October 1999

MonetaryTrends

THE FEDERAL RESERVE BANK of ST. LOUIS

# Convergence in the Euro-zone?

During the three months leading up to the Jan. 1, 1999, debut of the euro, market yield spreads between participating countries' government bonds and the German benchmark government bond narrowed to 0.25 percentage points or less. The top chart shows vanishing yield spreads for the bonds of Italy, the Netherlands and France relative to Germany, a phenomenon that was widely anticipated. By meeting the Maastricht criteria for economic and fiscal convergence, the 11 participating countries had provided a basis for financial-market convergence, as well. If investors continued to believe that the pre-existing currencies would remain locked together forever in the form of the euro, then all exchange-rate risk premiums should vanish from bond yields. In recent months, however, yield spreads have increased. Why?

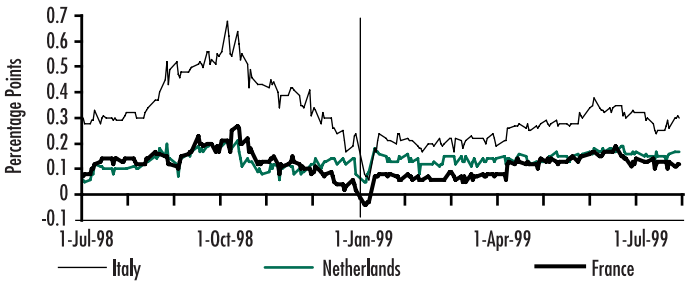
Positive yield spreads between a euro-zone member country's sovereign debt and German bonds could be due to any of several factors, including: (1) differences in market liquidity, (2) the risk of loss due to government default on bond payments, or (3) the risk that a country might leave the euro and devalue its new currency against the currency of Germany. Bond-market turbulence in the fall of 1998 and ensuing flight to highly liquid securities, such as German government bonds, clearly showed that differences in market liquidity contribute to yield spreads. The relative stability in the ranking of euro-zone members' yield spreads over time suggests that country-specific default risk is probably another component of the spread. Finally, devaluation risk is a plausible contributor to euro-zone yield spreads. For example, market speculation about Italy's long-run suitability for monetary union has caused periodic spikes in the Italian yield spread that have no counterpart in, say, French yield spreads.

How important is membership in European monetary union for maintaining low bond yields? The bottom chart shows that during 1999, the bond yield spreads (relative to German government bonds) of two European Union countries that are not currently participating in the monetary union—the United Kingdom and Sweden—have increased relative to the yield spread of Finland, a monetary-union participant. This suggests that countries firmly entrenched in the monetary union benefit from the market's view of the euro as a hard currency.

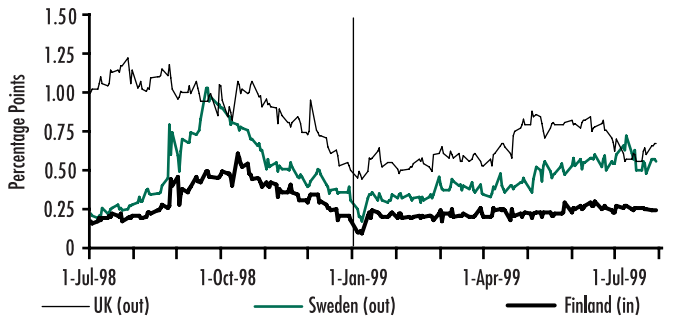
Persistent positive yield spreads against the German bond across the euro-zone indicate, however, that, despite initial "europhoria" at the outset of European monetary union, true bond-market convergence has failed to occur. Indeed, after six months, yield spreads on non-German euro-zone benchmark bonds were slightly higher than they were six months before monetary union took place.

