

## Putting the Financial Crisis and Lending Activity in a Broader Context

Some economists, policymakers, and pundits view the financial turmoil that began in August 2007 as the worst financial shock to the U.S. economy since the end of World War II. Some even assert that it amounts to the worst financial crisis since the 1930s. Accordingly, the Federal Reserve and other government agencies have taken aggressive actions to support the financial system and spur economic growth. Other economists and analysts, citing continued modest loan growth and relatively few bank failures last year (compared with, say, the late 1980s and early 1990s), do not share this view. Regardless, many banks have announced sharp earnings declines, and the possibility of further financial losses looms large.

A well-functioning financial sector is crucial to the performance of the U.S. economy. In a market-based economy, the financial sector channels the supply of funds from savers to the demands of borrowers, which supports the wealth-creating abilities of the entrepreneurial sector. At the same time, the performance of the financial sector also depends crucially on the health of the U.S. economy. Typically, growth of loans and leases at commercial banks declines sharply before a recession.

Clearly, bank actions to limit the credit supply can exacerbate an economic downturn. For example, banks typically tighten credit standards and/or loan terms as the economy weakens and nonperforming loans increase. But an adverse shock from outside the financial sector can be just as important—such as a sharp increase in oil prices or a plunge in house prices. Such shocks also slow the demand for credit because of weaker future growth of incomes and profits. In large and open economies, forces that trigger changes in the supply and demand for credit are often synchronized and difficult to distinguish.

Thus, it is not surprising that bank loans slowed when GDP growth slowed: When GDP averaged 2.7 percent for 2004-07, the growth of bank loans averaged 11.4 percent per year; when GDP fell slightly in 2008, growth of bank loans slowed to 5.6 percent. Most forecasters expect recessionary conditions through the first half of 2009, so continued weak growth of bank loans is likely. Indeed, in the 1990-91 and 2001 recessions, the year-to-year percentage decline in bank loans did not reach a trough until February 1993 and March 2002, respectively.

Other factors have weakened household and business spending in the current recession and thus have adversely affected the

supply and demand for bank loans. A 52 percent drop in the S&P 500 stock price index from October 9, 2007, to November 20, 2008, accompanied the oil shock and fall in house prices. Accordingly, household net worth (financial and tangible net wealth) fell by about \$7 trillion between 2007:Q2 and 2008:Q3. Another key factor has been the simultaneous slowing in economic growth in most of the world's largest economies, which is important because exports were a key source of U.S. economic growth in 2004-07.

Some claim the *key* cause of slower growth has been the losses and write-downs incurred by banks and other financial institutions that hold asset-backed securities (ABS) on their balance sheets.<sup>1</sup> In particular, prices of nonprime mortgage-related ABS have plummeted in part because of rising mortgage defaults and foreclosures stemming from falling house prices and a weakening economy. Because many of these ABS are no longer actively traded, determining their price—and thus the impact on the banking system's lending capacity—has been a key source of the uncertainty in financial markets. As a result, many firms have been extremely cautious in lending because of the perceived risk in lending to parties who may have substantial ABS losses. Some estimate that these losses may eventually exceed \$2 trillion, but even those estimates depend importantly on the pace of economic recovery. Moreover, not all firms hold ABS on their balance sheets, so the perception of increased credit risk—arising in part from poor macroeconomic conditions—has affected markets more broadly.

A report prepared for the 2008 U.S. Monetary Policy Forum argued that the financial crisis will begin to wane when (i) banks and other financial institutions can raise enough new equity capital to improve their balance sheets and (ii) risk and uncertainty recede enough that firms are less reticent about making loans.<sup>2</sup> A more stable macroeconomic environment will go far toward achieving this outcome.

—Kevin L. Kliesen

<sup>1</sup> This development is a by-product of the securitization of a wide swath of the U.S. credit markets that has created a so-called shadow banking system.

<sup>2</sup> Greenlaw, David; Hatzius, Jan; Kashyap, Anil, K. and Shin, Hyun S. "Leveraged Losses: Lessons from the Mortgage Market Meltdown." U.S. Monetary Policy Forum Report No. 2, 2008; <http://faculty.chicagosb.edu/anil.kashyap/research/MPFRreport-final.pdf>.

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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:

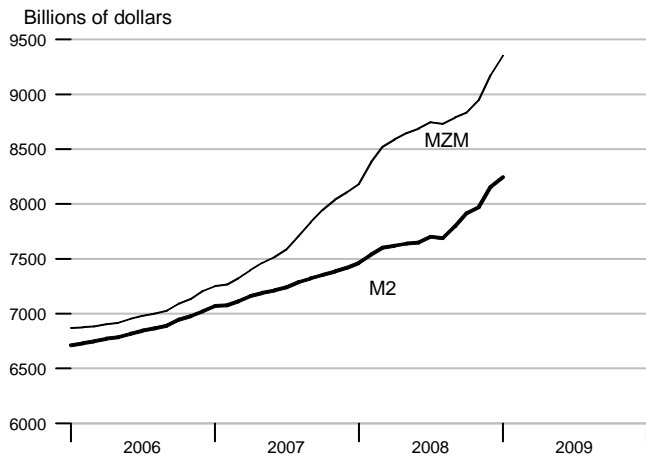
Editor, *Monetary Trends*  
Research Division  
Federal Reserve Bank of St. Louis  
P.O. Box 442  
St. Louis, MO 63166-0442

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.

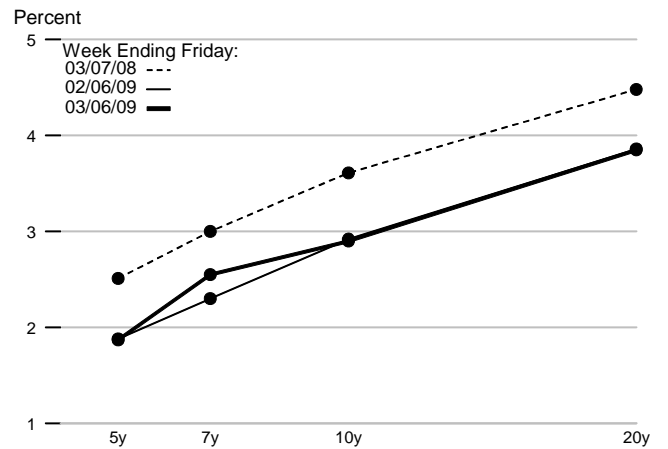
or to:

stlsFRED@stls.frb.org

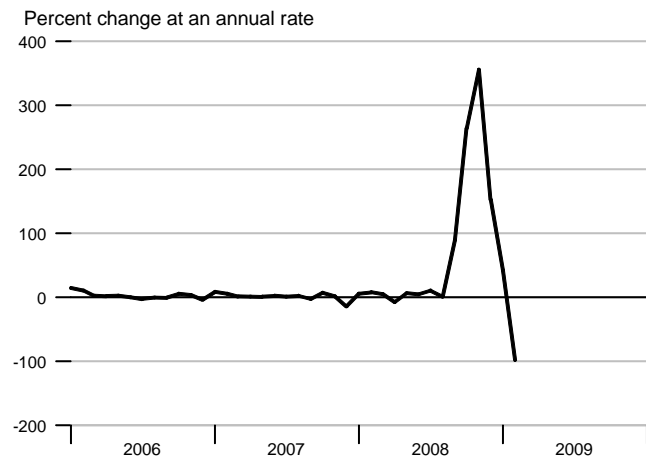
### M2 and MZM



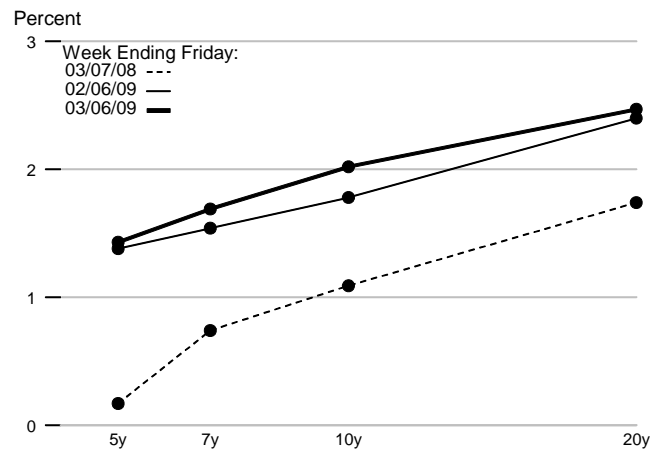
### Treasury Yield Curve



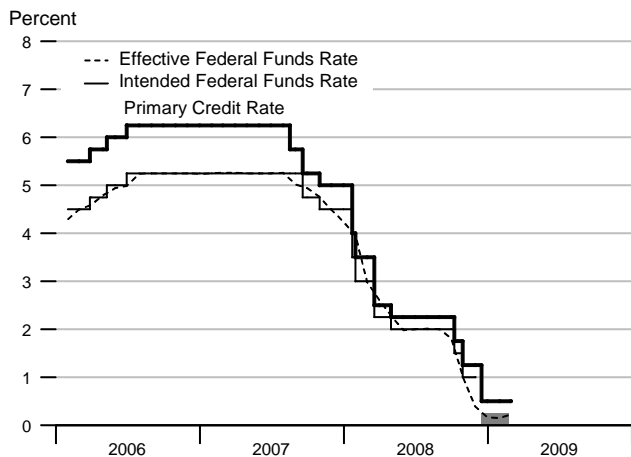
### Adjusted Monetary Base



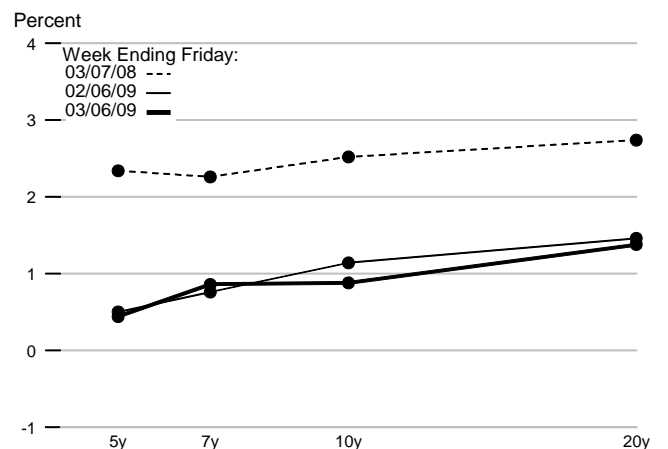
### Real Treasury Yield Curve



### Reserve Market Rates



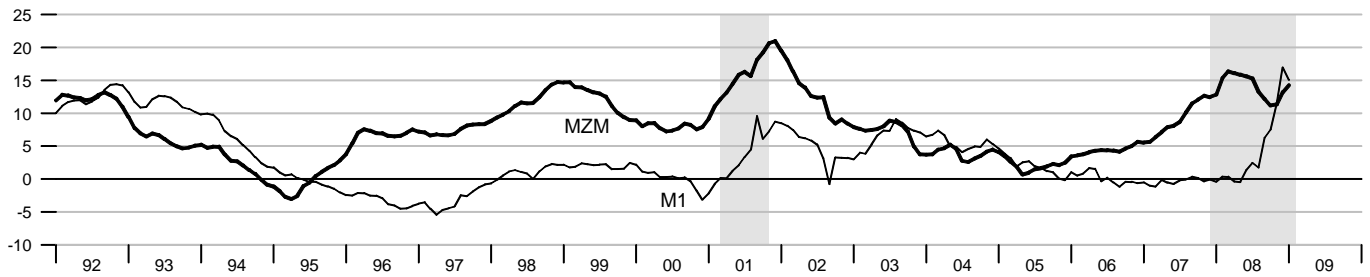
### Inflation-Indexed Treasury Yield Spreads



Data available as of January 2009.  
Note: Effective December 16, 2008, FOMC reports the intended Federal Funds Rate as a range.

