



Are Banks Vulnerable to a Housing Bust?

House prices in the United States have soared over the past five years. A common measure of the trend in house prices is the repeat sales index produced by the Office of Federal Housing Enterprise Oversight. According to this measure, between 2001:Q1 and 2005:Q3, U.S. house prices increased by an average of 40 percent in nominal terms and 29 percent relative to the consumer price index (excluding the shelter component of the index). This rapid appreciation has led some analysts to forecast a correction in real house prices—possibly even a decline in nominal prices.

A decline in house prices would reduce household wealth, which could restrain the growth of consumer expenditures and overall economic activity. Mortgage default rates could increase sharply if a decline in house prices were accompanied by slower growth of household income or rising interest rates. Furthermore, a decline in house prices would reduce the value of collateral behind the \$8 trillion residential mortgage debt market and would thereby increase the losses lenders experience on loan defaults. The popularity of nontraditional mortgage loans, such as interest-only loans and adjustable-rate loans that permit negative amortization (“option ARMS”), raises additional concern about default risk because such loans expose borrowers to more interest-rate and house-price risk than traditional fixed-rate, amortizing loans.

How exposed are banks to residential real estate? As a share of their total assets, commercial bank holdings of residential real estate loans and securities have risen markedly since the mid-1990s. For example, between 1999:Q1 and 2005:Q1, the sum of bank holdings of 1-to-4-family residential real estate loans and the market value of their holdings of mortgage-backed securities (excluding those issued or guaranteed by a government agency or government-sponsored enterprise, such as Fannie Mae and Freddie Mac) increased from about 15 percent of total bank assets to nearly 20 percent. More comprehensive measures that include all residential real estate loans show similar increases in exposure, as does the ratio of untapped home equity lines of credit to total bank assets.

These simple exposure measures provide little information, however, about whether banks today are more vulnerable to a decline in house prices than they were in the past. Although the share of bank assets consisting of residential real estate loans and securities has increased since 1999, so too has bank equity-capital relative to total bank assets. Between 1999:Q1 and 2005:Q1, equity-capital increased from 8.5 percent of total bank assets to 9.9 percent of total assets. Because capital serves as a cushion against loan and security losses, the increase in real estate loans and securities as a share of bank assets is less worrisome than it would have otherwise been.

The national averages, of course, mask considerable variation across banks in their holdings of residential real estate loans and securities and in their capital-to-assets ratios. One might assume that risks are greater for banks located in regions that have seen the most rapid house price appreciation. Loan-to-value ratios have tended to be lower in such regions, however, suggesting that the mortgage market may have adapted to a possibly higher risk of house price declines in those states. Further, the growth of the mortgage-backed securities market and proliferation of interstate branch banking may have reduced banks’ exposure to local real estate shocks by facilitating greater geographic diversification of their real estate loan and securities portfolios. Finally, a portion of the residential real estate loans and securities held by banks are guaranteed by third parties, and many banks purchase only highly rated securities that have little credit risk. Thus, to get a complete picture of how vulnerable individual banks are to a decline in house prices, we need to know more about the composition of their real estate loan and securities portfolios.

—David C. Wheelock

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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:

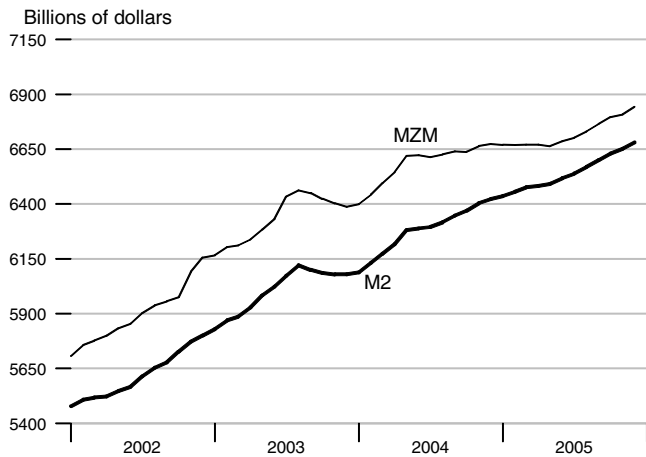
Editor, *Monetary Trends*
Research Division
Federal Reserve Bank of St. Louis
P.O. Box 442
St. Louis, MO 63166-0442

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

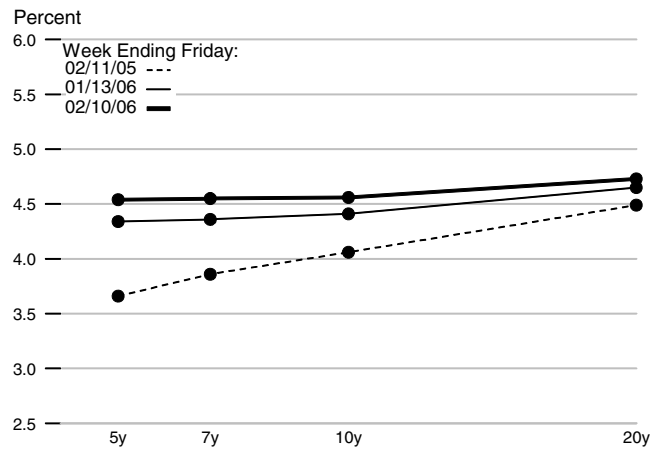
or to:

stlsFRED@stls.frb.org

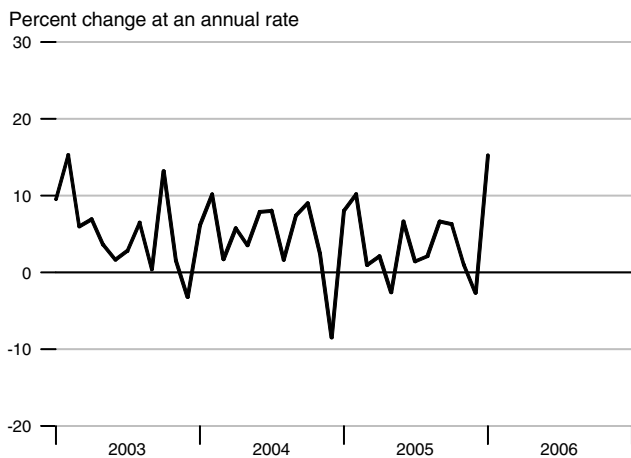
M2 and MZM



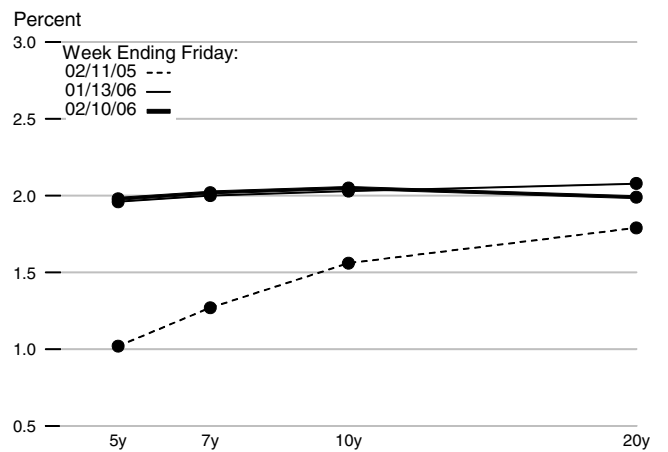
Treasury Yield Curve



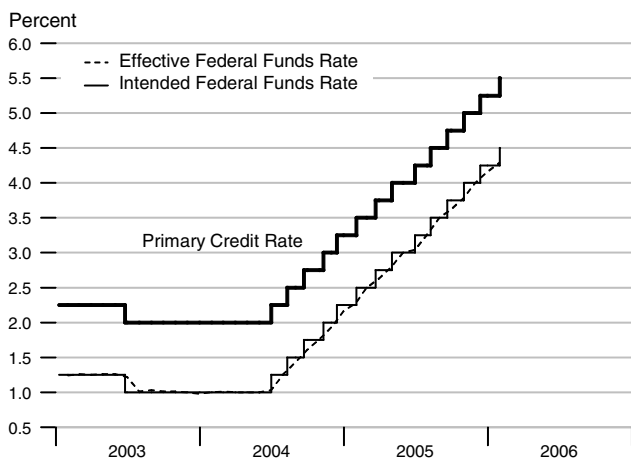
Adjusted Monetary Base



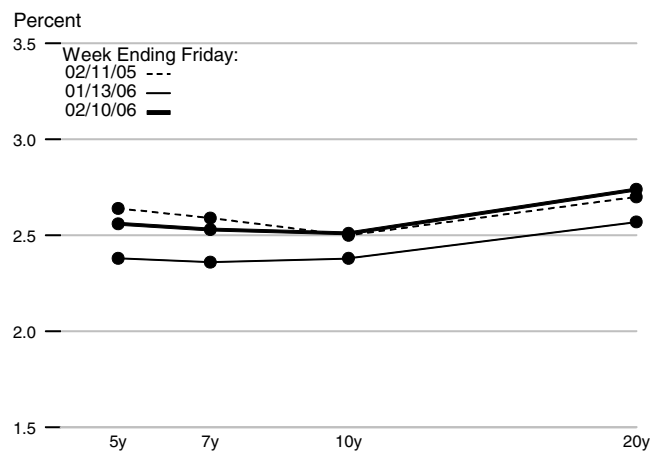
Real Treasury Yield Curve



Reserve Market Rates

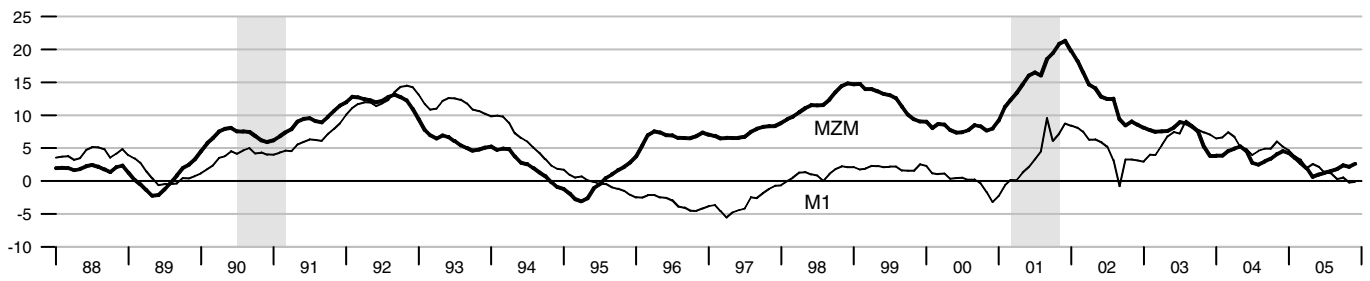


Inflation-Indexed Treasury Yield Spreads



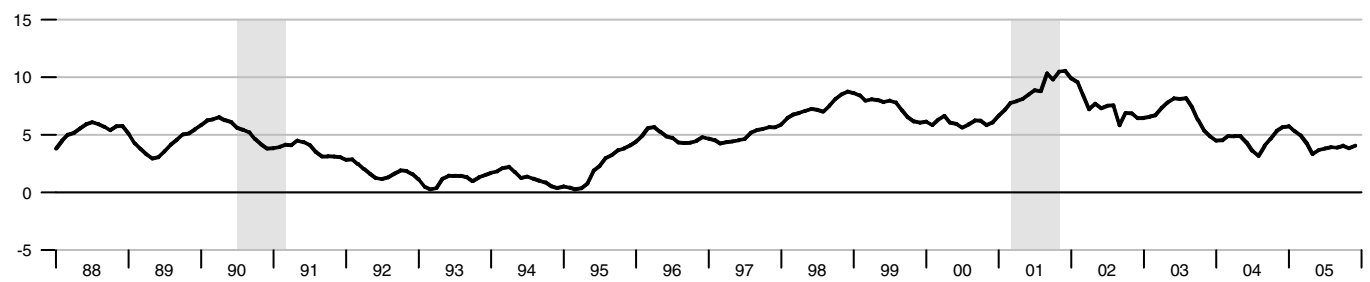
MZM and M1

Percent change from year ago



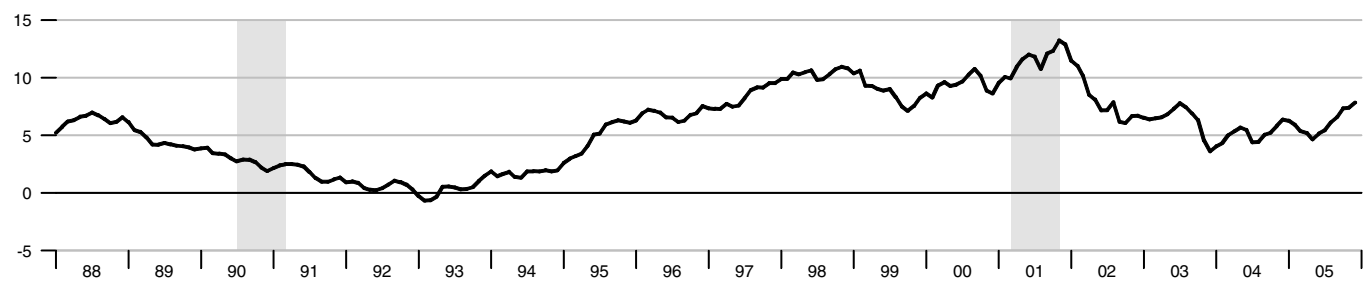
M2

Percent change from year ago



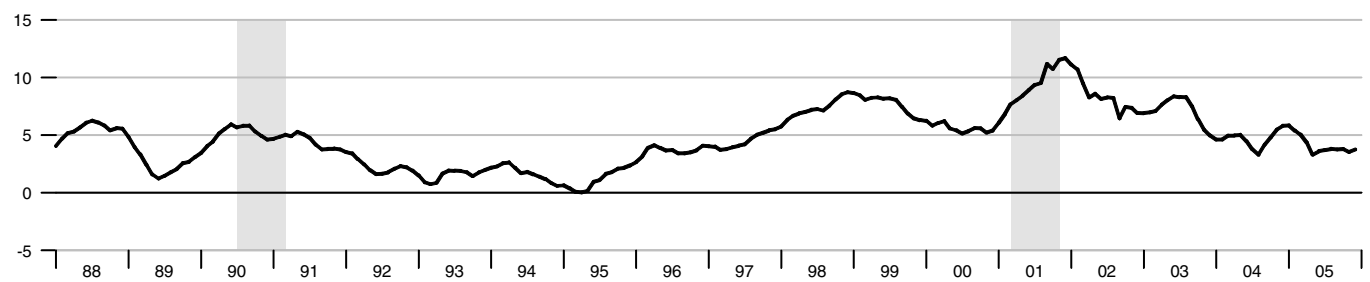
M3

Percent change from year ago



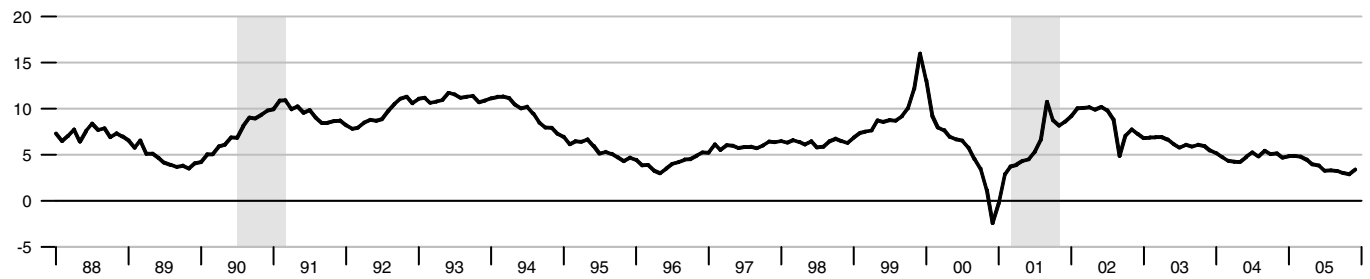
Monetary Services Index - M2

Percent change from year ago



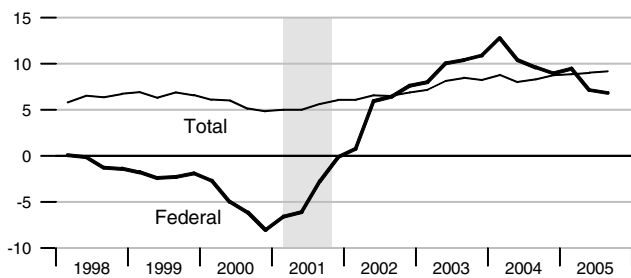
Adjusted Monetary Base

Percent change from year ago



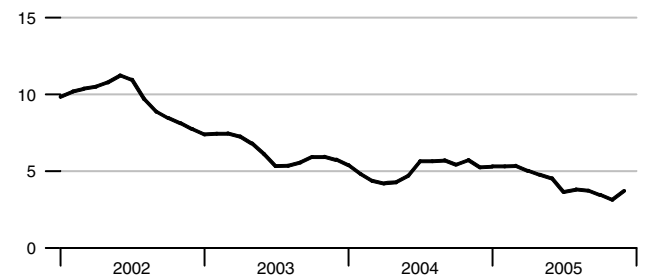
Domestic Nonfinancial Debt

Percent change from year ago



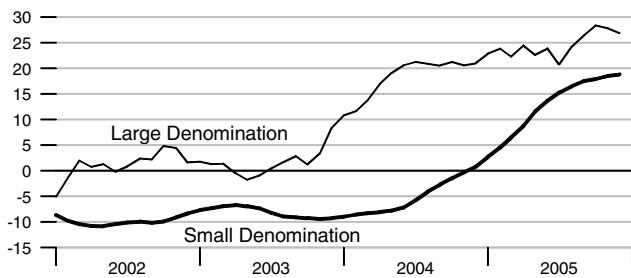
Currency Held by the Nonbank Public

Percent change from year ago



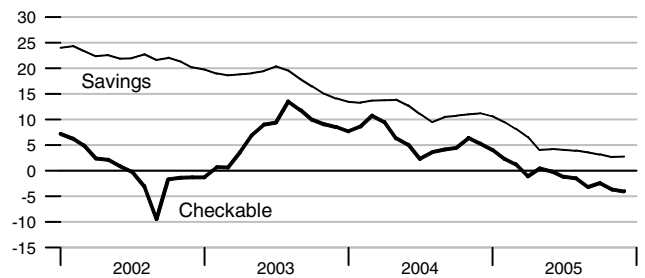
Time Deposits

Percent change from year ago



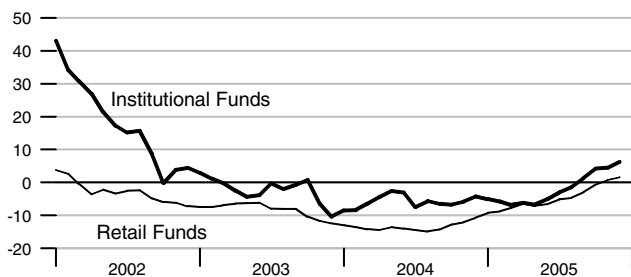
Checkable and Savings Deposits

Percent change from year ago



Money Market Mutual Fund Shares

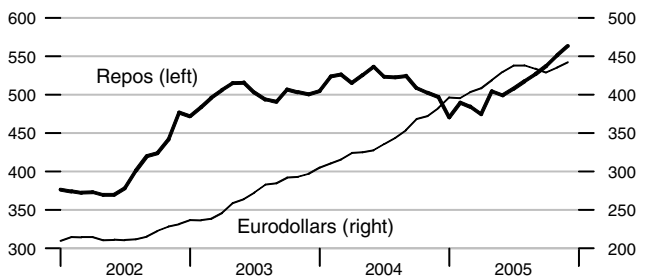
Percent change from year ago



Repurchase Agreements and Eurodollars

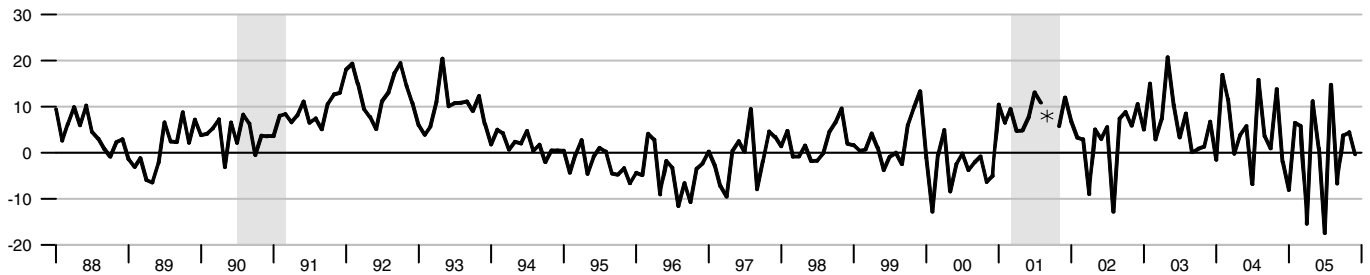
Billions of dollars

Billions of dollars



M1

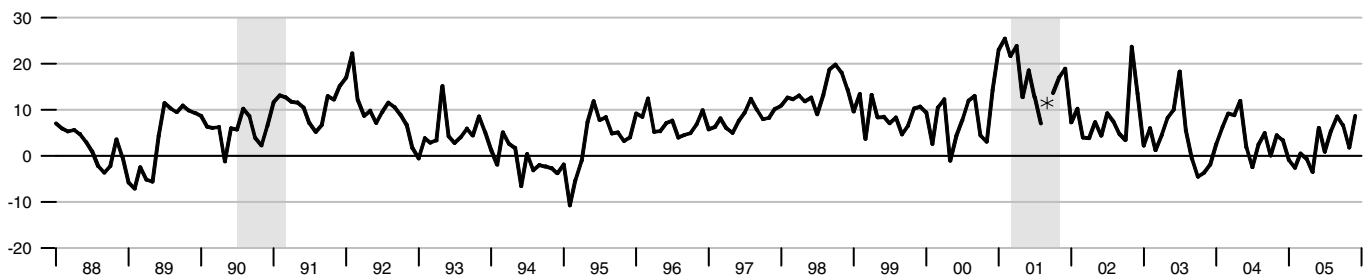
Percent change at an annual rate



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

M2M

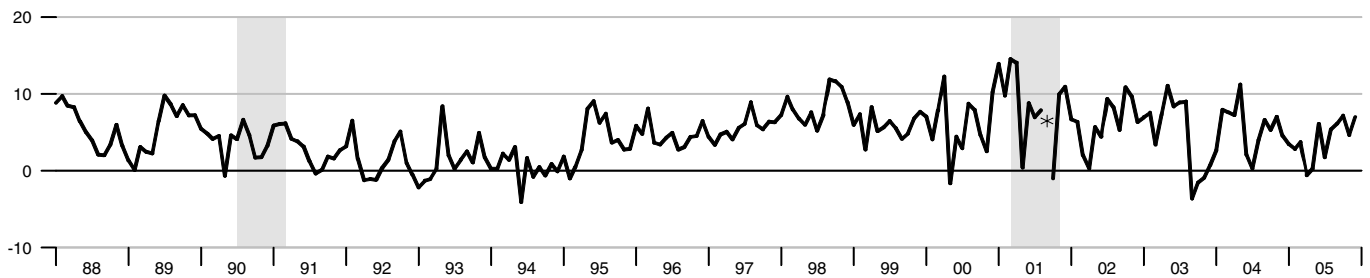
Percent change at an annual rate



*Actual value for September 2001 is 39.41 percent rate.

M2

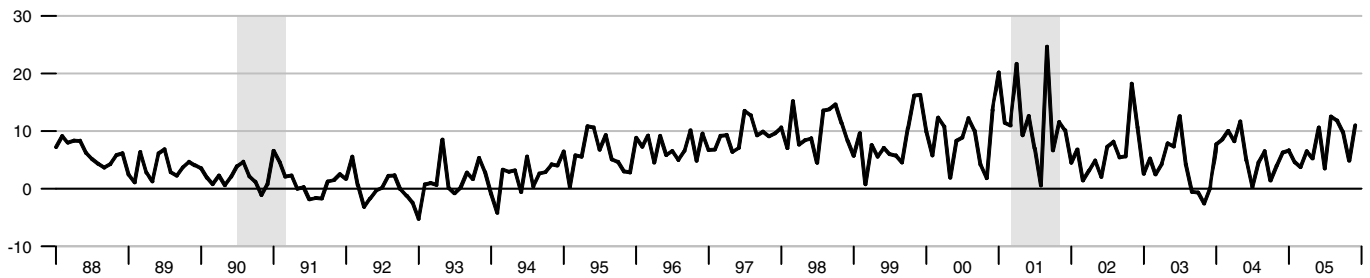
Percent change at an annual rate



*Actual value for September 2001 is 24.90 percent rate.