—William R. Emmons

**Government Bond Yield Spreads vs. Germany**




**"In and Out" Yield Spreads vs. Germany**




Source: Financial Times, various issues

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## *Conventions used in this publication:*

1. Unless otherwise indicated, data are monthly.

2. Shaded areas indicate recessions, as dated by the National Bureau of Economic Research.

3. The *percent change at an annual rate* is the simple, not compounded, monthly percent change multiplied by 12. For example, using consecutive months, the percent change at an annual rate in x between month *t-1* and the current month *t* is: $[(x_t / x_{t-1}) - 1] \times 1200$. Note that this differs from *National Economic Trends*. In that publication monthly percent changes are compounded and expressed as annual growth rates.

4. The *percent change from year ago* refers to the percent change from the same period in the previous year. For example, the percent change from year ago in x between month *t-12* and the current month *t* is: $[(x_t / x_{t-12}) - 1] \times 100$.

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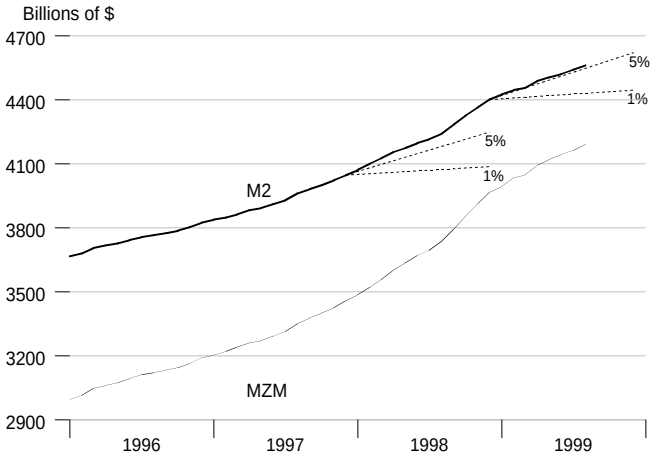
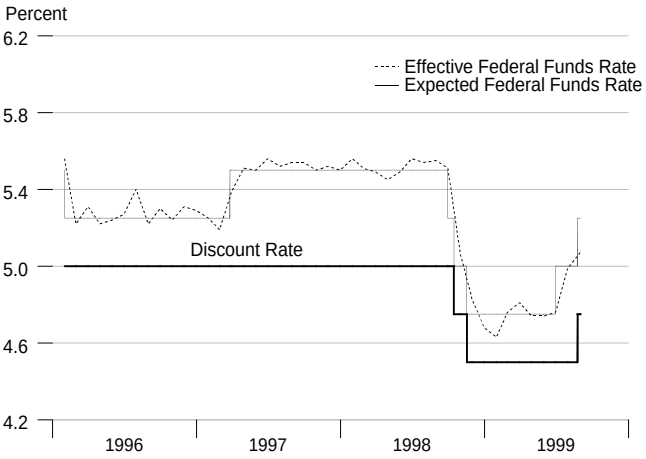
## M2 and MZM

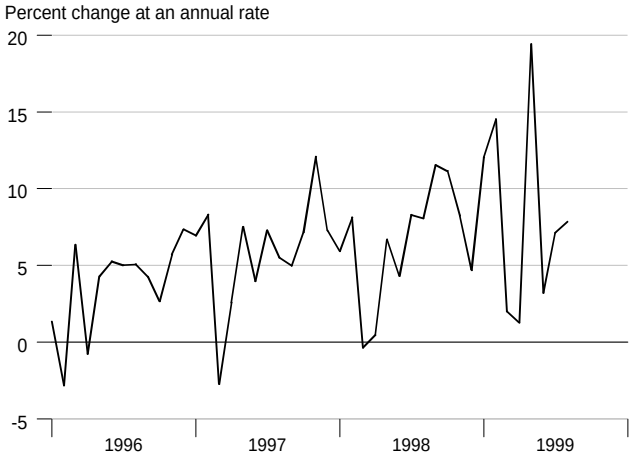



Dotted lines indicate the FOMC target ranges.