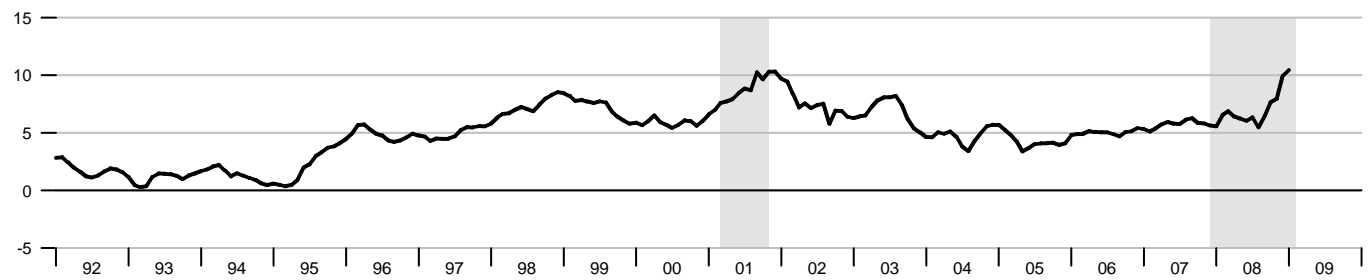
**MZM and M1**

Percent change from year ago



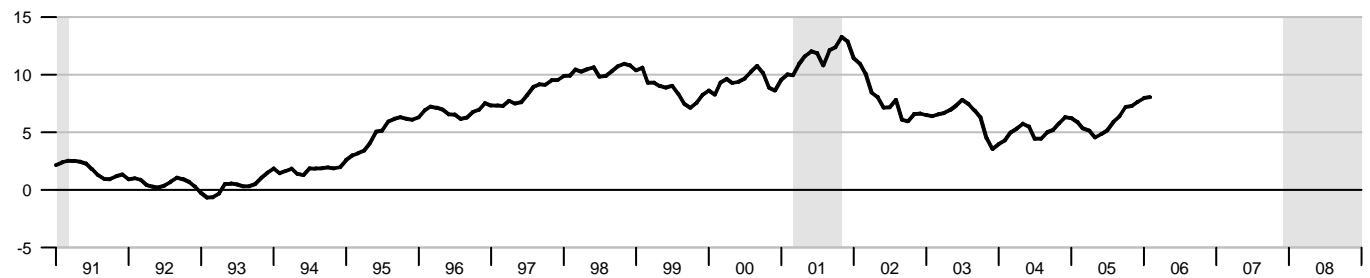
**M2**

Percent change from year ago



**M3\***

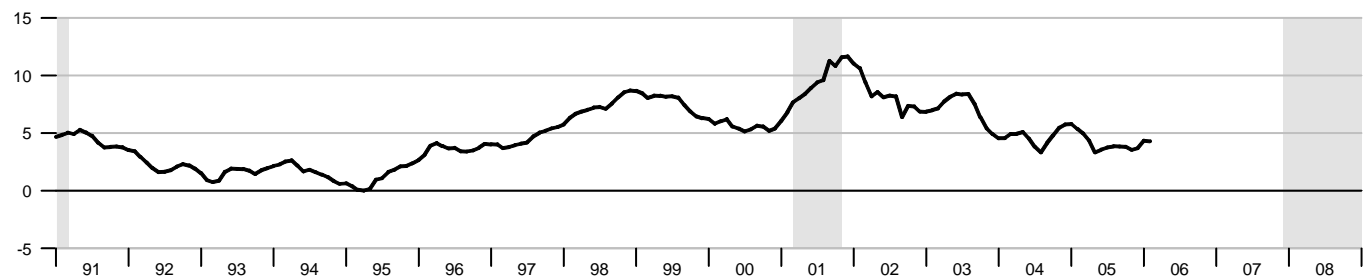
Percent change from year ago



\*See table of contents for changes to the series.

**Monetary Services Index - M2\*\***

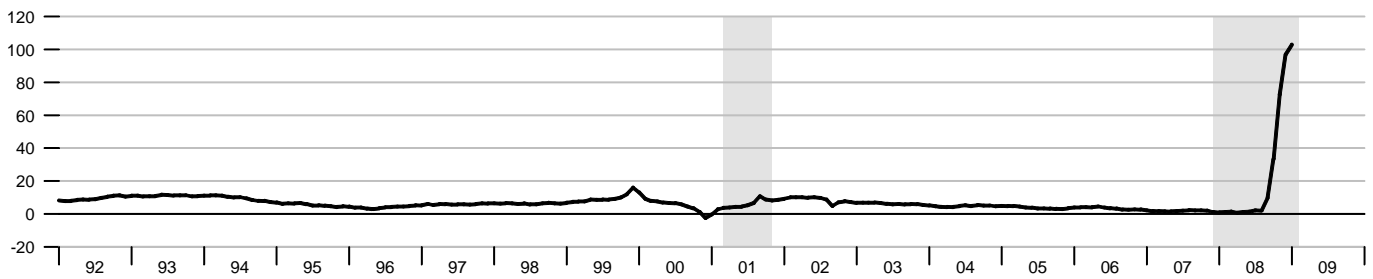
Percent change from year ago



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

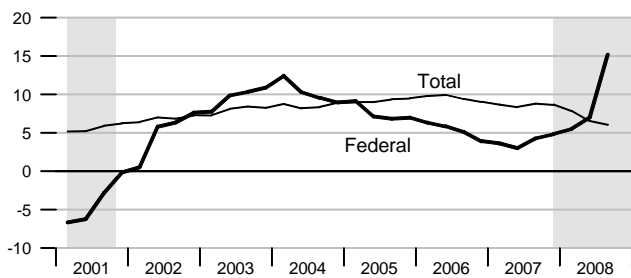
### Adjusted Monetary Base

Percent change from year ago



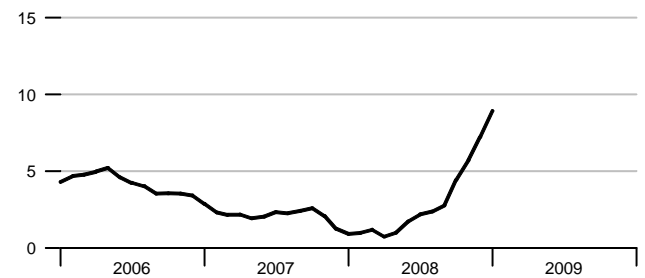
### Domestic Nonfinancial Debt

Percent change from year ago



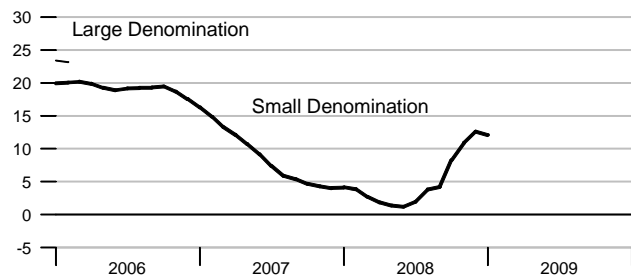
### Currency Held by the Nonbank Public

Percent change from year ago



### Time Deposits\*

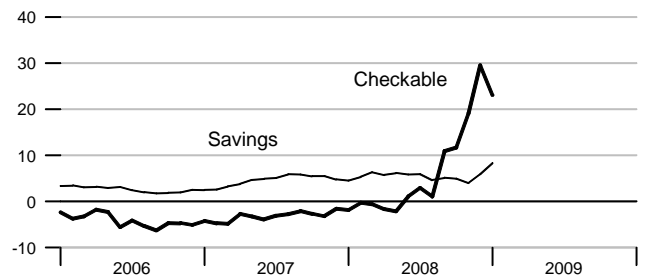
Percent change from year ago



\*See table of contents for changes to the series.

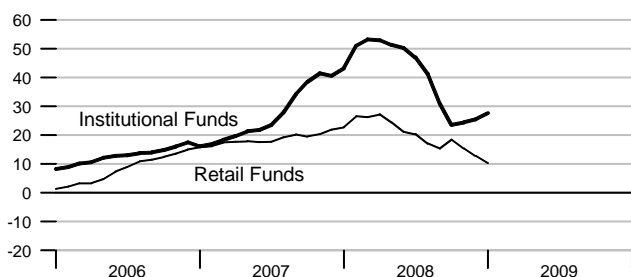
### Checkable and Savings Deposits

Percent change from year ago



### Money Market Mutual Fund Shares

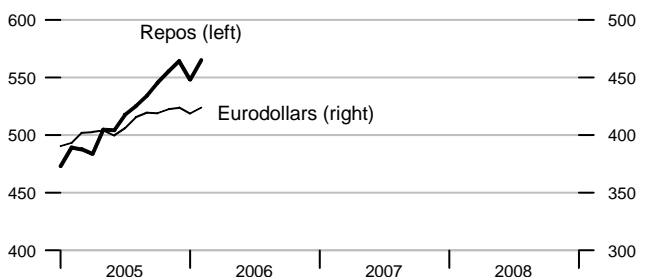
Percent change from year ago



### Repurchase Agreements and Eurodollars\*

Billions of dollars

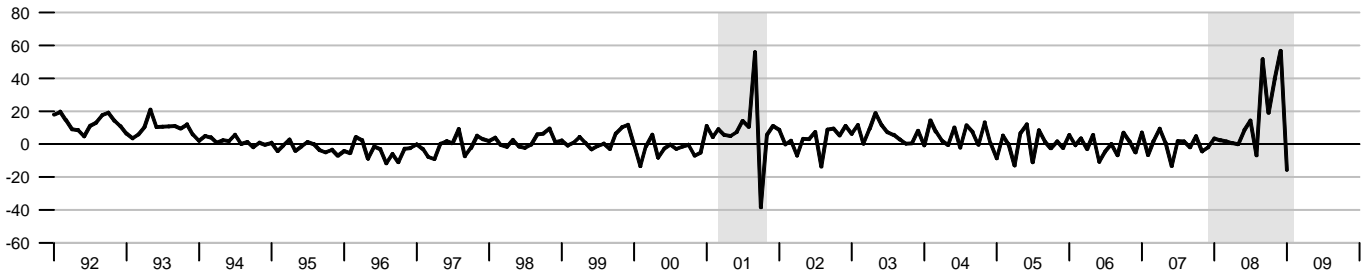
Billions of dollars



\*See table of contents for changes to these series.

