.24	6.25	8.25	5.32	4.97	4.58	4.56	5.32	3.76	6.14
2007	Jan	5.25	6.25	8.25	5.32	5.11	4.79	4.76	5.40	3.89	6.22
	Feb	5.26	6.25	8.25	5.31	5.16	4.75	4.72	5.39	3.95	6.29
	Mar	5.26	6.25	8.25	5.30	5.08	4.51	4.56	5.30	3.88	6.16
	Apr	5.25	6.25	8.25	5.31	5.01	4.60	4.69	5.47	3.99	6.18
	May	5.25	6.25	8.25	5.31	4.87	4.69	4.75	5.47	4.04	6.26
	Jun	5.25	6.25	8.25	5.33	4.74	5.00	5.10	5.79	4.36	6.66
	Jul	5.26	6.25	8.25	5.32	4.96	4.82	5.00	5.73	4.24	6.70
	Aug	5.02	6.01	8.25	5.49	4.32	4.34	4.67	5.79	4.30	6.57
	Sep	4.94	5.53	8.03	5.46	3.99	4.06	4.52	5.74	4.26	6.38
	Oct	4.76	5.24	7.74	5.08	4.00	4.01	4.53	5.66	4.20	6.38
	Nov	4.49	5.00	7.50	4.97	3.35	3.35	4.15	5.44	4.26	6.21
	Dec	4.24	4.83	7.33	5.02	3.07	3.13	4.10	5.49	4.25	6.10
2008	Jan	3.94	4.48	6.98	3.84	2.82	2.51	3.74	5.33	4.13	5.76
	Feb	2.98	3.50	6.00	3.06	2.17	2.19	3.74	5.53	4.42	5.92
	Mar	2.61	3.04	5.66	2.79	1.28	1.80	3.51	5.51	4.63	5.97
	Apr	2.28	2.49	5.24	2.85	1.31	2.23	3.68	5.55	4.45	5.92
	May	1.98	2.25	5.00	2.66	1.76	2.69	3.88	5.57	4.34	6.04
	Jun	2.00	2.25	5.00	2.76	1.89	3.08	4.10	5.68	4.47	6.32
	Jul	2.01	2.25	5.00	2.79	1.66	2.87	4.01	5.67	4.42	6.43

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

		M1	MZM	M2	M3*
Percent change at an annual rate					
	2003	6.46	7.41	6.99	6.40
	2004	5.57	3.97	4.72	5.09
	2005	2.03	2.23	4.45	5.97
	2006	0.19	4.07	4.79	4.95
	2007	-0.38	9.18	5.91	
2006	1	1.98	4.69	5.44	
	2	-0.55	2.60	3.22	
	3	-3.68	3.69	4.10	
	4	0.36	7.70	6.56	
2007	1	0.31	9.25	7.14	
	2	0.87	10.80	6.17	
	3	-1.40	11.98	4.73	
	4	-0.32	14.96	4.83	
2008	1	1.39	19.13	9.51	
	2	0.88	14.12	5.71	
2006	Jul	-4.12	3.19	4.44	
	Aug	-0.49	3.73	3.61	
	Sep	-8.01	3.28	4.08	
	Oct	6.13	10.19	9.14	
	Nov	2.70	7.74	6.16	
	Dec	-3.91	12.45	7.19	
2007	Jan	4.93	7.75	8.53	
	Feb	-4.42	7.08	4.62	
	Mar	2.03	12.59	8.52	
	Apr	6.89	12.55	8.07	
	May	-2.10	9.47	3.35	
	Jun	-8.18	7.51	2.74	
	Jul	2.22	8.80	3.96	
	Aug	1.22	20.15	8.53	
	Sep	-3.15	15.51	4.62	
	Oct	2.72	15.51	3.83	
	Nov	-3.39	12.56	4.55	
	Dec	0.90	10.36	4.97	
2008	Jan	0.82	13.44	8.00	
	Feb	4.87	36.06	17.00	
	Mar	1.91	23.50	12.40	
	Apr	-3.48	8.82	2.39	
	May	-3.15	6.68	1.31	
	Jun	16.08	3.89	-0.18	
	Jul	13.35	3.91	6.07	

*See table of contents for changes to the series.

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 nomi-

nal 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 year-over-year CPI inflation.

From 1991 to the present the source of the long-term PCE inflation expectations data is the Federal Reserve Bank of Philadelphia's *Survey of Professional Forecasters*. Prior to 1991, the data were obtained from the Board of Governors of the Federal Reserve System. Realized (actual) inflation is the annualized rate of change for the 40-quarter period that corresponds to the forecast horizon (the expectations measure). For example, in 1965:Q1, annualized PCE inflation over the next 40 quarters was expected to average 1.7 percent. In actuality, the average annualized rate of change measured 4.8 percent from 1965:Q1 to 1975:Q1. Thus, the vertical distance between the two lines in the chart at any point is the forecast error.

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

$$f_t^* = 2.5 + \pi_{t-1} + (\pi_{t-1} - \pi^*)/2 + 100 \cdot (y_{t-1} - y_{t-1}^P)/2$$

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

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

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),

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

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 $D(m) = (1 - e^{-R(m) \cdot m})/R(m)$. 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 1/15/2018. **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/.