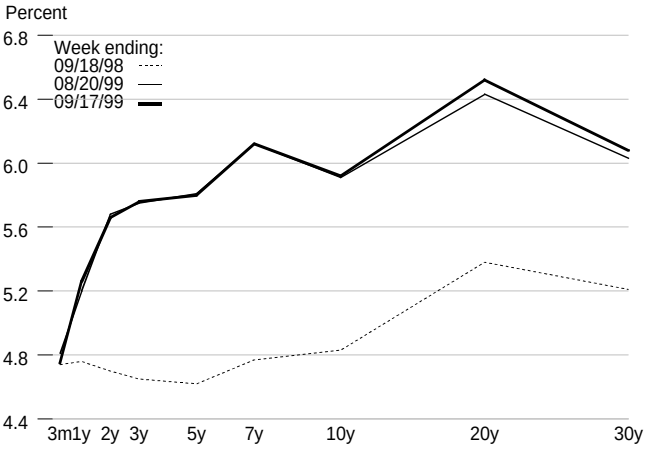
## Reserve Market Rates



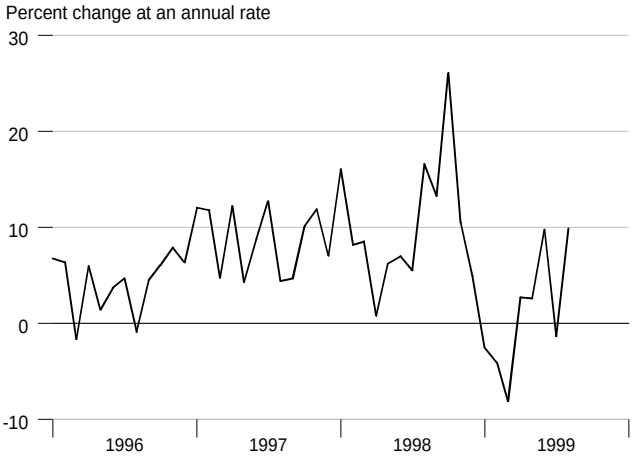

## Adjusted Monetary Base




## Treasury Yield Curve




## Total Bank Credit

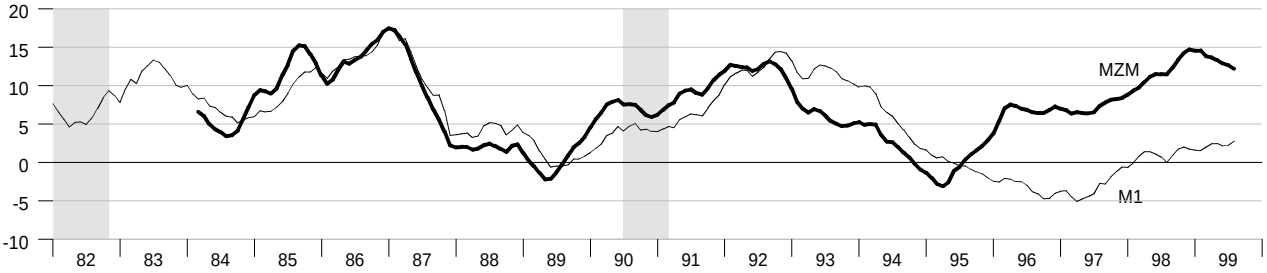



## Interest Rates

| | Jun 99 | Jul 99 | Aug 99 |
|---|---|---|---|
| Federal Funds Rate | 4.76 | 4.99 | 5.07 |
| Discount Rate | 4.50 | 4.50 | 4.56 |
| Prime Rate | 7.75 | 8.00 | 8.06 |
| Conventional Mortgage Rate | 7.55 | 7.63 | 7.94 |
| **Treasury Yields:** | | | |
| 3-month constant maturity | 4.72 | 4.69 | 4.87 |
| 6-month constant maturity | 5.03 | 4.75 | 5.09 |
| 1-year constant maturity | 5.10 | 5.03 | 5.20 |
| 3-year constant maturity | 5.70 | 5.62 | 5.77 |
| 5-year constant maturity | 5.81 | 5.68 | 5.84 |
| 10-year constant maturity | 5.90 | 5.79 | 5.94 |
| 30-year constant maturity | 6.04 | 5.98 | 6.07 |