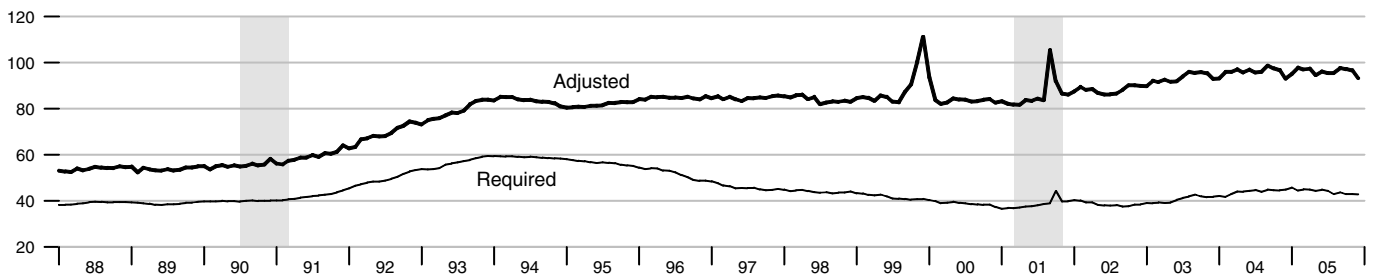
M3

Percent change at an annual rate



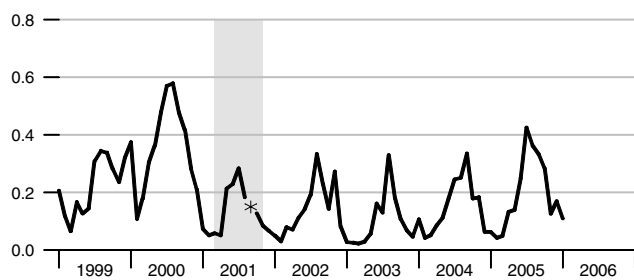
Adjusted and Required Reserves

Billions of dollars



Total Borrowings, nsa

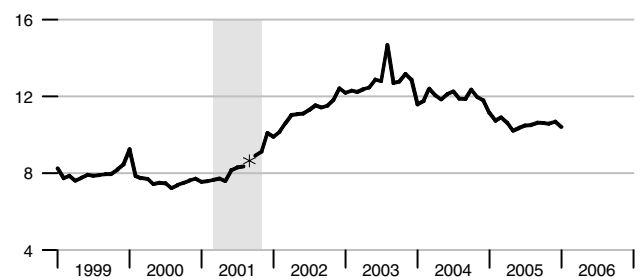
Billions of dollars



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

Excess Reserves plus RCB Contracts

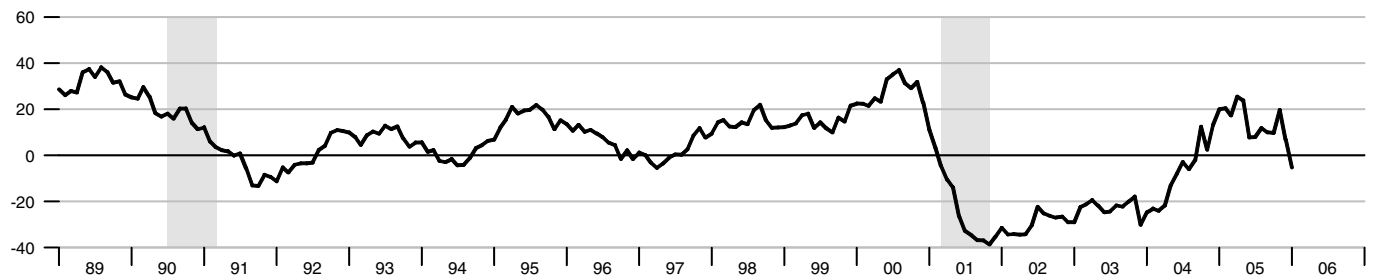
Billions of dollars



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

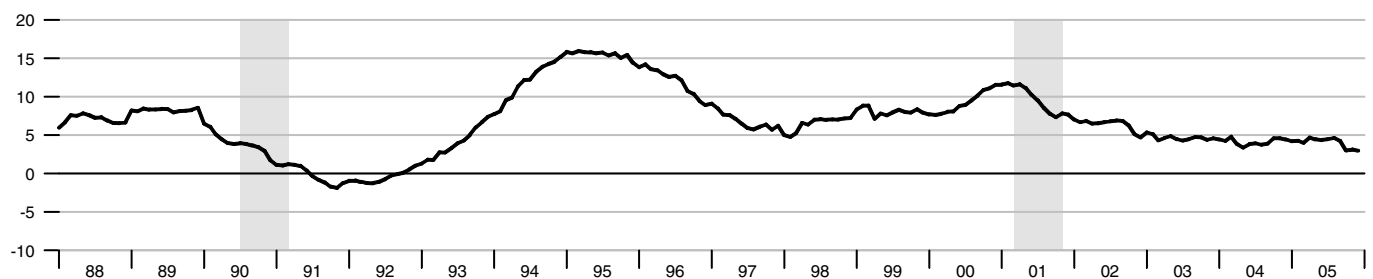
Nonfinancial Commercial Paper

Percent change from year ago

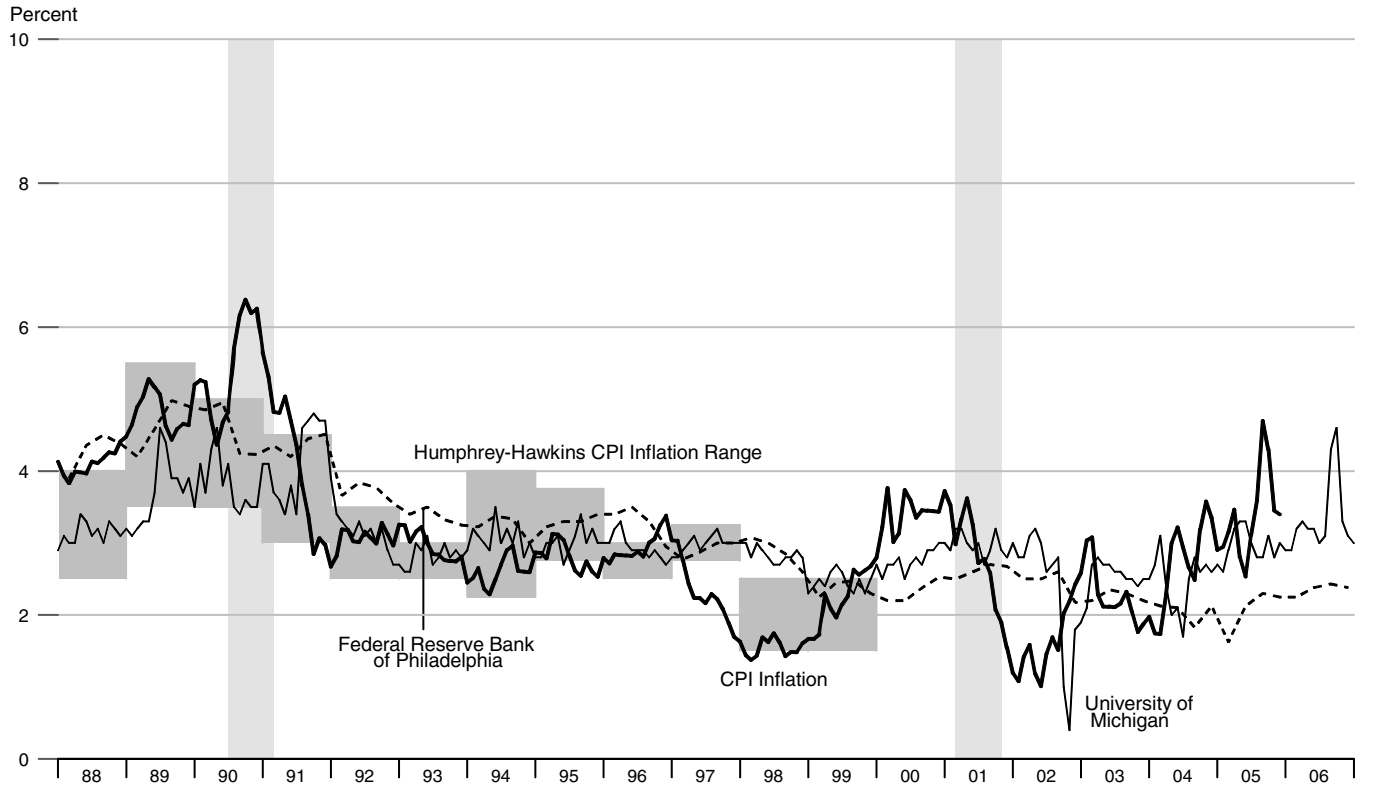


Consumer Credit

Percent change from year ago

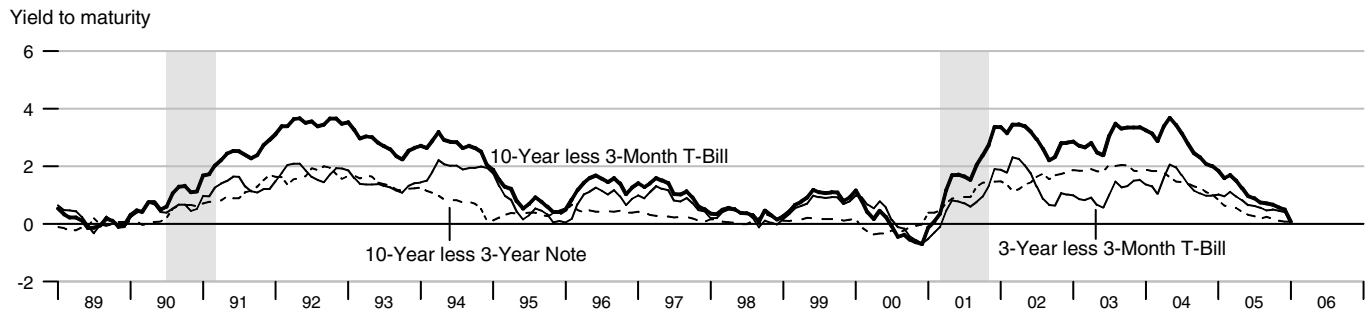


Inflation and Inflation Expectations

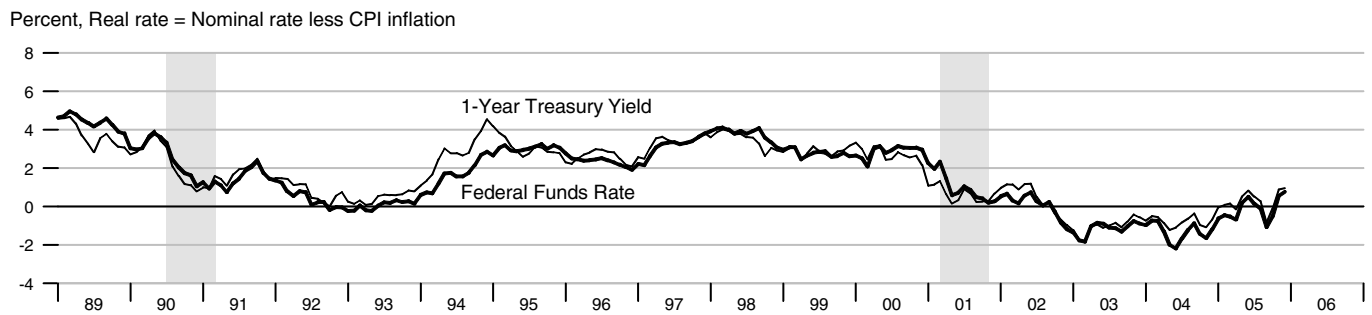


The shaded region shows the Humphrey-Hawkins CPI inflation range. Beginning in January 2000, the Humphrey-Hawkins inflation range was reported using the PCE price index and therefore is not shown on this graph. See notes on page 19.