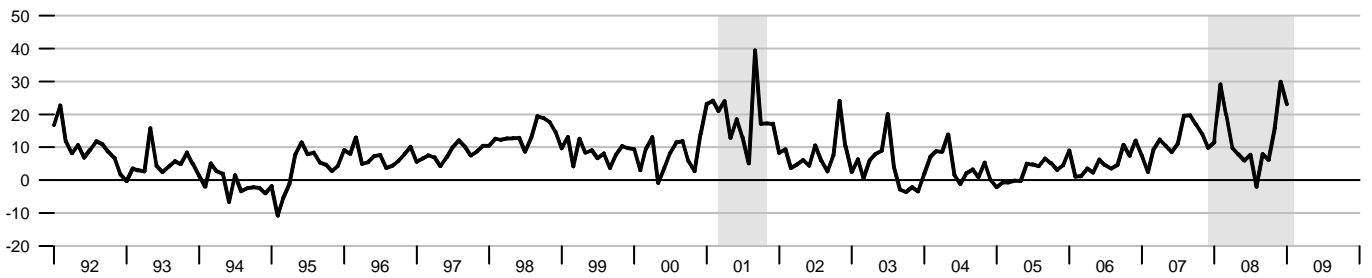
**M1**

Percent change at an annual rate



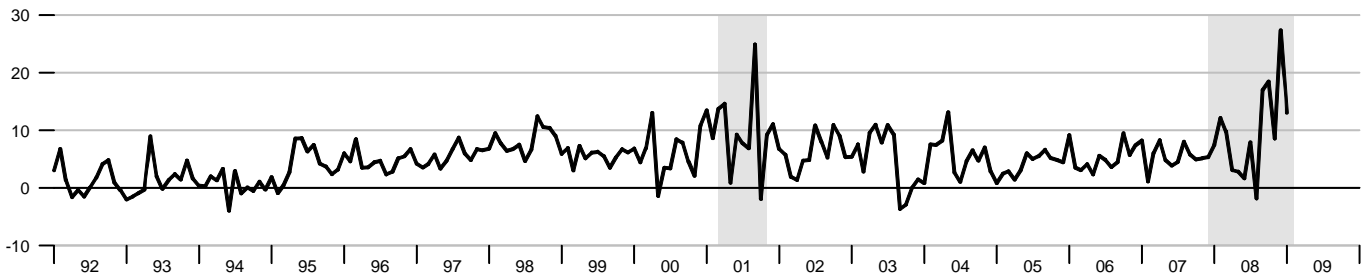
**M2M**

Percent change at an annual rate



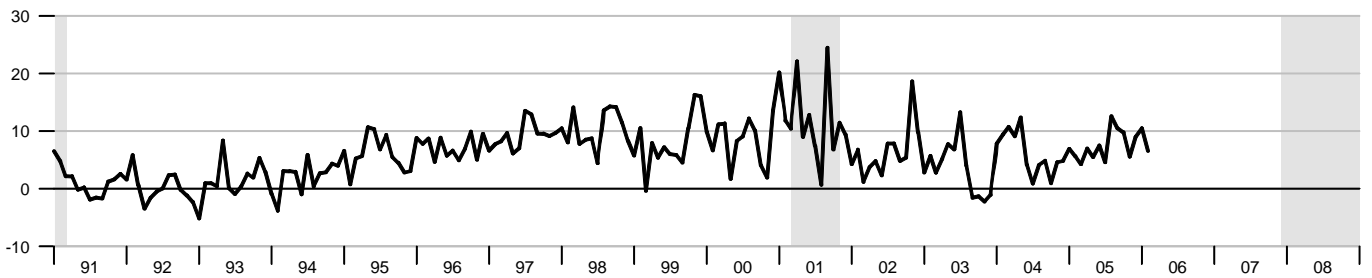
**M2**

Percent change at an annual rate



**M3\***

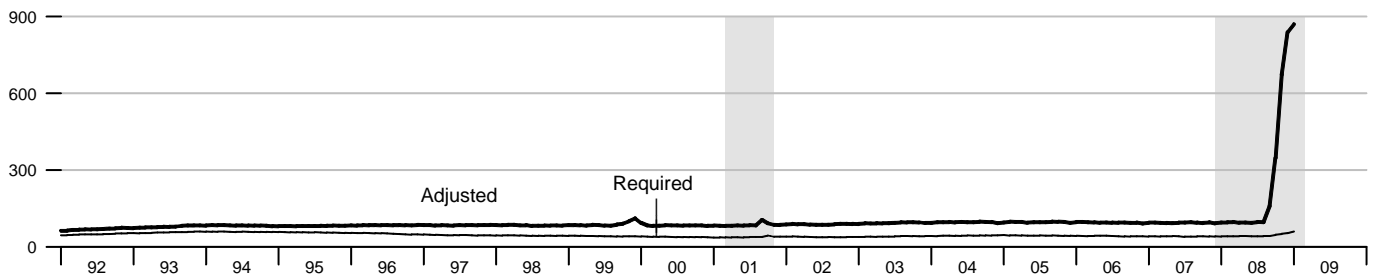
Percent change at an annual rate



\*See table of contents for changes to the series.

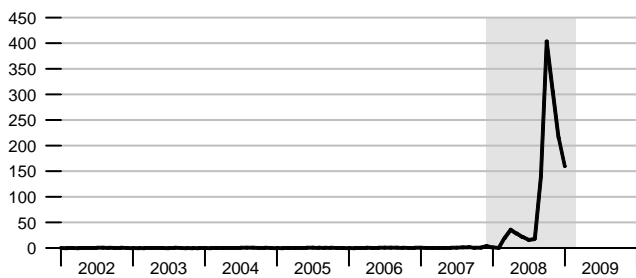
### Adjusted and Required Reserves

Billions of dollars



### Total Borrowings, nsa

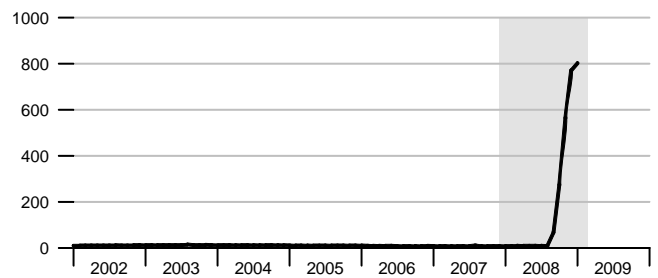
Billions of dollars



\* Data exclude term auction credit

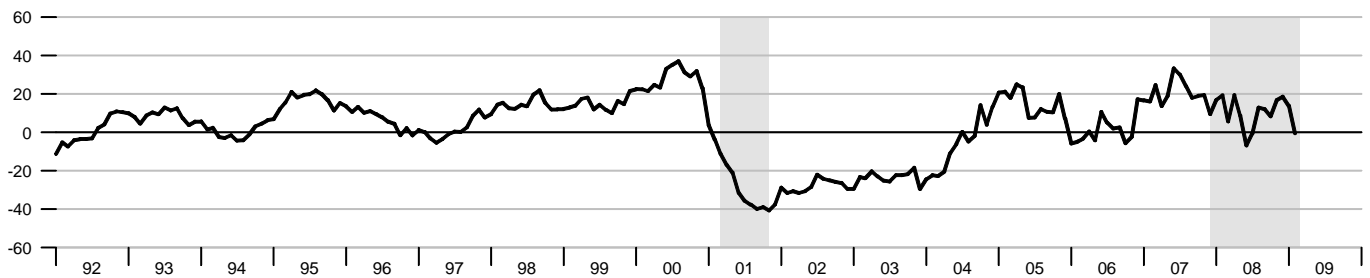
### Excess Reserves plus RCB Contracts

Billions of dollars



### Nonfinancial Commercial Paper

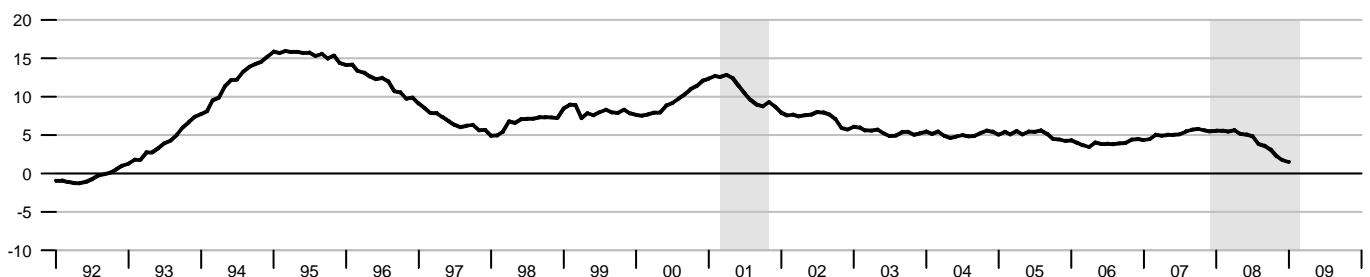
Percent change from year ago



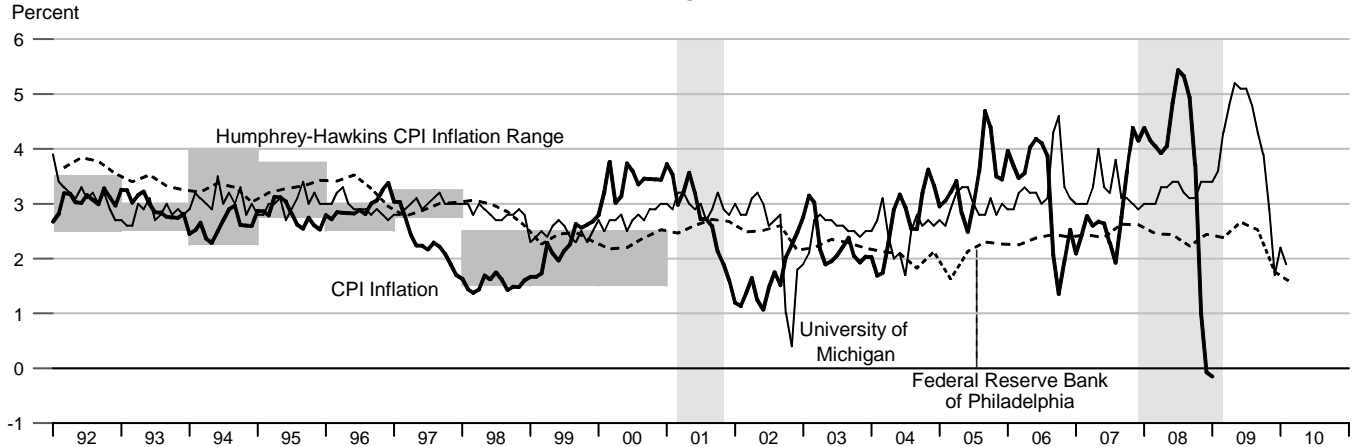
As of April 10, 2006, the Federal Reserve Board made major changes to its commercial paper calculations. For more information, please refer to <http://www.federalreserve.gov/releases/cp/about.htm>.