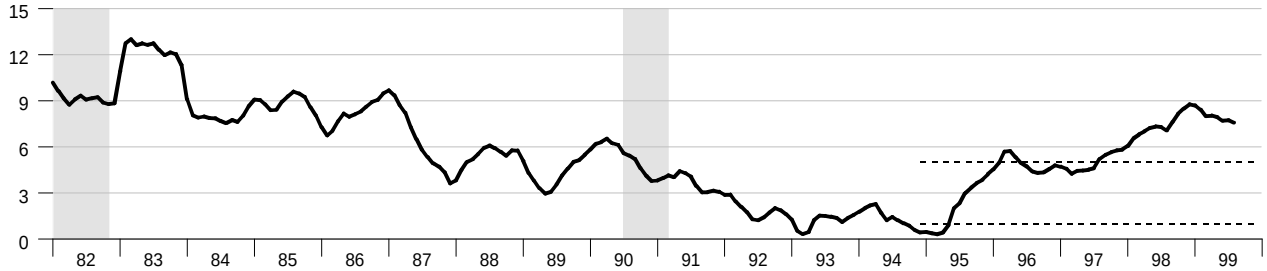
## MZM and M1

Percent change from year ago




## M2

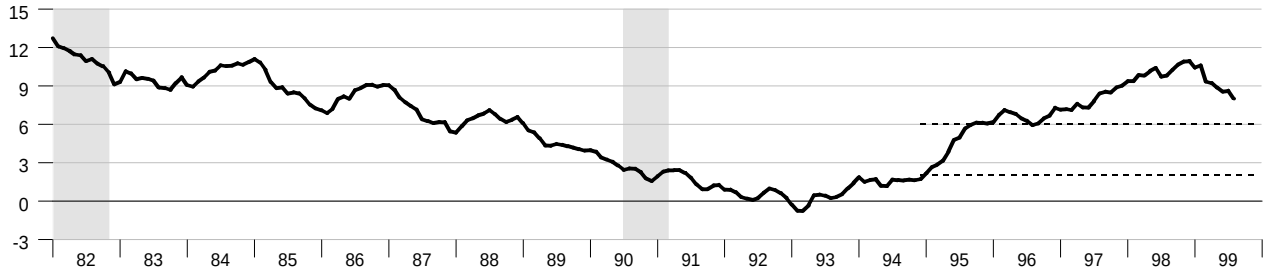
Percent change from year ago




Dotted lines indicate the FOMC target ranges.