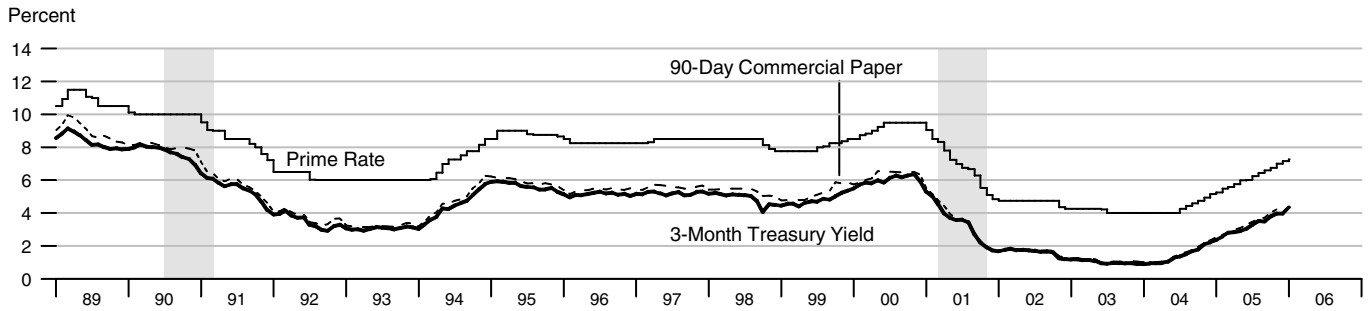
Treasury Security Yield Spreads



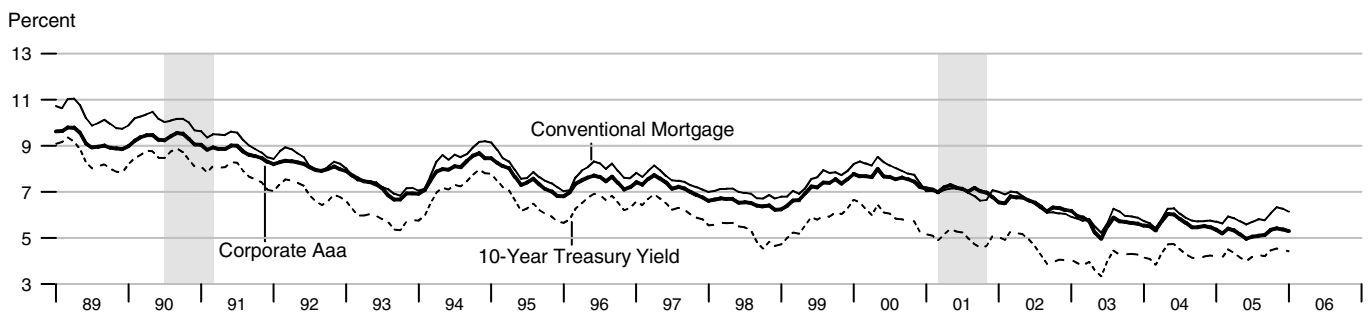
Real Interest Rates



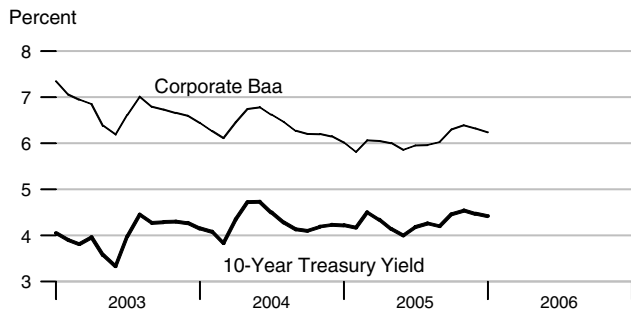
Short-Term Interest Rates



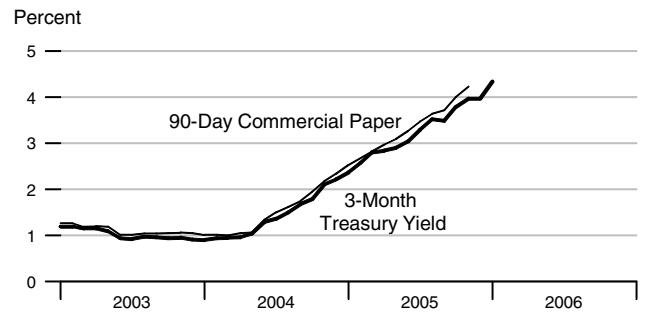
Long-Term Interest Rates



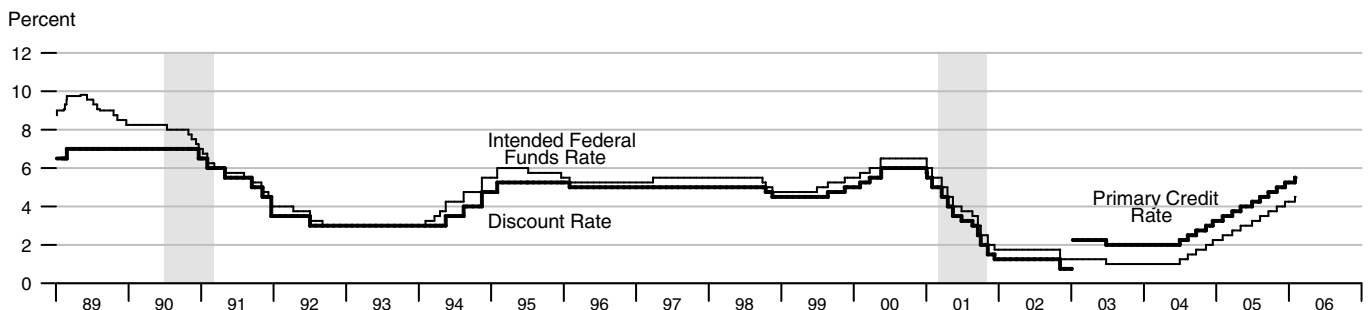
Long-Term Interest Rates



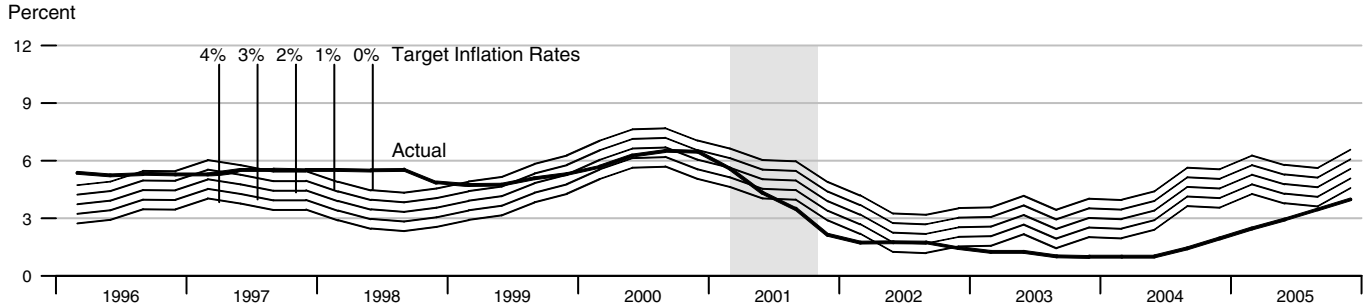
Short-Term Interest Rates



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



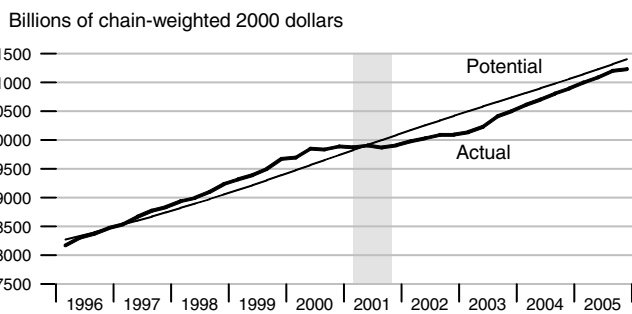
Federal Funds Rate and Inflation Targets



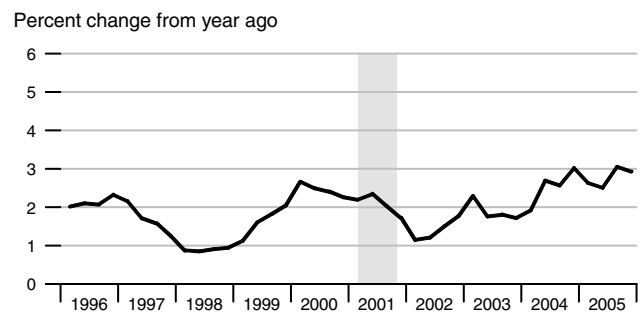
Calculated federal funds rate is based on Taylor's rule. See notes on page 19.

Components of Taylor's Rule

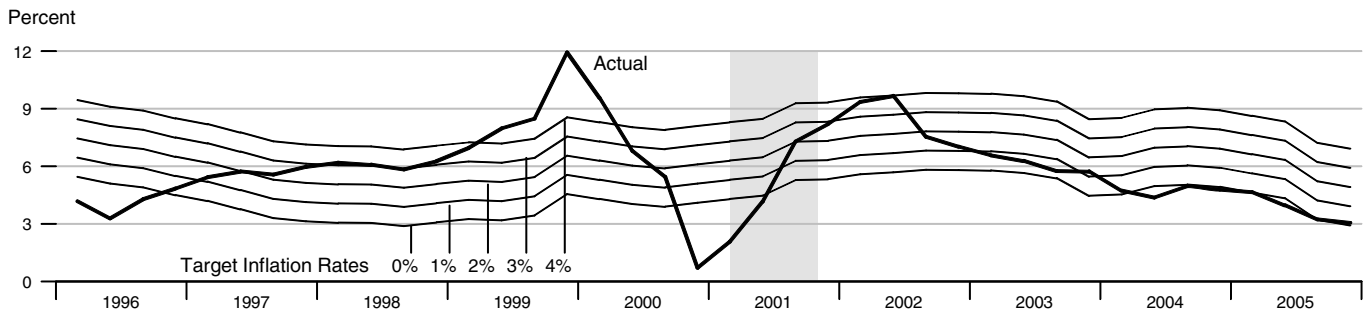
Actual and Potential Real GDP



PCE Inflation



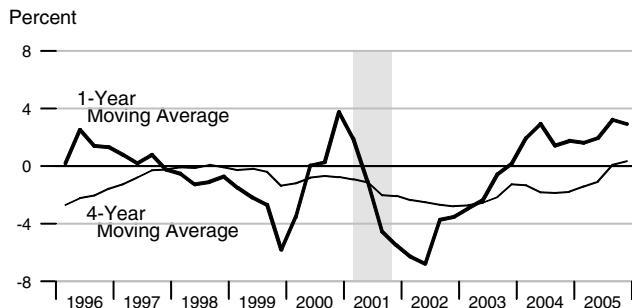
Monetary Base Growth* and Inflation Targets



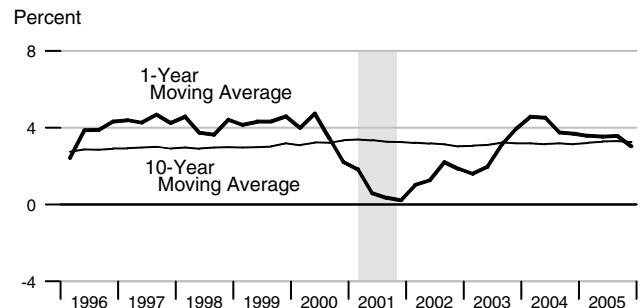
*Modified for the effects of sweeps programs on reserve demand. Calculated base growth is based on McCallum's rule. Actual base growth is percent change from year ago. See notes on page 19.