### Consumer Credit

Percent change from year ago

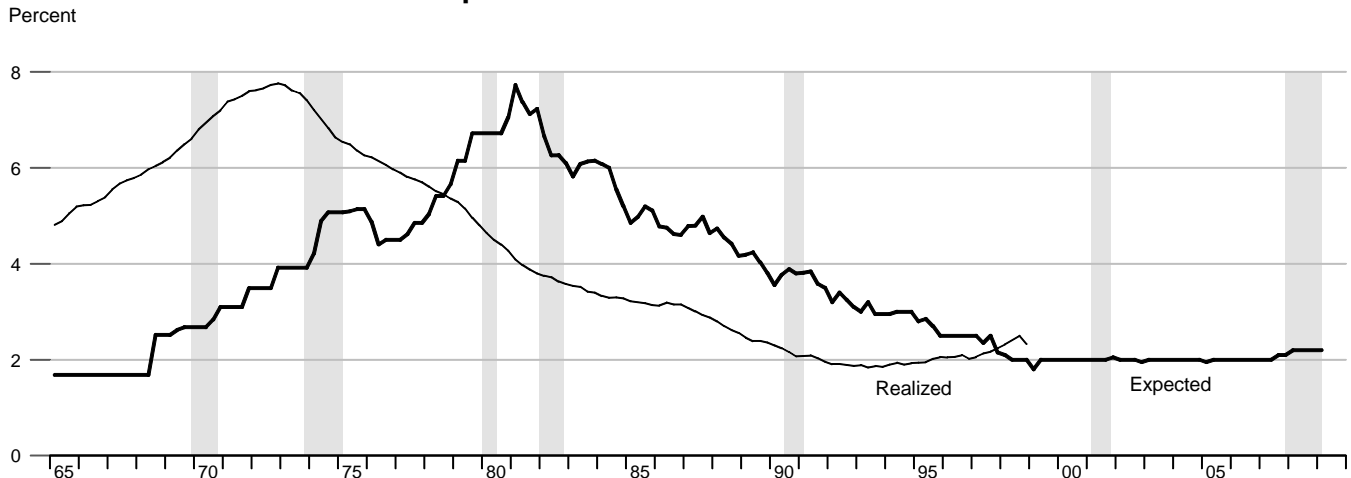


### CPI Inflation and 1-Year-Ahead CPI Inflation Expectations



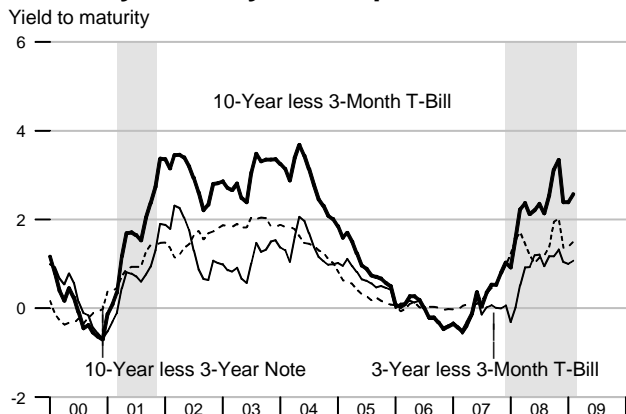
The shaded region shows the Humphrey-Hawkins CPI inflation range. Beginning in January 2000, the Humphrey-Hawkins inflation range was reported using the PCE price index and therefore is not shown on this graph.

### 10-Year Ahead PCE Inflation Expectations and Realized Inflation

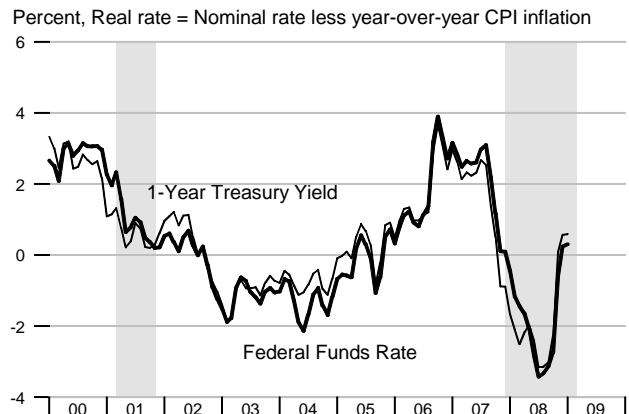


See the notes section for an explanation of the chart.

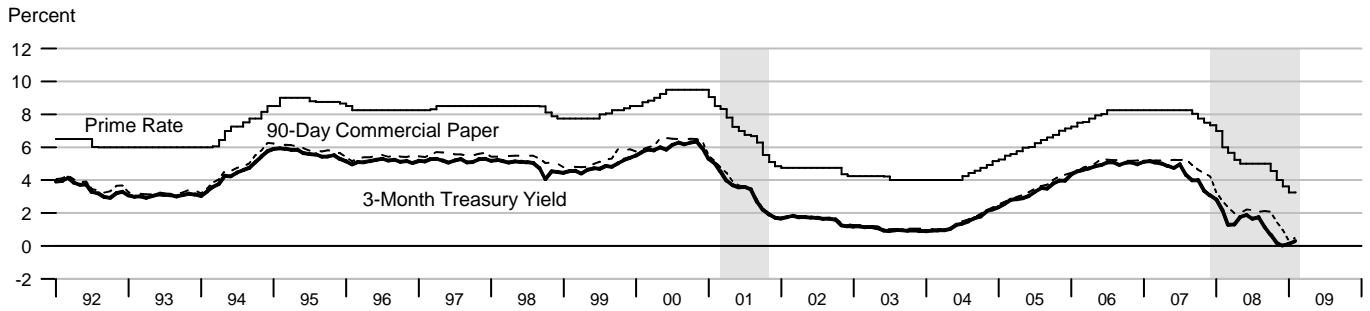
### Treasury Security Yield Spreads



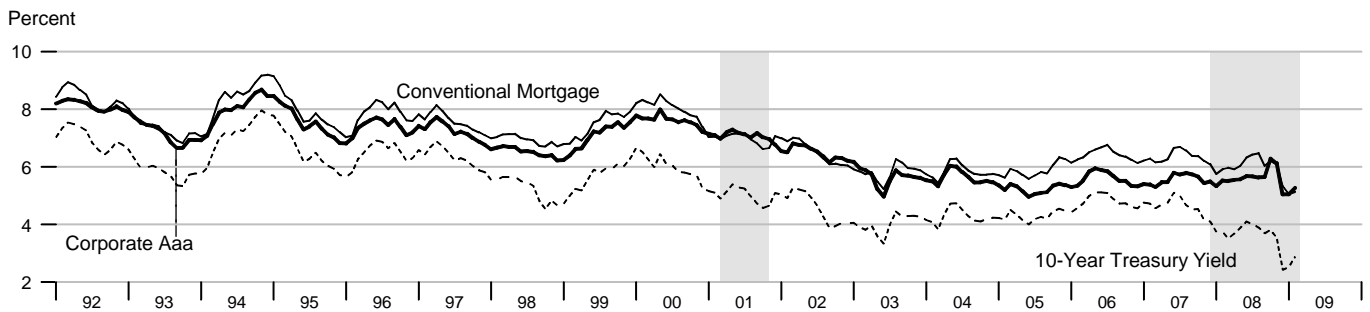
### Real Interest Rates



### Short-Term Interest Rates



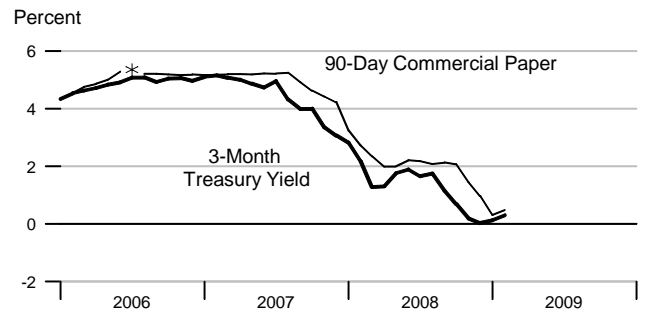
### Long-Term Interest Rates



### Long-Term Interest Rates

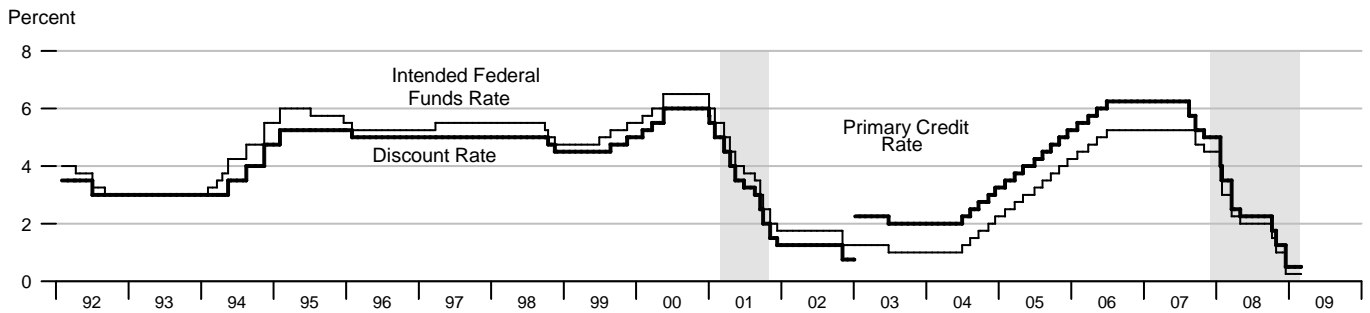


### Short-Term Interest Rates



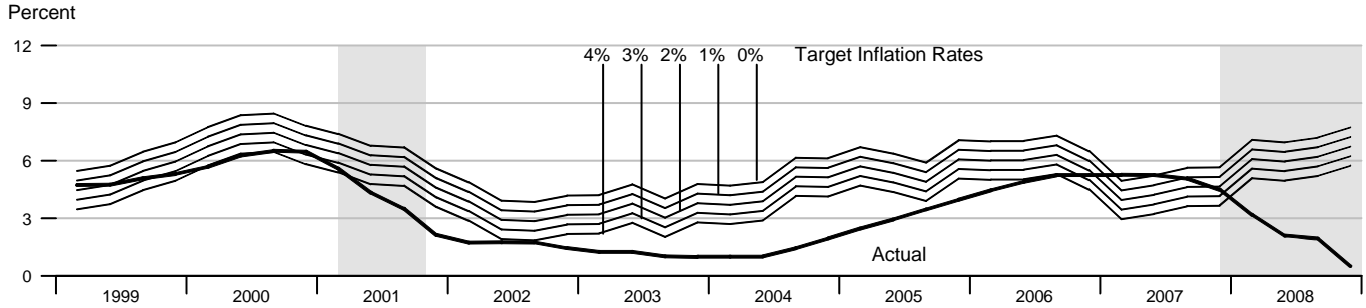
\*90-Day Commercial Paper data are not available for December 2005, January 2006, and July 2006.