## M3

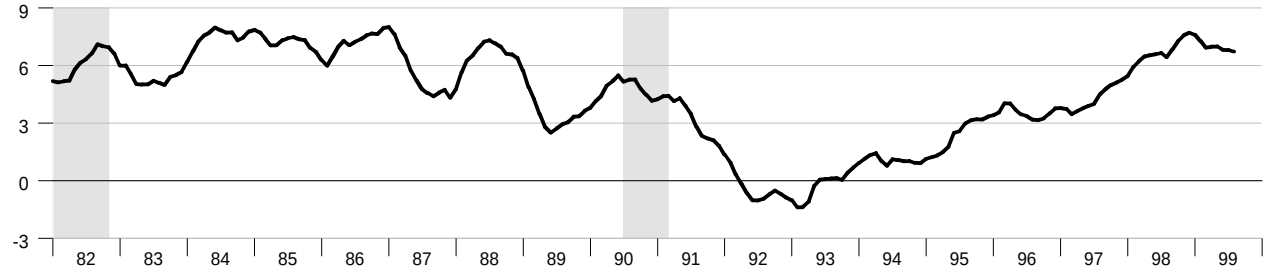
Percent change from year ago



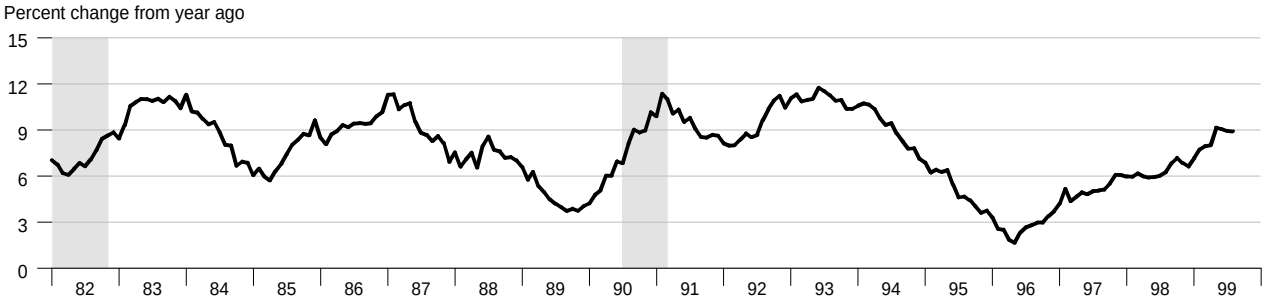

Dotted lines indicate the FOMC target ranges.