Components of McCallum's Rule

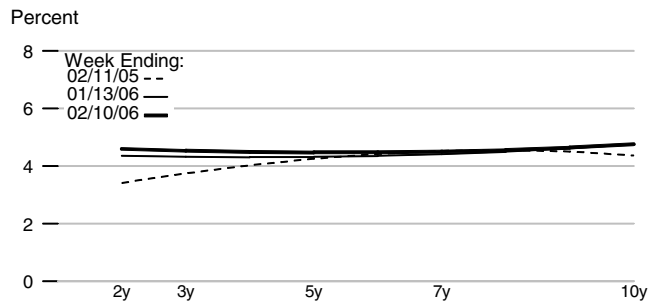
Monetary Base Velocity Growth



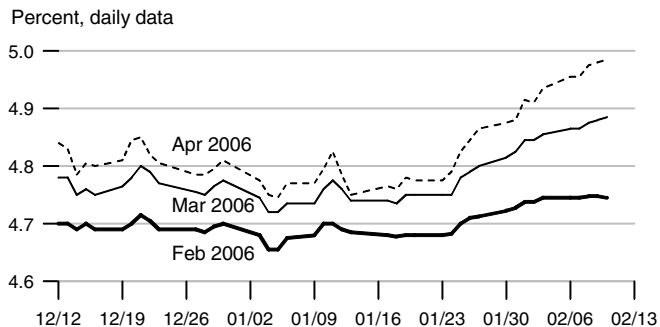
Real Output Growth



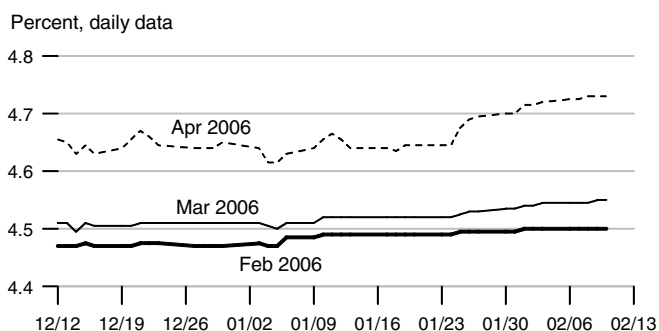
Implied One-Year Forward Rates



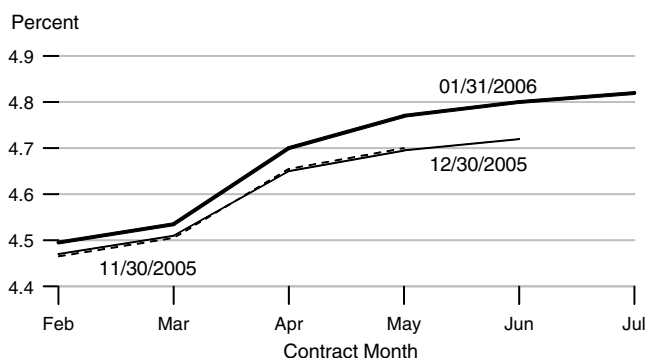
Rates on 3-Month Eurodollar Futures



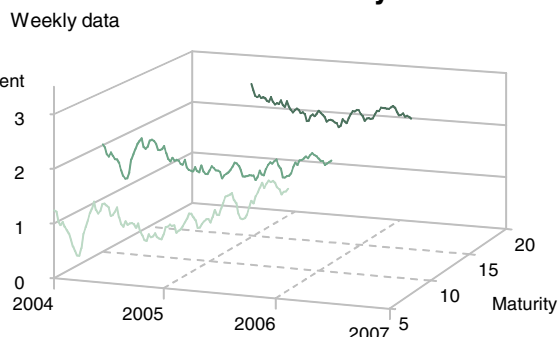
Rates on Selected Federal Funds Futures Contracts



Rates on Federal Funds Futures on Selected Dates

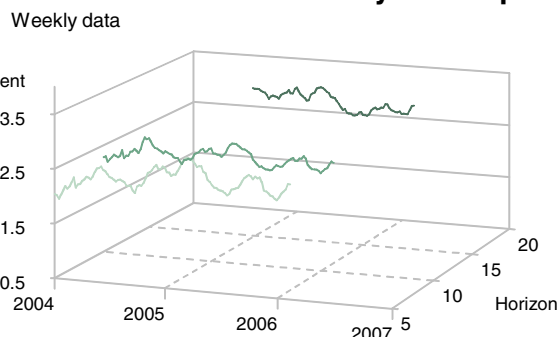


Inflation-Indexed Treasury Securities



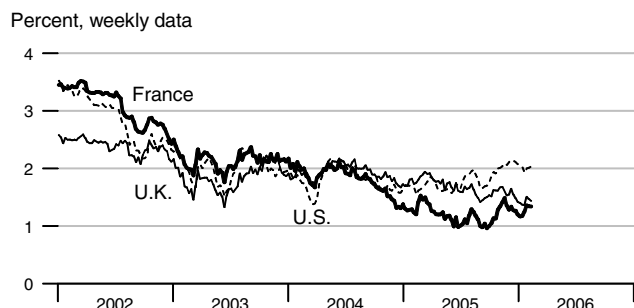
Note: Yields are inflation-indexed constant maturity U.S. Treasury securities

Inflation-Indexed Treasury Yield Spreads

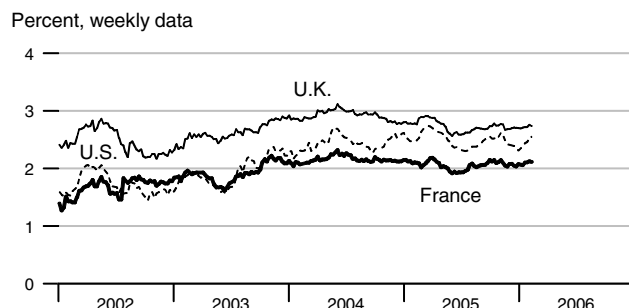


Note: Yield spread is between nominal and inflation-indexed constant maturity U.S. Treasury securities.

Inflation-Indexed 10-Year Government Notes

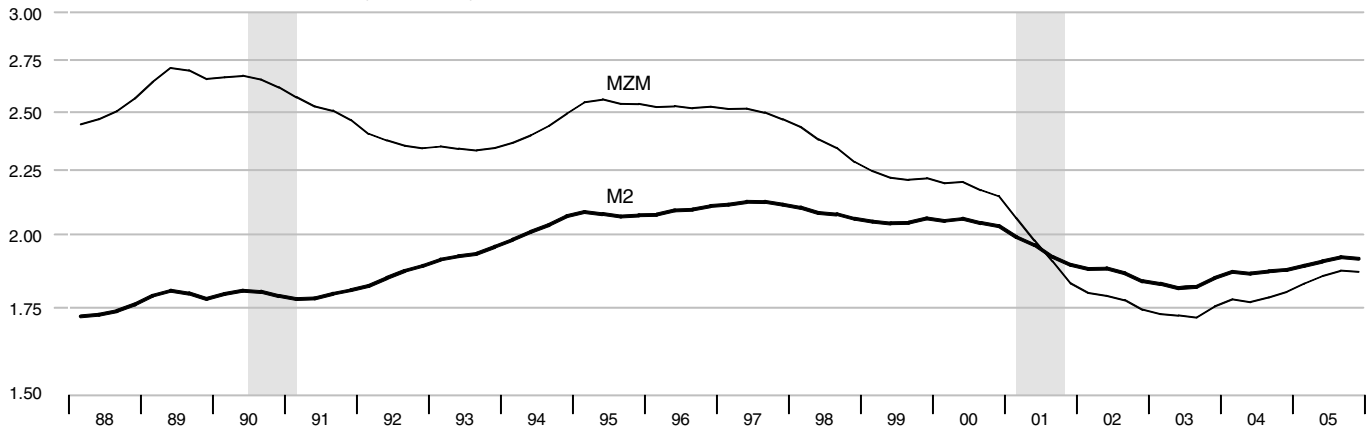


Inflation-Indexed 10-Year Government Yield Spreads



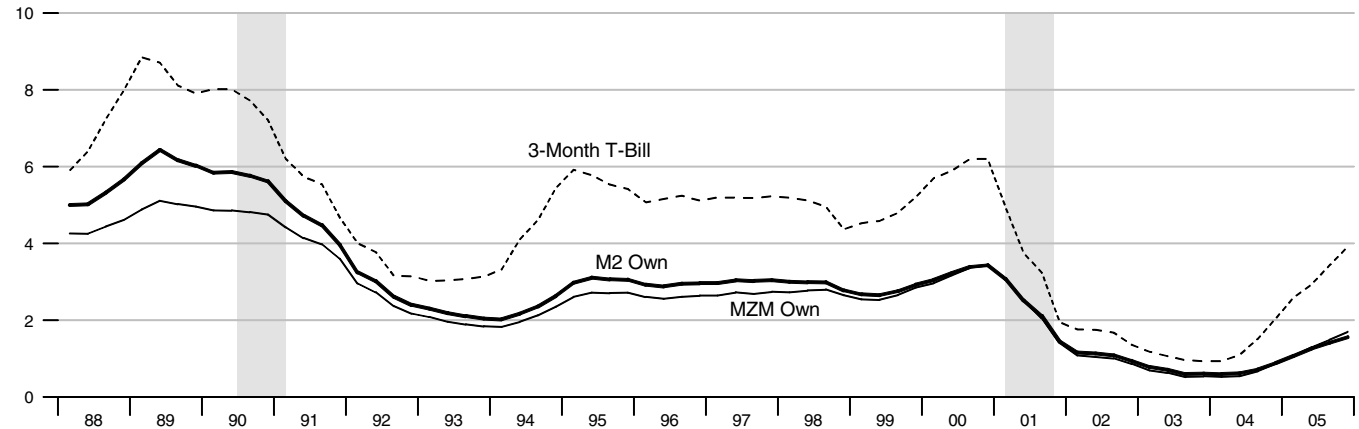
Velocity

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



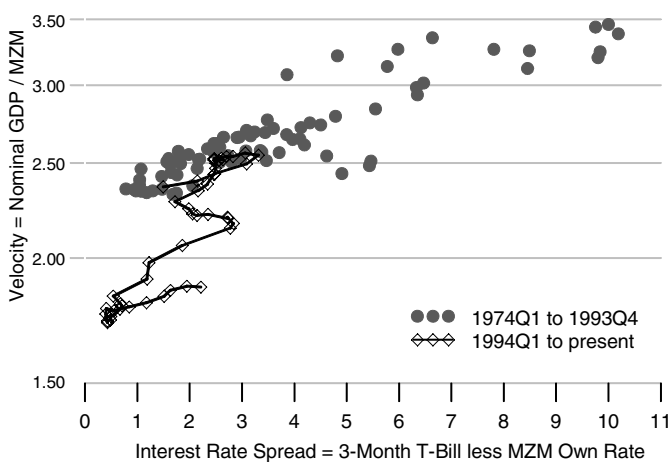
Interest Rates

Percent



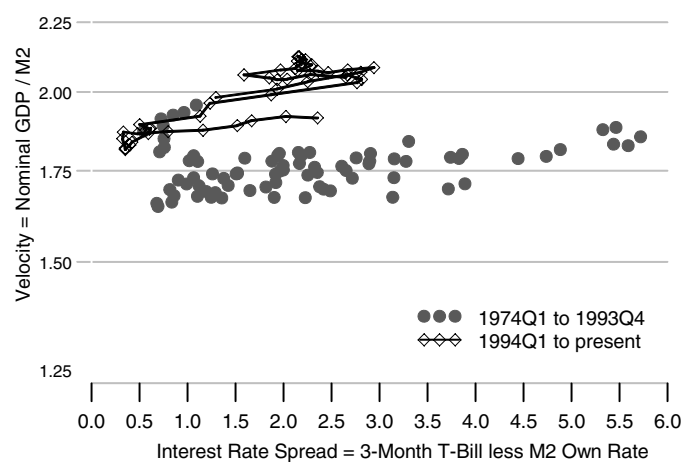
MZM Velocity and Interest Rate Spread

Ratio Scale



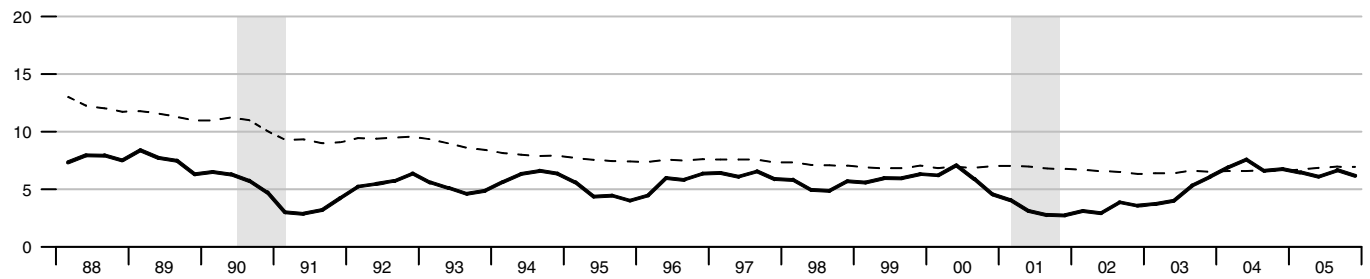
M2 Velocity and Interest Rate Spread

Ratio Scale



Gross Domestic Product

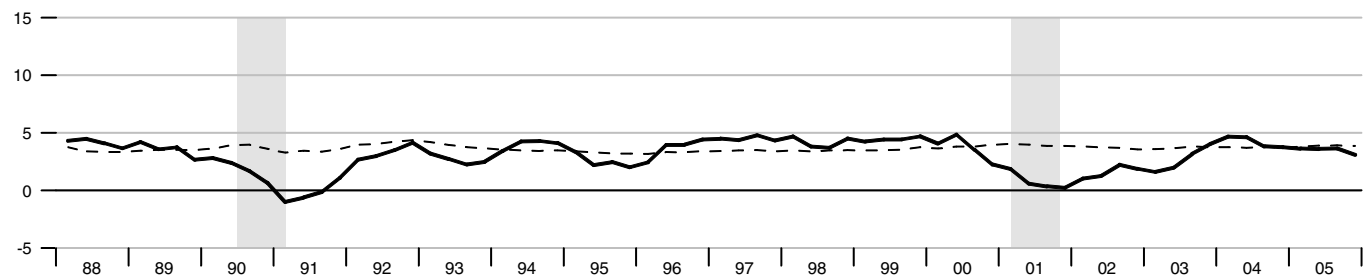
Percent change from year ago



Dashed lines indicate 10-year moving averages.