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



Data available as of January 2009.

### Federal Funds Rate and Inflation Targets

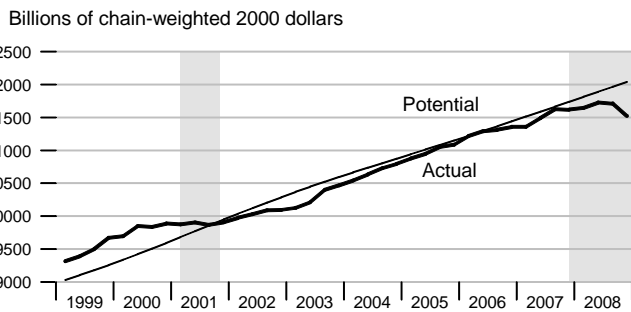


Calculated federal funds rate is based on Taylor's rule.

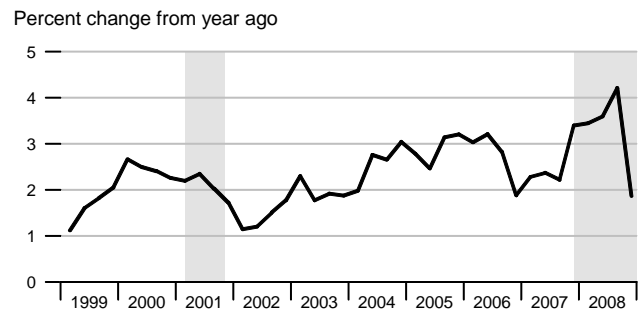
See notes on page 19.

### Components of Taylor's Rule

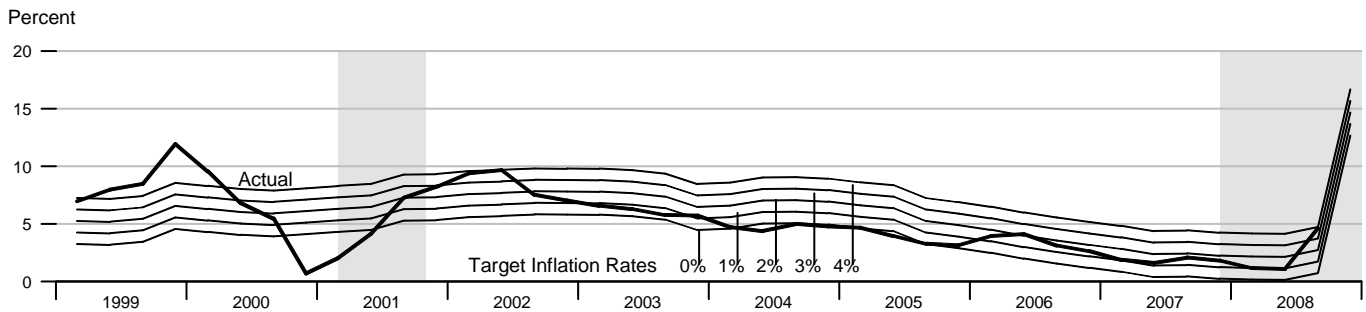
#### Actual and Potential Real GDP



#### PCE Inflation



### Monetary Base Growth\* and Inflation Targets

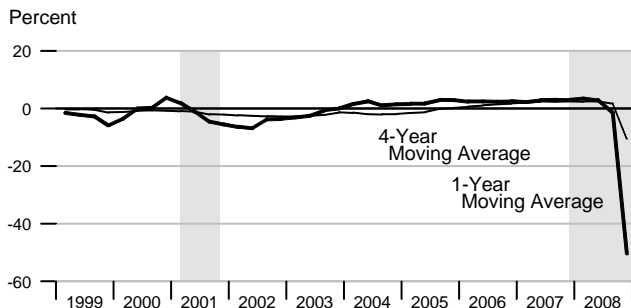


\*Modified for the effects of sweeps programs on reserve demand. Calculated base growth is based on McCallum's rule. Actual base growth is percent change from year ago.

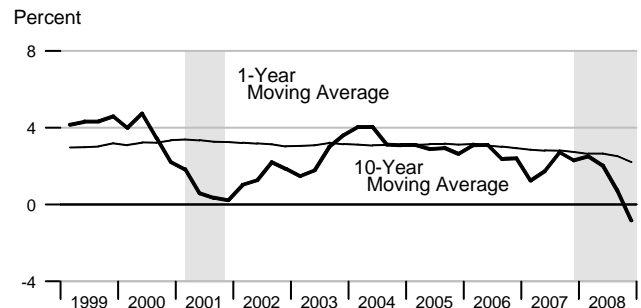
See notes on page 19.

### Components of McCallum's Rule

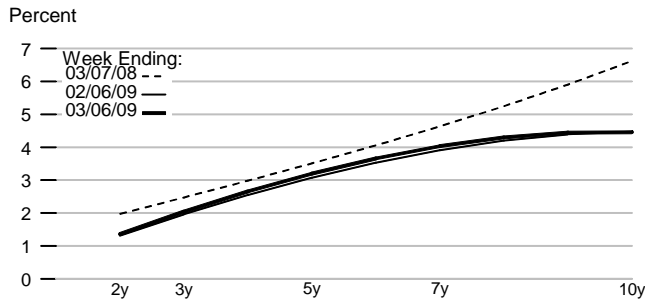
#### Monetary Base Velocity Growth



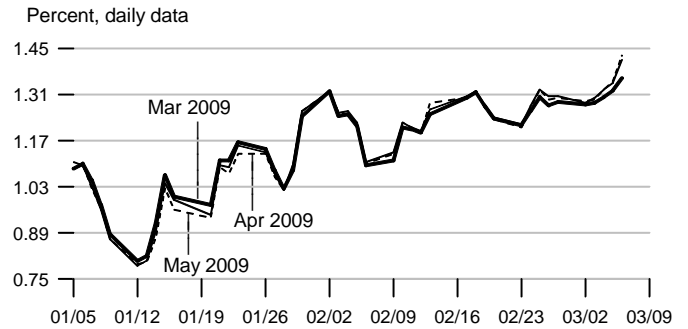
#### Real Output Growth



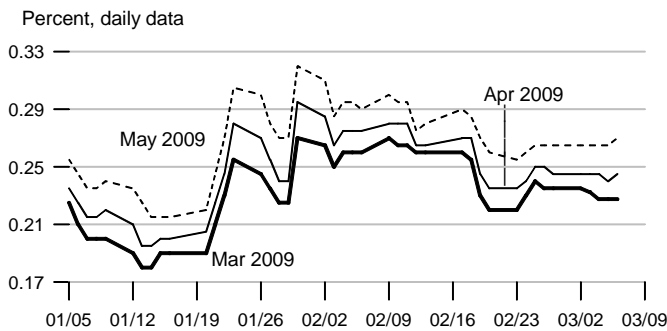
### Implied One-Year Forward Rates



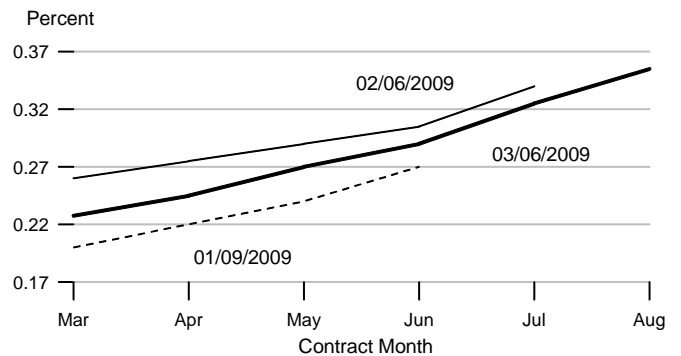
### Rates on 3-Month Eurodollar Futures



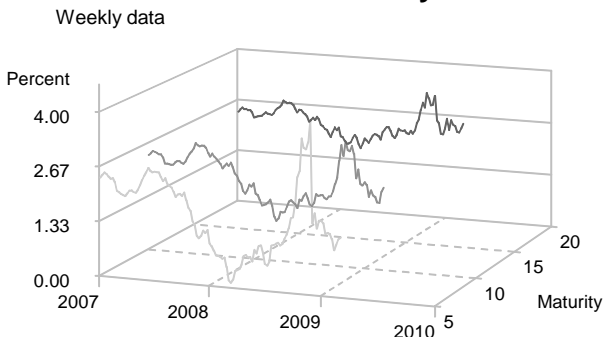
### Rates on Selected Federal Funds Futures Contracts



### Rates on Federal Funds Futures on Selected Dates

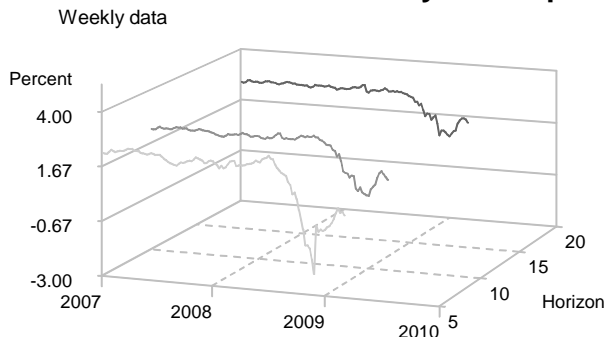


### Inflation-Indexed Treasury Securities



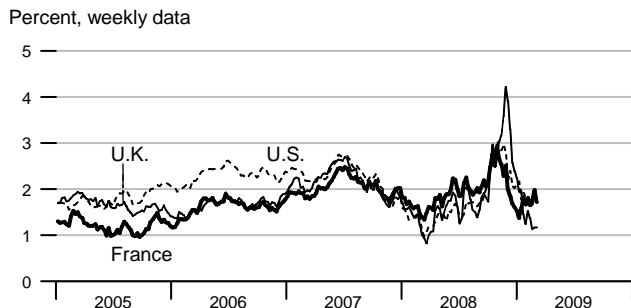
Note: Yields are inflation-indexed constant maturity U.S. Treasury securities

### Inflation-Indexed Treasury Yield Spreads

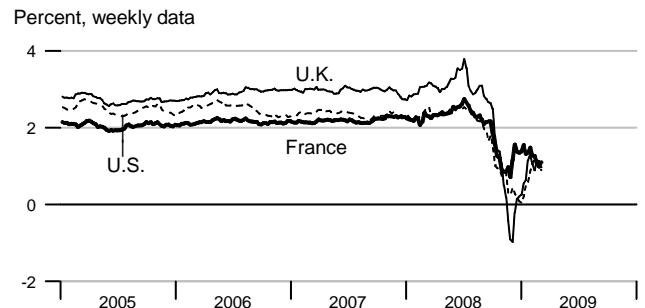


Note: Yield spread is between nominal and inflation-indexed constant maturity U.S. Treasury securities.