## Monetary Services Index - M2

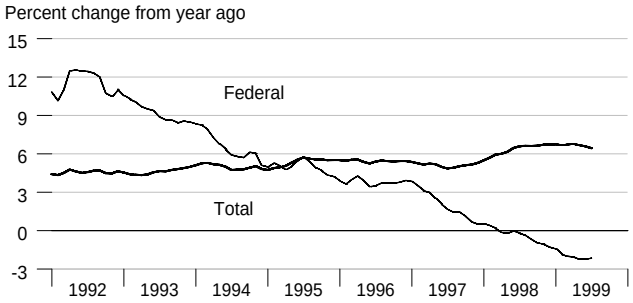
Percent change from year ago



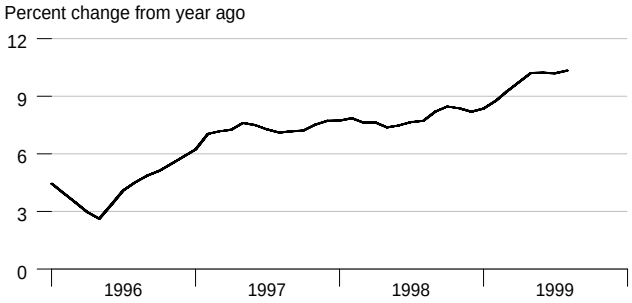
## Adjusted Monetary Base



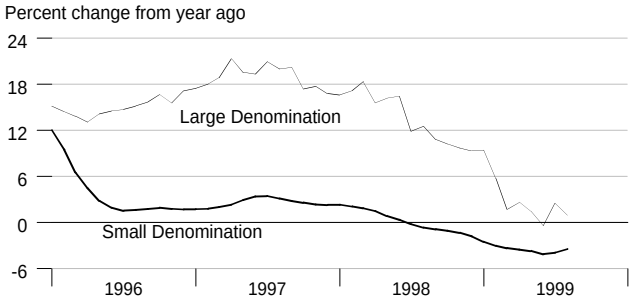

## Domestic Nonfinancial Debt



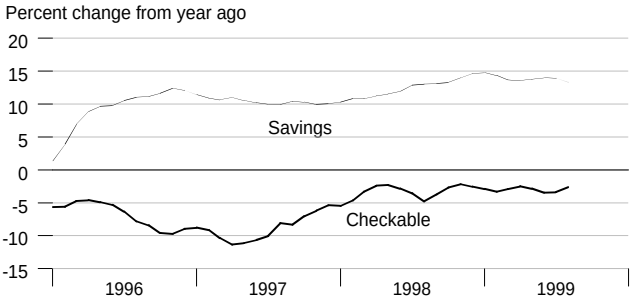

## Currency Held by the Nonbank Public



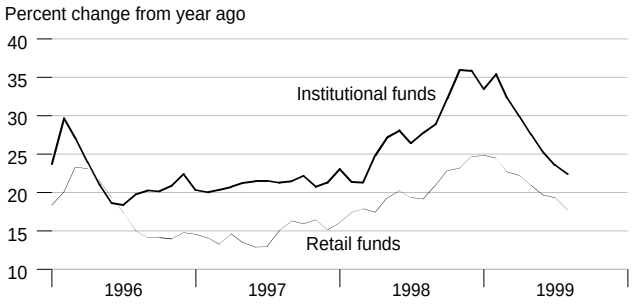

## Time Deposits



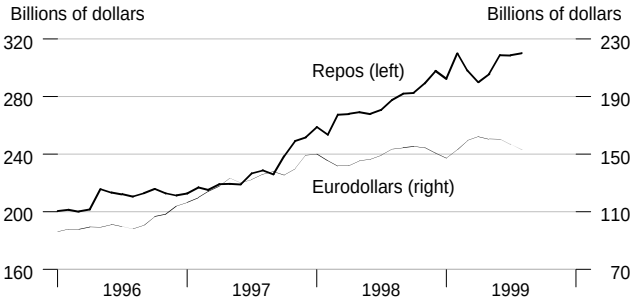