Real Gross Domestic Product

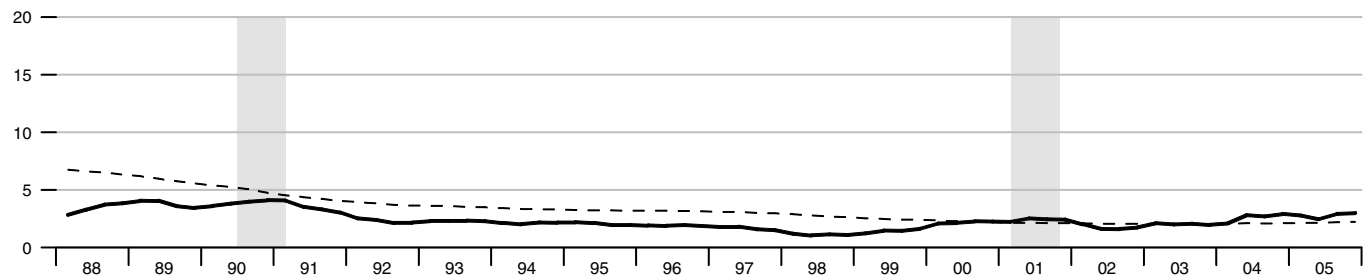
Percent change from year ago



Dashed lines indicate 10-year moving averages.

Gross Domestic Product Price Index

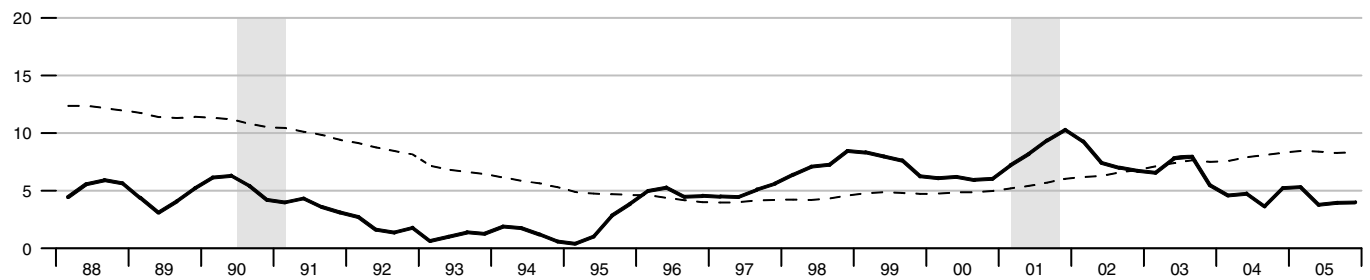
Percent change from year ago



Dashed lines indicate 10-year moving averages.

M2

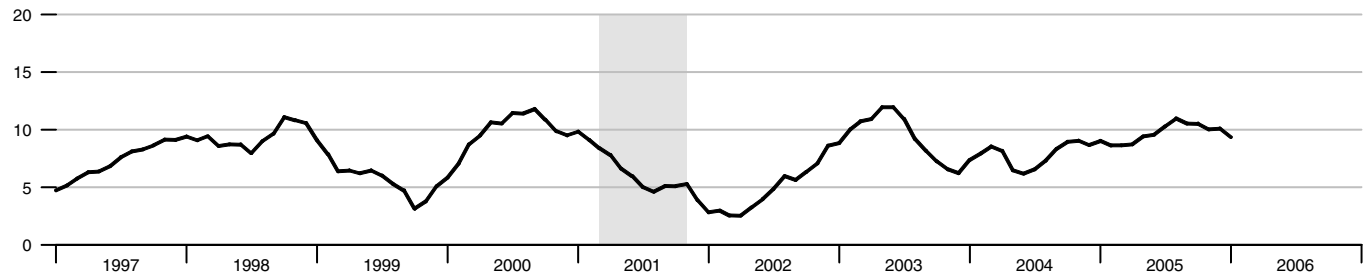
Percent change from year ago



Dashed lines indicate 10-year moving averages.

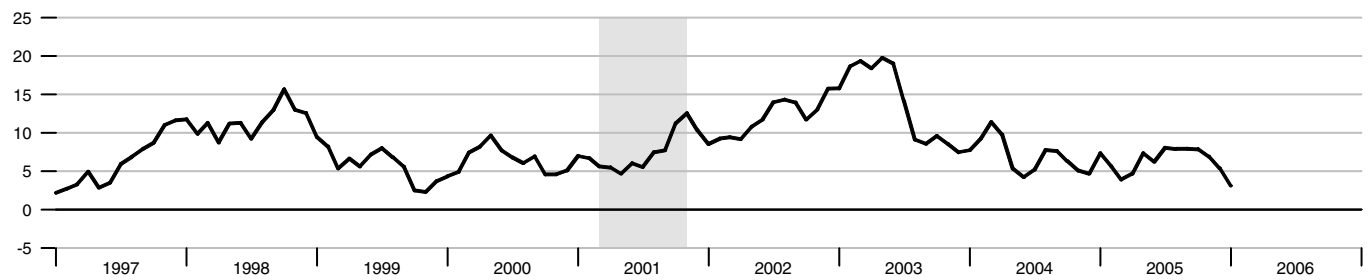
Bank Credit

Percent change from year ago



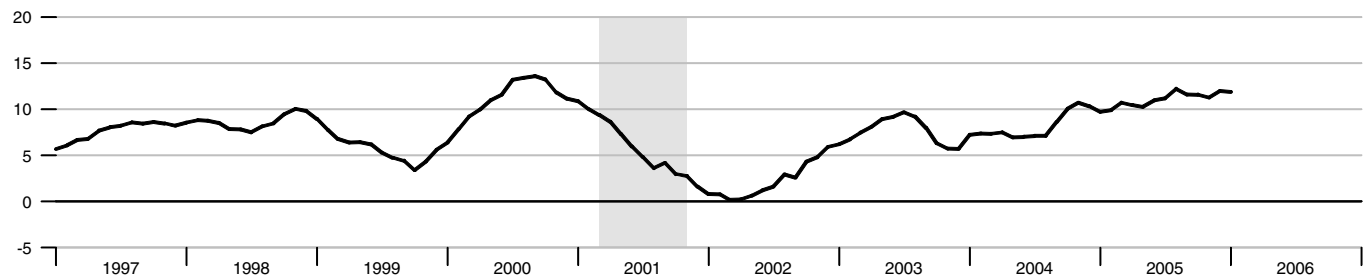
Investment Securities in Bank Credit at Commercial Banks

Percent change from year ago



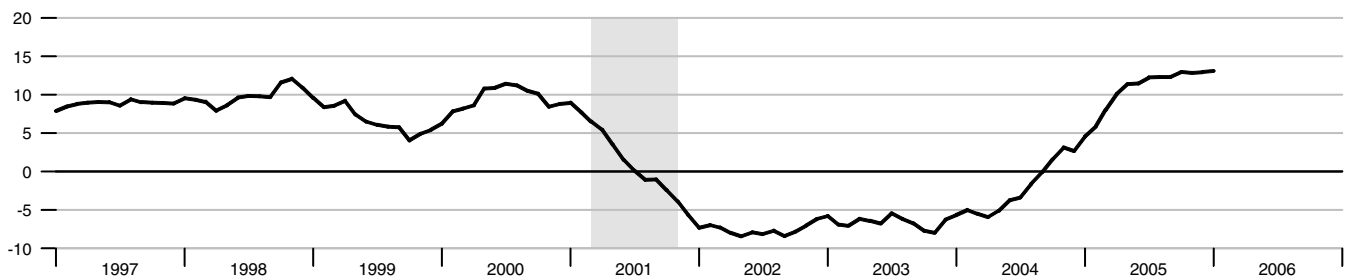
Total Loans and Leases in Bank Credit at Commercial Banks

Percent change from year ago

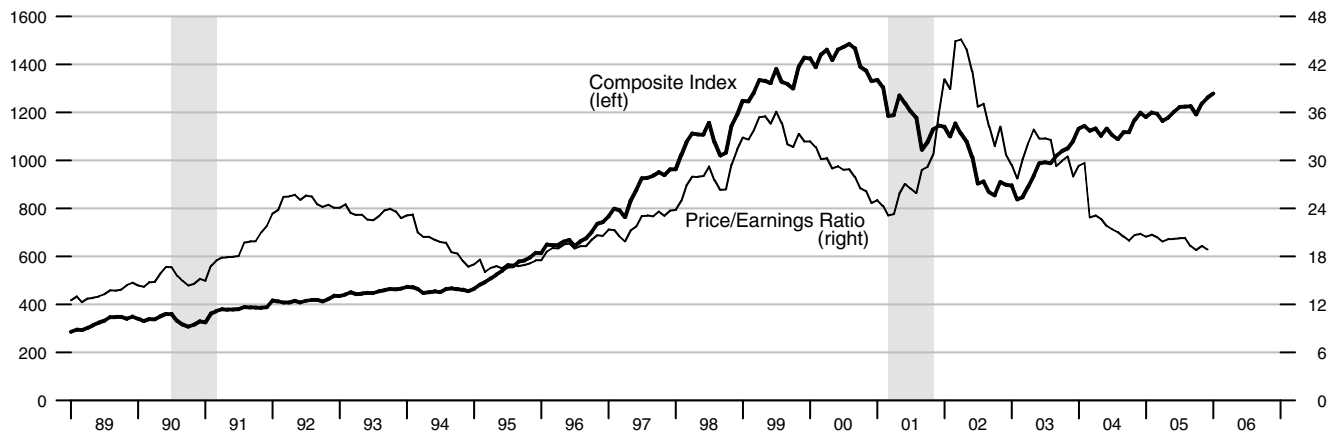


Commercial and Industrial Loans at Commercial Banks

Percent change from year ago



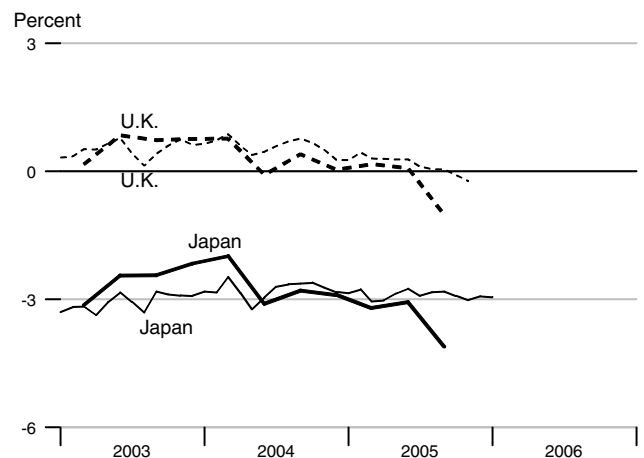
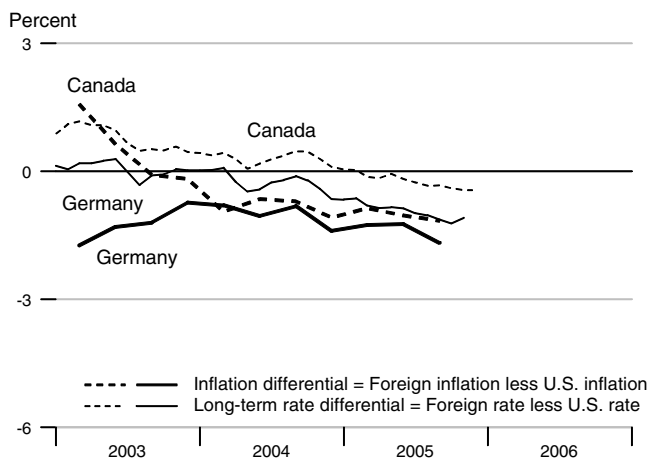
Standard & Poor's 500