### Inflation-Indexed 10-Year Government Notes

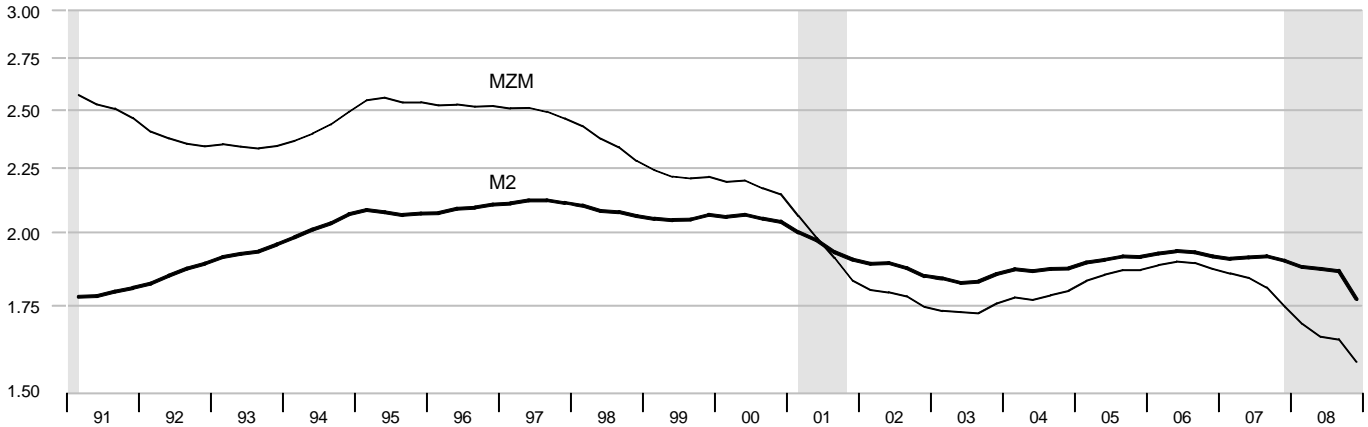


### Inflation-Indexed 10-Year Government Yield Spreads



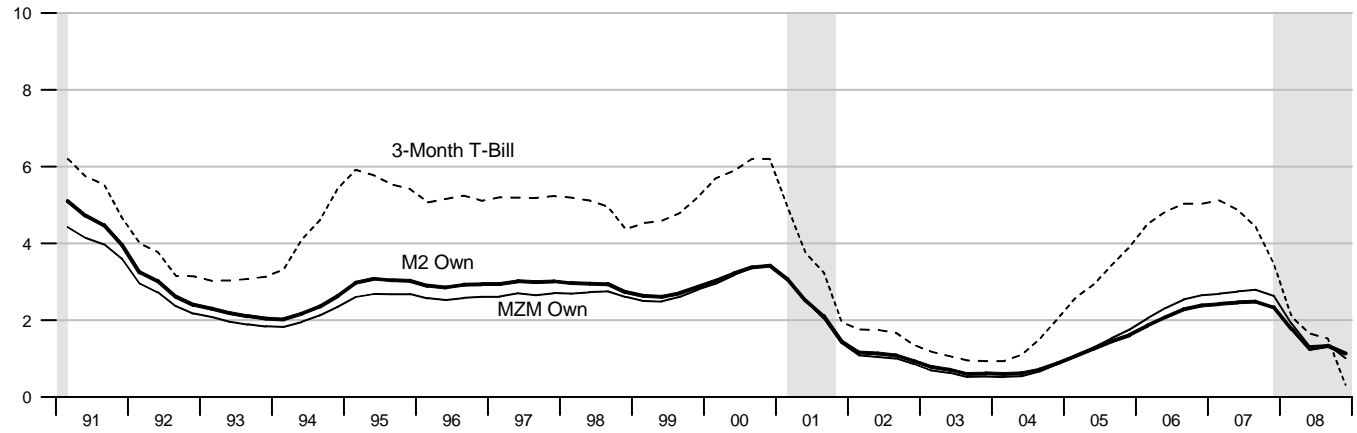
**Velocity**

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



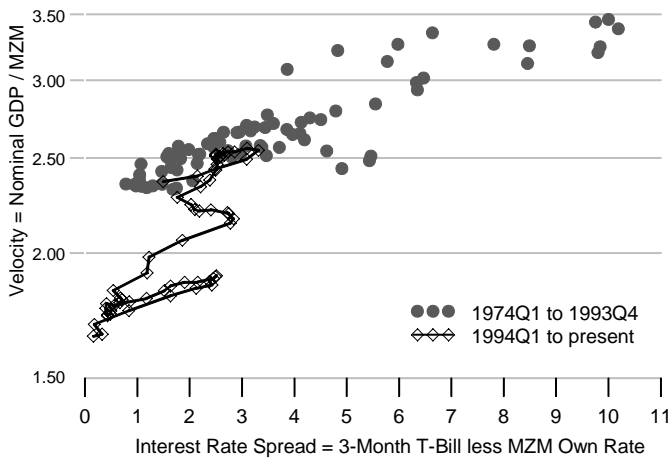
**Interest Rates**

Percent



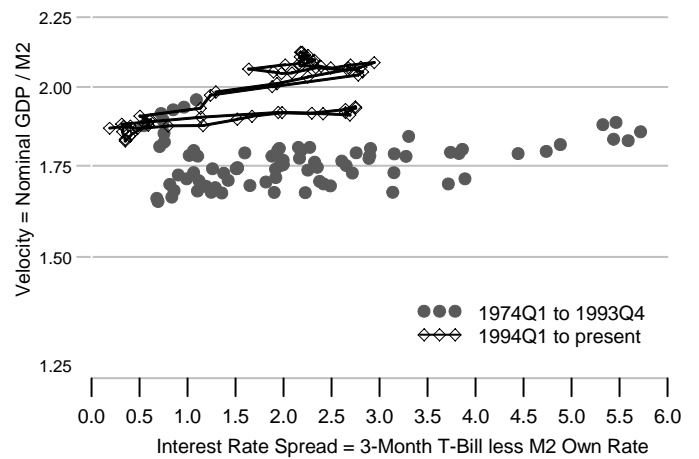
**MZM Velocity and Interest Rate Spread**

Ratio Scale



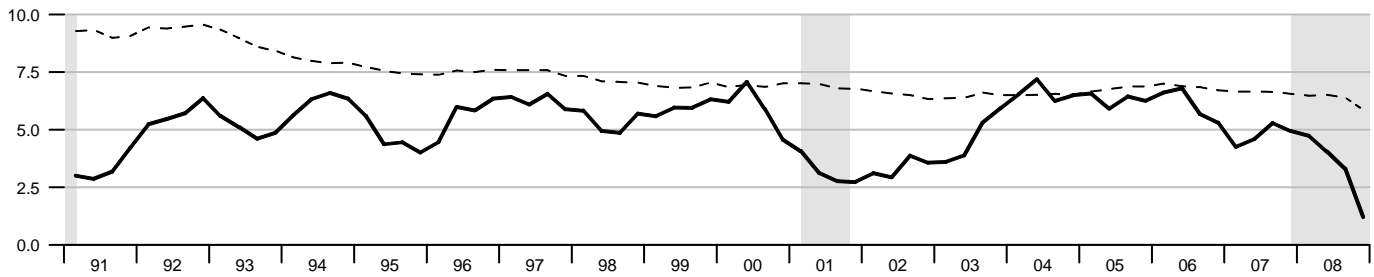
**M2 Velocity and Interest Rate Spread**

Ratio Scale



### Gross Domestic Product

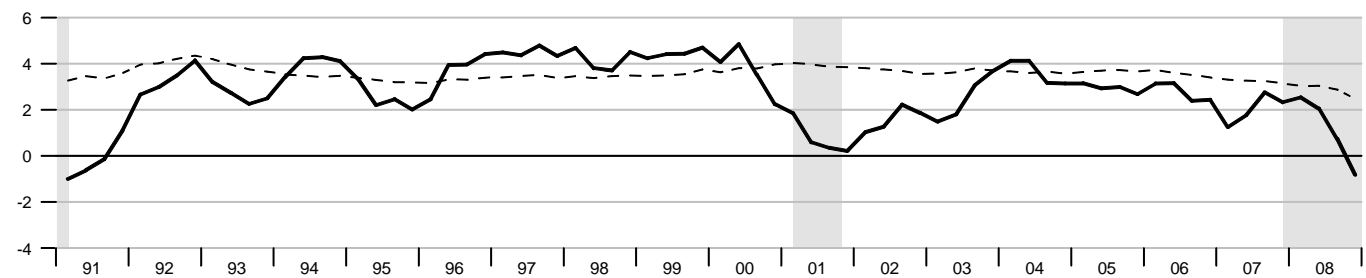
Percent change from year ago



Dashed lines indicate 10-year moving averages.