Recent Inflation and Long-Term Interest Rates

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

Inflation and Long-Term Interest Rate Differentials



| | | Money Stock | | | | Bank Credit | Adjusted | | MSI M2 |
|------|-----|-------------|----------|----------|----------|----------------|---------------|----------|---------|
| | | M1 | MZM | M2 | M3 | | Monetary Base | Reserves | |
| 2001 | | 1140.194 | 5223.790 | 5219.729 | 7647.122 | 5343.999 | 641.167 | 86.172 | 271.439 |
| 2002 | | 1196.304 | 5895.682 | 5615.341 | 8261.412 | 5596.949 | 697.092 | 88.158 | 294.191 |
| 2003 | | 1273.874 | 6333.044 | 6004.852 | 8788.772 | 6120.440 | 740.929 | 93.313 | 315.219 |
| 2004 | | 1344.809 | 6581.878 | 6277.881 | 9236.688 | 6597.515 | 776.706 | 96.065 | 329.910 |
| 2005 | | 1368.647 | 6723.032 | 6544.201 | 9792.421 | 7238.732 | 806.308 | 96.184 | 343.599 |
| 2003 | 1 | 1234.075 | 6194.044 | 5862.073 | 8623.154 | 5954.723 | 726.942 | 91.199 | 307.910 |
| | 2 | 1268.163 | 6284.973 | 5978.401 | 8741.195 | 6135.072 | 738.455 | 92.122 | 313.666 |
| | 3 | 1293.883 | 6448.626 | 6097.615 | 8905.988 | 6187.760 | 744.335 | 95.167 | 319.766 |
| | 4 | 1299.373 | 6404.534 | 6081.317 | 8884.751 | 6204.205 | 753.986 | 94.762 | 319.534 |
| 2004 | 1 | 1318.491 | 6446.239 | 6131.124 | 9005.440 | 6428.349 | 761.428 | 95.033 | 322.486 |
| | 2 | 1339.022 | 6595.770 | 6262.097 | 9224.868 | 6560.281 | 771.146 | 96.603 | 328.774 |
| | 3 | 1352.700 | 6626.757 | 6319.858 | 9318.217 | 6645.832 | 782.782 | 96.800 | 331.731 |
| | 4 | 1369.023 | 6658.748 | 6398.444 | 9398.226 | 6755.598 | 791.469 | 95.824 | 336.649 |
| 2005 | 1 | 1369.836 | 6669.661 | 6455.965 | 9532.940 | 6992.251 | 798.244 | 96.652 | 339.987 |
| | 2 | 1368.644 | 6673.851 | 6497.695 | 9674.806 | 7166.528 | 802.634 | 96.047 | 341.128 |
| | 3 | 1366.775 | 6732.692 | 6569.143 | 9863.517 | 7350.245 | 808.398 | 96.289 | 344.200 |
| | 4 | 1369.333 | 6815.922 | 6654.000 | 10098.42 | 7445.906 | 815.958 | 95.749 | 349.079 |
| 2003 | Dec | 1304.238 | 6387.170 | 6079.350 | 8873.979 | 6251.309 | 752.957 | 92.976 | 319.634 |
| 2004 | Jan | 1305.957 | 6400.119 | 6088.266 | 8931.912 | 6321.749 | 756.795 | 93.210 | 320.482 |
| | Feb | 1319.901 | 6443.579 | 6132.086 | 9002.017 | 6442.659 | 763.197 | 95.940 | 322.499 |
| | Mar | 1329.614 | 6495.018 | 6173.019 | 9082.391 | 6520.638 | 764.293 | 95.949 | 324.478 |
| | Apr | 1339.369 | 6545.925 | 6216.884 | 9151.381 | 6540.996 | 767.950 | 97.097 | 326.515 |
| | May | 1336.468 | 6618.866 | 6280.601 | 9245.609 | 6549.959 | 770.211 | 95.781 | 329.610 |
| | Jun | 1341.229 | 6622.518 | 6288.805 | 9277.613 | 6589.888 | 775.276 | 96.930 | 330.197 |
| | Jul | 1343.460 | 6614.016 | 6295.411 | 9284.571 | 6602.294 | 780.465 | 95.693 | 330.486 |
| | Aug | 1354.143 | 6625.958 | 6317.259 | 9316.289 | 6632.673 | 781.530 | 96.029 | 331.433 |
| | Sep | 1360.497 | 6640.298 | 6346.905 | 9353.791 | 6702.530 | 786.352 | 98.679 | 333.274 |
| | Oct | 1360.805 | 6638.593 | 6369.248 | 9361.356 | 6713.829 | 792.251 | 97.564 | 334.886 |
| | Nov | 1374.121 | 6663.955 | 6403.997 | 9397.514 | 6759.505 | 793.883 | 96.835 | 336.880 |
| | Dec | 1372.144 | 6673.695 | 6422.086 | 9435.807 | 6793.459 | 788.274 | 93.073 | 338.181 |
| 2005 | Jan | 1367.044 | 6669.919 | 6436.425 | 9492.097 | 6892.661 | 793.547 | 95.100 | 339.216 |
| | Feb | 1369.469 | 6668.684 | 6455.705 | 9536.480 | 6999.366 | 800.277 | 97.812 | 339.882 |
| | Mar | 1372.994 | 6670.381 | 6475.766 | 9570.244 | 7084.727 | 800.907 | 97.043 | 340.864 |
| | Apr | 1365.736 | 6670.762 | 6482.699 | 9625.628 | 7112.340 | 802.314 | 97.407 | 340.777 |
| | May | 1370.711 | 6664.081 | 6492.131 | 9669.599 | 7166.414 | 800.583 | 94.557 | 340.497 |
| | Jun | 1369.486 | 6686.710 | 6518.255 | 9729.192 | 7220.830 | 805.005 | 96.176 | 342.109 |
| | Jul | 1362.513 | 6702.219 | 6538.452 | 9766.046 | 7281.203 | 805.967 | 95.507 | 342.723 |
| | Aug | 1370.384 | 6730.916 | 6568.929 | 9868.791 | 7360.532 | 807.387 | 95.638 | 344.072 |
| | Sep | 1367.427 | 6764.940 | 6600.048 | 9955.713 | 7408.999 | 811.840 | 97.722 | 345.805 |
| | Oct | 1369.172 | 6796.290 | 6629.610 | 10037.71 | 7420.537 | 816.105 | 97.296 | 347.587 |
| | Nov | 1370.035 | 6808.597 | 6651.939 | 10088.28 | 7437.517 | 816.789 | 96.696 | 348.787 |
| | Dec | 1368.792 | 6842.879 | 6680.451 | 10169.26 | 7479.663 | 814.979 | 93.255 | 350.864 |

*All values are given in billions of dollars.

| | | Federal Funds | Primary Credit Rate | Prime Rate | 3-mo CDs | Treasury Yields | | | Corporate Aaa Bonds | S & L Aaa Bonds | Conventional Mortgage |
|------|-----|---------------|---------------------|------------|----------|-----------------|------|-------|---------------------|-----------------|-----------------------|
| | | | | | | 3-mo | 3-yr | 10-yr | | | |
| 2001 | | 3.89 | | 6.92 | 3.69 | 3.47 | 4.08 | 5.02 | 7.08 | 5.01 | 6.97 |
| 2002 | | 1.67 | | 4.68 | 1.73 | 1.63 | 3.10 | 4.61 | 6.49 | 4.87 | 6.54 |
| 2003 | | 1.13 | 2.11 | 4.12 | 1.15 | 1.03 | 2.11 | 4.02 | 5.67 | 4.52 | 5.82 |
| 2004 | | 1.35 | 2.34 | 4.34 | 1.56 | 1.40 | 2.78 | 4.27 | 5.63 | 4.50 | 5.84 |
| 2005 | | 3.21 | 4.19 | 6.19 | 3.51 | 3.21 | 3.93 | 4.29 | 5.23 | 4.28 | 5.86 |
| 2003 | 1 | 1.25 | 2.25 | 4.25 | 1.26 | 1.18 | 2.07 | 3.92 | 6.00 | 4.60 | 5.83 |
| | 2 | 1.25 | 2.23 | 4.24 | 1.17 | 1.06 | 1.77 | 3.62 | 5.31 | 4.28 | 5.51 |
| | 3 | 1.02 | 2.00 | 4.00 | 1.07 | 0.95 | 2.20 | 4.23 | 5.70 | 4.68 | 6.01 |
| | 4 | 1.00 | 2.00 | 4.00 | 1.10 | 0.93 | 2.38 | 4.29 | 5.66 | 4.52 | 5.92 |
| 2004 | 1 | 1.00 | 2.00 | 4.00 | 1.05 | 0.93 | 2.17 | 4.02 | 5.45 | 4.26 | 5.61 |
| | 2 | 1.01 | 2.00 | 4.00 | 1.25 | 1.10 | 2.98 | 4.60 | 5.93 | 4.82 | 6.13 |
| | 3 | 1.43 | 2.42 | 4.42 | 1.70 | 1.51 | 2.92 | 4.30 | 5.64 | 4.54 | 5.89 |
| | 4 | 1.95 | 2.94 | 4.94 | 2.25 | 2.04 | 3.05 | 4.17 | 5.48 | 4.39 | 5.73 |
| 2005 | 1 | 2.47 | 3.44 | 5.44 | 2.78 | 2.58 | 3.61 | 4.30 | 5.32 | 4.23 | 5.76 |
| | 2 | 2.94 | 3.91 | 5.91 | 3.23 | 2.93 | 3.73 | 4.16 | 5.15 | 4.15 | 5.72 |
| | 3 | 3.46 | 4.43 | 6.43 | 3.74 | 3.43 | 3.98 | 4.21 | 5.09 | 4.28 | 5.76 |
| | 4 | 3.98 | 4.97 | 6.97 | 4.30 | 3.91 | 4.37 | 4.49 | 5.38 | 4.45 | 6.22 |
| 2004 | Jan | 1.00 | 2.00 | 4.00 | 1.06 | 0.90 | 2.27 | 4.15 | 5.54 | 4.42 | 5.74 |
| | Feb | 1.01 | 2.00 | 4.00 | 1.05 | 0.94 | 2.25 | 4.08 | 5.50 | 4.26 | 5.64 |
| | Mar | 1.00 | 2.00 | 4.00 | 1.05 | 0.95 | 2.00 | 3.83 | 5.33 | 4.11 | 5.45 |
| | Apr | 1.00 | 2.00 | 4.00 | 1.08 | 0.96 | 2.57 | 4.35 | 5.73 | 4.69 | 5.83 |
| | May | 1.00 | 2.00 | 4.00 | 1.20 | 1.04 | 3.10 | 4.72 | 6.04 | 4.93 | 6.27 |
| | Jun | 1.03 | 2.01 | 4.01 | 1.46 | 1.29 | 3.26 | 4.73 | 6.01 | 4.85 | 6.29 |
| | Jul | 1.26 | 2.25 | 4.25 | 1.57 | 1.36 | 3.05 | 4.50 | 5.82 | 4.71 | 6.06 |
| | Aug | 1.43 | 2.43 | 4.43 | 1.68 | 1.50 | 2.88 | 4.28 | 5.65 | 4.52 | 5.87 |
| | Sep | 1.61 | 2.58 | 4.58 | 1.86 | 1.68 | 2.83 | 4.13 | 5.46 | 4.40 | 5.75 |
| | Oct | 1.76 | 2.75 | 4.75 | 2.04 | 1.79 | 2.85 | 4.10 | 5.47 | 4.38 | 5.72 |
| | Nov | 1.93 | 2.93 | 4.93 | 2.26 | 2.11 | 3.09 | 4.19 | 5.52 | 4.45 | 5.73 |
| | Dec | 2.16 | 3.15 | 5.15 | 2.45 | 2.22 | 3.21 | 4.23 | 5.47 | 4.35 | 5.75 |
| 2005 | Jan | 2.28 | 3.25 | 5.25 | 2.61 | 2.37 | 3.39 | 4.22 | 5.36 | 4.24 | 5.71 |
| | Feb | 2.50 | 3.49 | 5.49 | 2.77 | 2.58 | 3.54 | 4.17 | 5.20 | 4.16 | 5.63 |
| | Mar | 2.63 | 3.58 | 5.58 | 2.97 | 2.80 | 3.91 | 4.50 | 5.40 | 4.29 | 5.93 |
| | Apr | 2.79 | 3.75 | 5.75 | 3.09 | 2.84 | 3.79 | 4.34 | 5.33 | 4.18 | 5.86 |
| | May | 3.00 | 3.98 | 5.98 | 3.22 | 2.90 | 3.72 | 4.14 | 5.15 | 4.20 | 5.72 |
| | Jun | 3.04 | 4.01 | 6.01 | 3.38 | 3.04 | 3.69 | 4.00 | 4.96 | 4.08 | 5.58 |
| | Jul | 3.26 | 4.25 | 6.25 | 3.57 | 3.29 | 3.91 | 4.18 | 5.06 | 4.18 | 5.70 |
| | Aug | 3.50 | 4.44 | 6.44 | 3.77 | 3.52 | 4.08 | 4.26 | 5.09 | 4.33 | 5.82 |
| | Sep | 3.62 | 4.59 | 6.59 | 3.87 | 3.49 | 3.96 | 4.20 | 5.13 | 4.34 | 5.77 |
| | Oct | 3.78 | 4.75 | 6.75 | 4.13 | 3.79 | 4.29 | 4.46 | 5.35 | 4.49 | 6.07 |
| | Nov | 4.00 | 5.00 | 7.00 | 4.31 | 3.97 | 4.43 | 4.54 | 5.42 | 4.42 | 6.33 |
| | Dec | 4.16 | 5.15 | 7.15 | 4.45 | 3.97 | 4.39 | 4.47 | 5.37 | 4.46 | 6.27 |
| 2006 | Jan | 4.29 | 5.26 | 7.26 | 4.56 | 4.34 | 4.35 | 4.42 | 5.30 | 4.27 | 6.15 |