### Real Gross Domestic Product

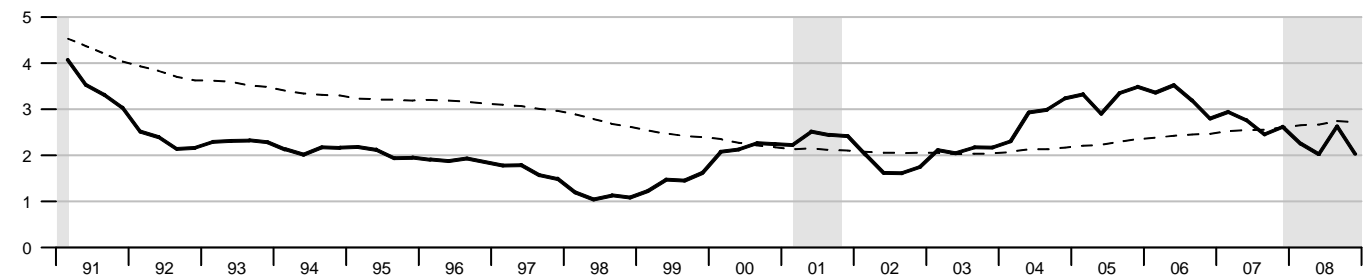
Percent change from year ago



Dashed lines indicate 10-year moving averages.

### Gross Domestic Product Price Index

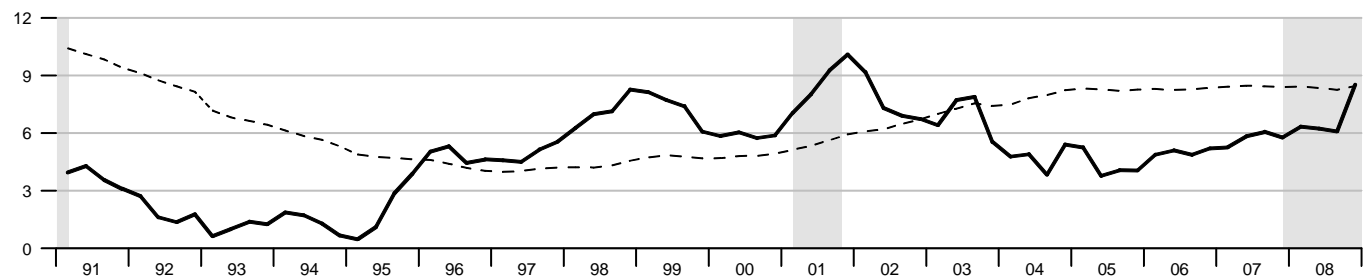
Percent change from year ago



Dashed lines indicate 10-year moving averages.

### M2

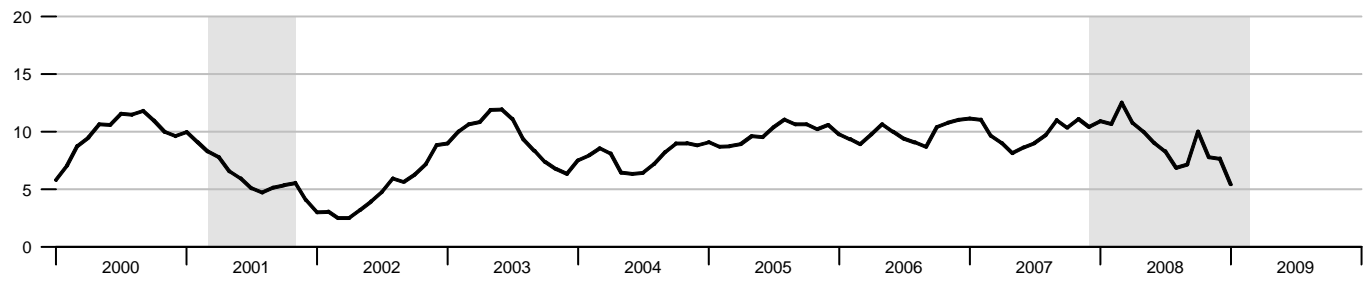
Percent change from year ago



Dashed lines indicate 10-year moving averages.

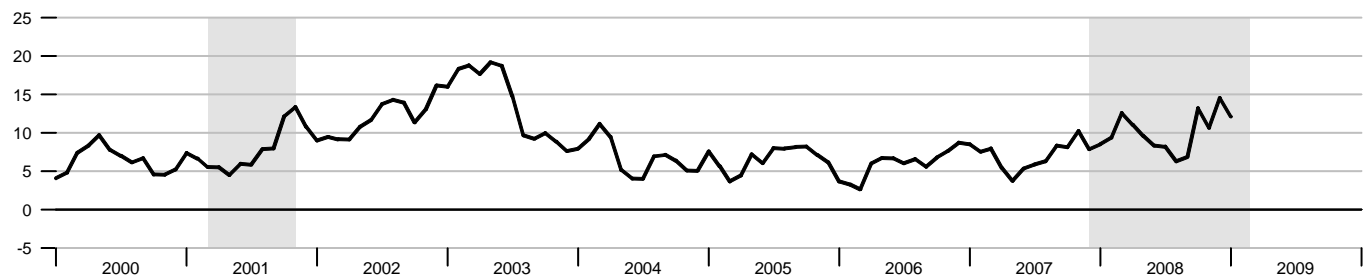
**Bank Credit**

Percent change from year ago



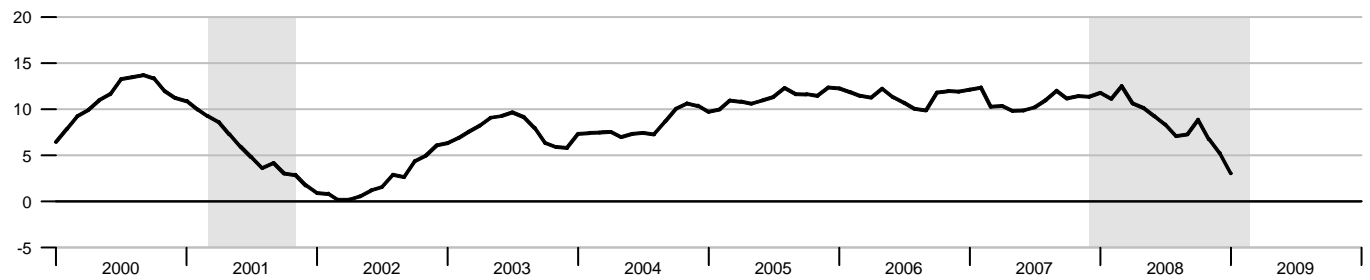
**Investment Securities in Bank Credit at Commercial Banks**

Percent change from year ago



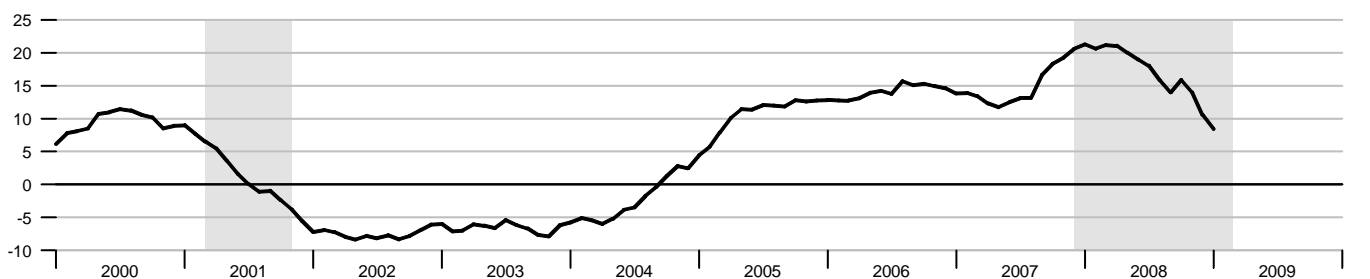
**Total Loans and Leases in Bank Credit at Commercial Banks**

Percent change from year ago

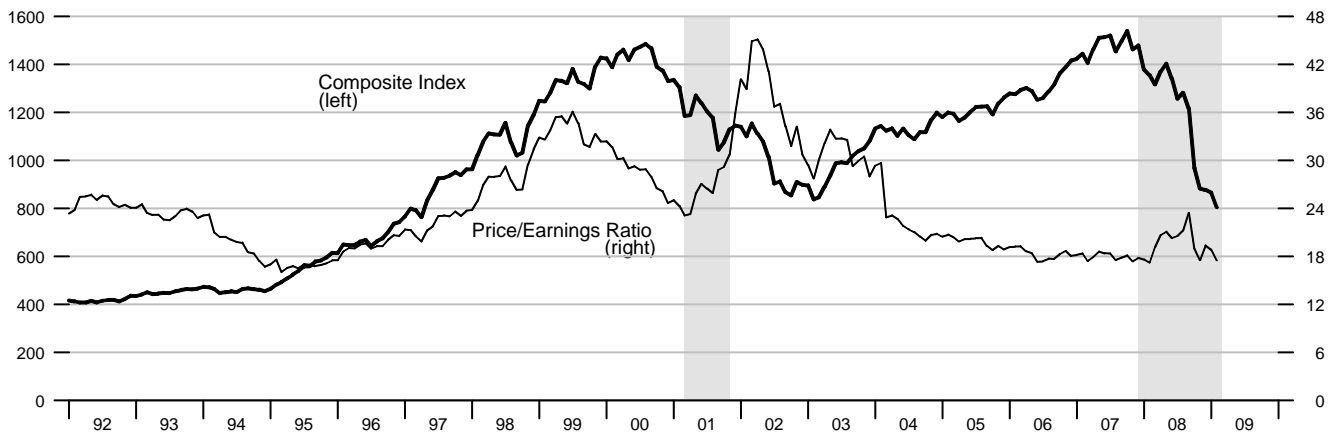


**Commercial and Industrial Loans at Commercial Banks**

Percent change from year ago



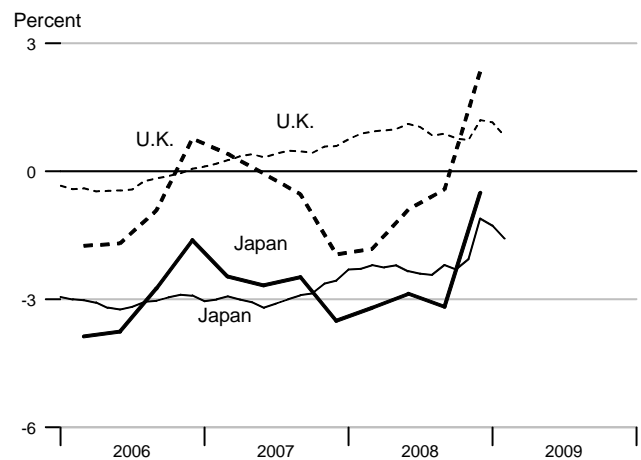
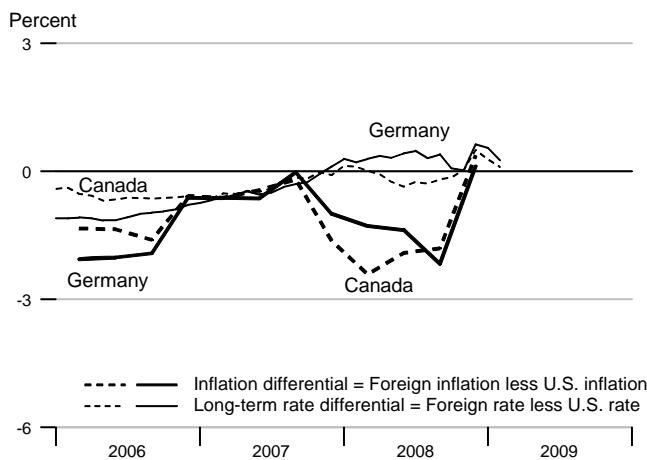
### Standard & Poor's 500