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

| | | M1 | MZM | M2 | M3 |
|---|-----|--------|-------|-------|-------|
| Percent change at an annual rate | | | | | |
| 2001 | | 3.33 | 15.88 | 8.77 | 11.47 |
| 2002 | | 4.92 | 12.87 | 7.58 | 8.04 |
| 2003 | | 6.49 | 7.41 | 6.93 | 6.38 |
| 2004 | | 5.57 | 3.93 | 4.54 | 5.10 |
| 2005 | | 1.77 | 2.14 | 4.23 | 6.12 |
| <hr/> | | | | | |
| 2003 | 1 | 8.38 | 7.85 | 6.90 | 6.69 |
| | 2 | 10.59 | 5.42 | 7.48 | 5.15 |
| | 3 | 7.63 | 10.46 | 7.69 | 7.59 |
| | 4 | 2.29 | -2.08 | -0.45 | -0.46 |
| 2004 | 1 | 6.21 | 2.44 | 3.57 | 5.35 |
| | 2 | 5.88 | 8.59 | 7.75 | 9.14 |
| | 3 | 3.34 | 2.01 | 3.43 | 4.23 |
| | 4 | 5.71 | 2.78 | 5.77 | 4.03 |
| 2005 | 1 | 0.46 | 0.44 | 3.98 | 5.51 |
| | 2 | -0.58 | -0.48 | 1.68 | 5.88 |
| | 3 | -1.89 | 3.42 | 3.86 | 8.27 |
| | 4 | 2.34 | 6.10 | 6.19 | 9.68 |
| <hr/> | | | | | |
| 2003 | Dec | 6.72 | -1.96 | 0.72 | 0.04 |
| <hr/> | | | | | |
| 2004 | Jan | -1.50 | 2.62 | 2.66 | 7.72 |
| | Feb | 16.89 | 6.26 | 7.93 | 8.61 |
| | Mar | 11.57 | 9.16 | 7.61 | 10.03 |
| | Apr | -0.20 | 8.85 | 7.23 | 8.25 |
| | May | 3.87 | 11.92 | 11.21 | 11.66 |
| | Jun | 5.76 | 1.83 | 2.08 | 4.89 |
| | Jul | -6.79 | -2.46 | 0.30 | 0.30 |
| | Aug | 15.81 | 2.50 | 3.98 | 4.57 |
| | Sep | 3.58 | 4.94 | 6.60 | 6.49 |
| | Oct | 0.95 | 0.08 | 5.31 | 1.43 |
| | Nov | 13.79 | 4.48 | 7.02 | 4.02 |
| | Dec | -2.01 | 3.44 | 4.52 | 6.27 |
| <hr/> | | | | | |
| 2005 | Jan | -8.07 | -0.89 | 3.45 | 6.65 |
| | Feb | 6.48 | -2.58 | 2.83 | 4.56 |
| | Mar | 5.81 | 0.49 | 3.70 | 3.75 |
| | Apr | -15.40 | -0.62 | -0.59 | 6.49 |
| | May | 11.17 | -3.47 | 0.27 | 5.26 |
| | Jun | 0.95 | 6.07 | 6.10 | 10.61 |
| | Jul | -17.44 | 0.91 | 1.76 | 3.52 |
| | Aug | 14.75 | 5.40 | 5.38 | 12.52 |
| | Sep | -6.67 | 8.54 | 6.14 | 11.84 |
| | Oct | 3.74 | 6.64 | 7.16 | 9.86 |
| | Nov | 4.44 | 1.81 | 4.65 | 4.86 |
| | Dec | -0.33 | 8.66 | 6.97 | 10.99 |

Definitions

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

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

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

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

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

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

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

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

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

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

Notes

Page 3: Readers are cautioned that, since early 1994, the level and growth of M1 have been depressed by retail sweep programs that reclassify transactions deposits (demand deposits and other checkable deposits) as savings deposits overnight, thereby reducing banks' required reserves; see Anderson and Rasche (2001) and research.stlouisfed.org/aggreg/swdata.html. **Primary Credit Rate, Discount Rate, and Intended Federal Funds Rate** shown in the chart **Reserve Market Rates** are plotted as of the date of the change, while the **Effective Federal Funds Rate** is plotted as of the end of the month. Interest rates in the table are monthly averages from the Board of Governors H.15 Statistical Release. The **Treasury Yield Curve** and **Real Treasury Yield Curve** show constant maturity yields calculated by the U.S. Treasury for securities 5, 7, 10, and 20 years to maturity. **Inflation-Indexed Treasury Yield Spreads** are a

measure of inflation compensation at those horizons, and it is simply the nominal constant maturity yield less the real constant maturity yield. Daily data and descriptions are available at research.stlouisfed.org/fred2/. See also *Statistical Supplement to the Federal Reserve Bulletin*, table 1.35. The 30-year constant maturity series was discontinued by the Treasury as of February 18, 2002.

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

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

Page 8: **Inflation Expectations** measures include the quarterly Federal Reserve Bank of Philadelphia *Survey of Professional Forecasters*, the monthly University of Michigan Survey Research Center's *Surveys of Consumers*, and the annual Federal Open Market Committee (FOMC) range as reported to the Congress in the February testimony that accompanies the Monetary Policy Report to the Congress. Beginning February 2000, the FOMC began using the personal consumption expenditures (PCE) price index to report its inflation range; the FOMC then switched to the PCE chain-type price index excluding food and energy prices ("core") beginning July 2004. Accordingly, neither are shown on this graph. **CPI Inflation** is the percentage change from a year ago in the consumer price index for all urban consumers. **Real Interest Rates** are ex post measures, equal to nominal rates minus CPI inflation.

Page 9: **FOMC Intended Federal Funds Rate** is the level (or midpoint of the range, if applicable) of the federal funds rate that the staff of the FOMC expected to be consistent with the desired degree of pressure on bank reserve positions. In recent years, the FOMC has set an explicit target for the federal funds rate.

Page 10: **Federal Funds Rate and Inflation Targets** shows the observed federal funds rate, quarterly, and the level of the funds rate implied by applying Taylor's (1993) equation

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

to five alternative target inflation rates, $\pi^* = 0, 1, 2, 3, 4$ percent, where f_t^* is the implied federal funds rate, π_{t-1} is the previous period's inflation rate (PCE) measured on a year-over-year basis, y_{t-1} is the log of the previous period's level of real gross domestic product (GDP), and y_{t-1}^P is the log of an estimate of the previous period's level of potential output. **Potential Real GDP** is as estimated by the Congressional Budget Office.

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

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

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

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

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

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

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

where duration is approximated as $D(m) = (1 - e^{-R(m) \times m})/R(m)$. These rates are linear approximations to the true instantaneous forward rates; see Shiller (1990). For a discussion of the use of forward rates as indicators of inflation expectations, see Sharpe (1997). **Rates on 3-Month Eurodollar Futures and Rates on Selected Federal Funds Futures Contracts** trace through time the yield on three specific contracts. **Rates on Federal Funds Futures on Selected Dates** displays a single day's snapshot of yields for contracts expiring in the months shown on the horizontal axis. **Inflation-Indexed Treasury Securities and Yield Spreads** are those plotted on page 3. **Inflation-Indexed 10-Year Government Notes** shows the yield of an inflation-indexed note that is scheduled to mature in approximately (but not greater than) 10 years. The current French note has a maturity date of 7/25/2015, the current U.K. note has a maturity date of 8/16/2013, and the current U.S. note has a maturity date of 7/15/2015. **Inflation-Indexed Treasury Yield Spreads** and **Inflation-Indexed 10-Year Government Yield Spreads** equal the difference between the yields on the most recently issued inflation-indexed securities and the unadjusted security yields of similar maturity.

Page 12: **Velocity** (for MZM and M2) equals the ratio of GDP, measured in current dollars, to the level of the monetary aggregate. **MZM** and **M2 Own Rates** are weighted averages of the rates received by households and firms on the assets included in the aggregates. Prior to 1982, the 3-month T-bill rates are secondary market yields. From 1982 forward, rates are 3-month constant maturity yields.

Page 13: **Real Gross Domestic Product** is GDP as measured in chained 2000 dollars. The **Gross Domestic Product Price Index** is the implicit price deflator for GDP, which is defined by the Bureau of Economic Analysis, U.S. Department of Commerce, as the ratio of GDP measured in current dollars to GDP measured in chained 2000 dollars.

Page 14: **Investment Securities** are all securities held by commercial banks in both investment and trading accounts.

Page 15: **Inflation Rate Differentials** are the differences between the foreign consumer price inflation rates and year-over-year changes in the U.S. all-items Consumer Price Index.

Page 17: **Treasury Yields** are Treasury constant maturities as reported in the Board of Governors of the Federal Reserve System's H.15 release.

Sources

Agence France Trésor: French note yields.

Bank of Canada: Canadian note yields.

Bank of England: U.K. note yields.

Board of Governors of the Federal Reserve System:

Monetary aggregates and components: H.6 release. Bank credit and components: H.8 release. Consumer credit: G.19 release. Required reserves, excess reserves, clearing balance contracts, and discount window borrowing: H.4.1 and H.3 releases. Interest rates: H.15 release. Nonfinancial commercial paper: Board of Governors website. Nonfinancial debt: Z.1 release. M2 own rate.

Bureau of Economic Analysis: GDP.

Bureau of Labor Statistics: CPI.

Chicago Board of Trade: Federal funds futures contract.

Chicago Mercantile Exchange: Eurodollar futures.

Congressional Budget Office: Potential real GDP.

Federal Reserve Bank of Philadelphia: Survey of Professional Forecasters inflation expectations.

Federal Reserve Bank of St. Louis: Adjusted monetary base and adjusted reserves, monetary services index, MZM own rate, one-year forward rates.

Organization for Economic Cooperation and Development: International interest and inflation rates.

Standard & Poor's: Stock price-earnings ratio, stock price composite index.

University of Michigan Survey Research Center: Median expected price change.

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