### Recent Inflation and Long-Term Interest Rates

	Consumer Price Inflation Rates				Long-Term Government Bond Rates			
	Percent change from year ago				Percent			
	2008Q1	2008Q2	2008Q3	2008Q4	Nov08	Dec08	Jan09	Feb09
United States	4.20	4.27	5.23	1.53	3.53	2.42	2.52	2.87
Canada	1.78	2.35	3.43	1.90	3.56	2.92	2.80	2.97
France	2.95	3.30	3.25	1.76	3.98	3.54	3.60	.
Germany	2.92	2.90	3.07	1.65	3.56	3.05	3.07	3.13
Italy	3.06	3.57	3.97	2.80	4.74	4.47	4.62	4.54
Japan	1.00	1.40	2.06	1.03	1.47	1.31	1.25	1.30
United Kingdom	2.38	3.37	4.81	3.88	4.26	3.62	3.67	3.69

### Inflation and Long-Term Interest Rate Differentials



		Money Stock				Bank	Adjusted		MSI M2**
		M1	MZM	M2	M3*	Credit	Monetary Base	Reserves	
2004		1344.402	6556.928	6248.406	9234.718	6600.045	776.768	96.129	329.873
2005		1371.752	6697.133	6515.975	9786.477	7250.672	806.628	96.560	343.539
2006		1374.358	6986.483	6842.763	10270.74	7963.127	835.039	94.913	
2007		1369.576	7619.362	7235.304		8754.318	850.579	94.200	
2008		1423.583	8686.134	7727.885		9565.437	1009.761	232.104	
2006	1	1381.423	6876.284	6731.000		7644.954	830.534	96.495	
	2	1380.550	6924.310	6791.445		7889.849	836.387	95.082	
	3	1366.663	7002.055	6866.923		8025.322	834.610	94.829	
	4	1368.796	7143.282	6981.686		8292.383	838.627	93.246	
2007	1	1369.251	7279.610	7085.785		8455.768	846.309	94.123	
	2	1374.350	7458.604	7187.360		8567.627	849.919	93.558	
	3	1367.069	7709.610	7283.222		8820.484	852.267	95.428	
	4	1367.635	8029.626	7384.847		9173.392	853.820	93.691	
2008	1	1370.798	8361.485	7534.377		9416.829	856.319	96.170	
	2	1377.006	8642.040	7635.440		9416.879	859.325	94.366	
	3	1414.813	8754.948	7727.475		9476.941	892.679	117.729	
	4	1531.717	8986.063	8014.247		9951.101	1430.720	620.150	
2007	Jan	1373.592	7250.698	7069.503		8430.229	843.494	94.186	
	Feb	1366.017	7265.761	7076.141		8491.514	847.258	94.424	
	Mar	1368.143	7322.370	7111.712		8445.562	848.174	93.758	
	Apr	1378.801	7397.675	7160.675		8506.916	848.960	93.603	
	May	1379.739	7462.432	7189.135		8569.435	849.615	92.773	
	Jun	1364.511	7515.704	7212.270		8626.531	851.181	94.299	
	Jul	1366.558	7584.888	7239.370		8702.304	851.858	94.605	
	Aug	1368.421	7708.629	7287.654		8820.576	853.438	96.648	
	Sep	1366.227	7835.314	7322.642		8938.571	851.505	95.031	
	Oct	1371.683	7945.750	7352.836		9075.407	856.459	93.524	
	Nov	1366.682	8038.563	7384.407		9200.630	857.515	95.757	
	Dec	1364.540	8104.565	7417.297		9244.139	847.487	91.792	
2008	Jan	1368.387	8182.799	7463.613		9349.976	851.441	95.076	
	Feb	1371.076	8381.144	7539.039		9397.558	856.945	96.190	
	Mar	1372.931	8520.512	7600.479		9502.952	860.571	97.243	
	Apr	1373.665	8590.031	7619.971		9420.801	855.242	94.371	
	May	1373.707	8646.561	7637.837		9426.324	859.687	94.904	
	Jun	1383.647	8689.529	7648.513		9403.511	863.047	93.823	
	Jul	1400.138	8745.460	7698.924		9425.481	870.535	96.821	
	Aug	1392.196	8730.926	7687.292		9426.150	871.322	96.506	
	Sep	1452.104	8788.457	7796.210		9579.192	936.180	159.860	
	Oct	1475.216	8834.054	7916.030		9983.591	1142.213	347.543	
	Nov	1524.003	8950.676	7972.505		9916.552	1480.746	673.865	
	Dec	1595.931	9173.460	8154.206		9953.159	1669.200	839.043	
2009	Jan	1574.989	9350.905	8244.000		9857.788	1727.935	869.922	

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			
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
2008		1.93	2.39	5.09	2.97	1.39	2.24	3.67	5.63	4.58	6.04
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	4.43	6.09
	3	1.94	2.25	5.00	3.06	1.52	2.63	3.86	5.65	4.50	6.31
	4	0.51	1.31	4.06	2.82	0.30	1.48	3.25	5.82	5.02	5.87
2007	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	4.50	6.32
	Jul	2.01	2.25	5.00	2.79	1.66	2.87	4.01	5.67	4.44	6.43
	Aug	2.00	2.25	5.00	2.79	1.75	2.70	3.89	5.64	4.44	6.48
	Sep	1.81	2.25	5.00	3.59	1.15	2.32	3.69	5.65	4.61	6.04
	Oct	0.97	1.81	4.56	4.32	0.69	1.86	3.81	6.28	5.05	6.20
	Nov	0.39	1.25	4.00	2.36	0.19	1.51	3.53	6.12	4.83	6.09
	Dec	0.16	0.86	3.61	1.77	0.03	1.07	2.42	5.05	5.17	5.33
2009	Jan	0.15	0.50	3.25	1.02	0.13	1.13	2.52	5.05	4.64	5.06
	Feb	0.22	0.50	3.25	1.16	0.30	1.37	2.87	5.27	4.56	5.13

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

		M1	MZM	M2	M3*
<b>Percent change at an annual rate</b>					
	2004	5.57	3.91	4.73	5.09
	2005	2.03	2.14	4.28	5.97
	2006	0.19	4.32	5.02	4.95
	2007	-0.35	9.06	5.74	
	2008	3.94	14.00	6.81	
<hr/>					
2006	1	1.76	4.73	5.72	
	2	-0.25	2.79	3.59	
	3	-4.02	4.49	4.45	
	4	0.62	8.07	6.68	
2007	1	0.13	7.63	5.96	
	2	1.49	9.84	5.73	
	3	-2.12	13.46	5.34	
	4	0.17	16.60	5.58	
2008	1	0.93	16.53	8.10	
	2	1.81	13.42	5.36	
	3	10.98	5.23	4.81	
	4	33.05	10.56	14.85	
<hr/>					
2007	Jan	7.00	7.52	8.21	
	Feb	-6.62	2.49	1.13	
	Mar	1.87	9.35	6.03	
	Apr	9.35	12.34	8.26	
	May	0.82	10.50	4.77	
	Jun	-13.24	8.57	3.86	
	Jul	1.80	11.05	4.51	
	Aug	1.64	19.58	8.00	
	Sep	-1.92	19.72	5.76	
	Oct	4.79	16.91	4.95	
	Nov	-4.38	14.02	5.15	
	Dec	-1.88	9.85	5.34	
<hr/>					
2008	Jan	3.38	11.58	7.49	
	Feb	2.36	29.09	12.13	
	Mar	1.62	19.95	9.78	
	Apr	0.64	9.79	3.08	
	May	0.04	7.90	2.81	
	Jun	8.68	5.96	1.67	
	Jul	14.30	7.73	7.89	
	Aug	-6.81	-1.99	-1.82	
	Sep	51.64	7.91	16.99	
	Oct	19.09	6.22	18.45	
	Nov	39.68	15.84	8.58	
	Dec	56.63	29.87	27.36	
<hr/>					
2009	Jan	-15.67	23.07	13.05	

\*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](http://research.stlouisfed.org/msi/index.html).

**Note:** M1, M2, M3, Bank Credit, and Domestic Nonfinancial Debt are constructed and published by the Board of Governors of the Federal Reserve System. For details, see *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](http://research.stlouisfed.org/aggreg/swdata.html). **Primary Credit Rate**, **Discount Rate**, and **Intended Federal Funds Rate** shown in the chart **Reserve Market Rates** are plotted as of the date of the change, while the **Effective Federal Funds Rate** is plotted as of the end of the month. Interest rates in the table are monthly averages from the Board of Governors H.15 Statistical Release. The **Treasury Yield Curve** 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/](http://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,  $\pi_{t-1}$  is the previous period's inflation rate (PCE) measured on a year-over-year basis,  $y_{t-1}$  is the log of the previous period's level of real gross domestic product (GDP), and  $y_{t-1}^P$  is the log of an estimate of the previous period's level of potential output. **Potential Real GDP** is as estimated by the Congressional Budget Office.

**Monetary Base Growth and Inflation Targets** shows the quarterly growth of the adjusted monetary base (modified to include an estimate of the effect of sweep programs) implied by applying McCallum's (1988, 1993) equation

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

to five alternative target inflation rates,  $\pi^* = 0, 1, 2, 3, 4$  percent, where  $\Delta MB_t^*$  is the implied growth rate of the adjusted monetary base. The 10-year moving average growth of real GDP for a quarter  $t$  is calculated as the average quarterly growth during the previous 40 quarters, at an annual rate, by the formula

$(y_t - y_{t-40})/40$  ? 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](http://research.stlouisfed.org/aggreg/swdata.html).

**Page 11: Implied One-Year Forward Rates** are calculated by this Bank from Treasury constant maturity yields. Yields to maturity,  $R(m)$ , for securities with  $m = 1, \dots, 10$  years to maturity are obtained by linear interpolation between reported yields. These yields are smoothed by fitting the regression suggested by Nelson and Siegel (1987),

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

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  $D(m) = (1 - e^{-R(m) ? m})/R(m)$ . 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/](http://research.stlouisfed.org/publications/review/).