## Checkable and Savings Deposits




## Money Market Mutual Fund Shares

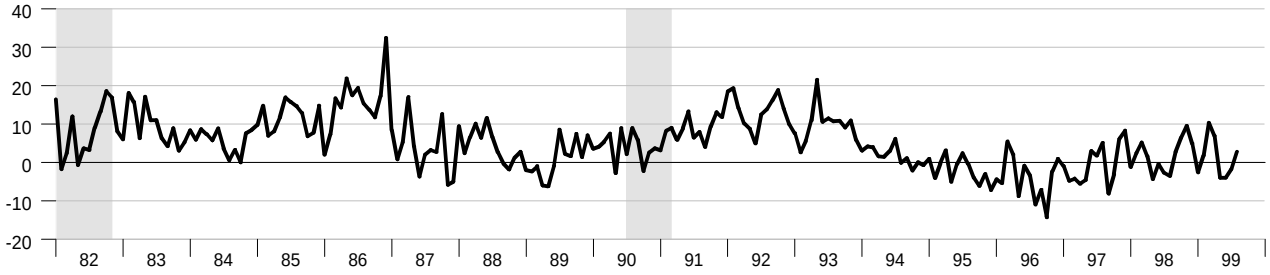



## Repurchase Agreements and Eurodollars



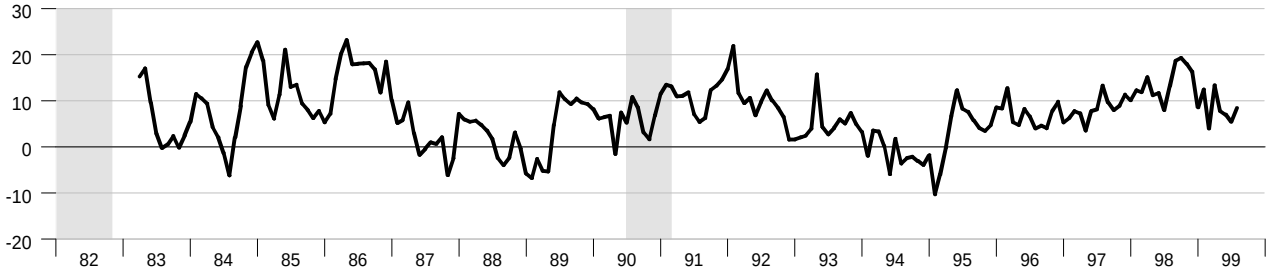
## M1

Percent change at an annual rate



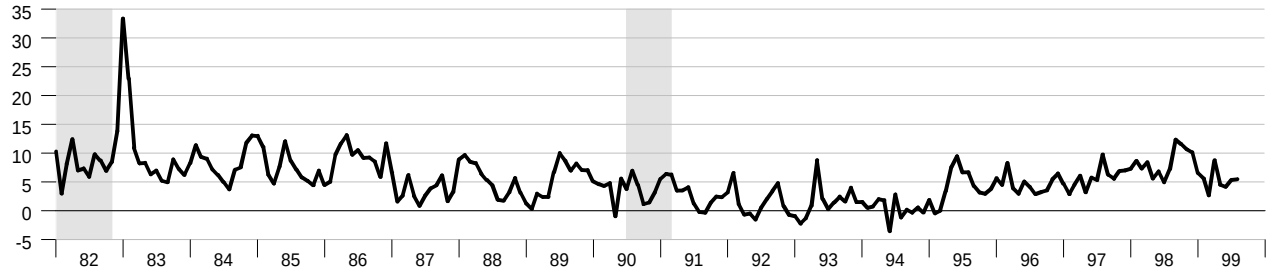

## MZM

Percent change at an annual rate



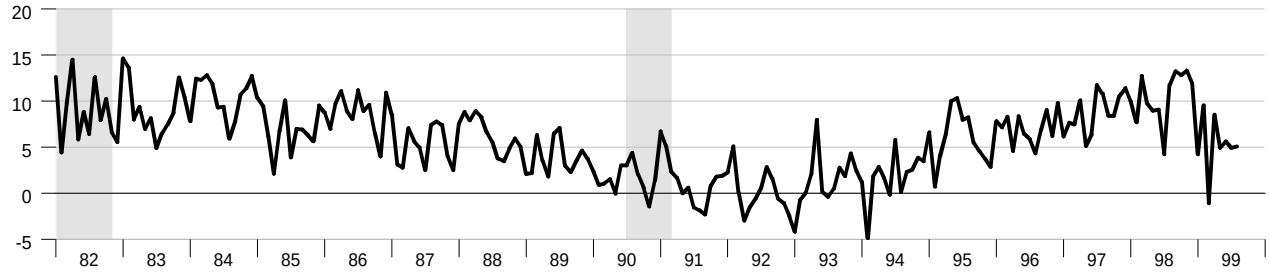

## M2

Percent change at an annual rate

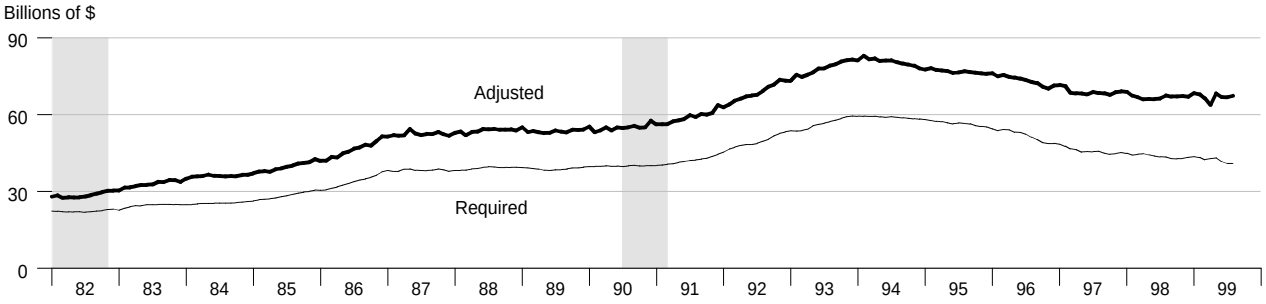



## M3

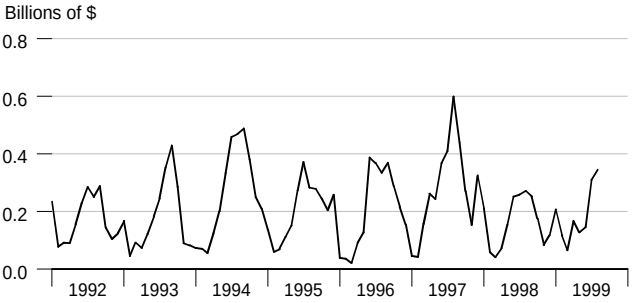
Percent change at an annual rate



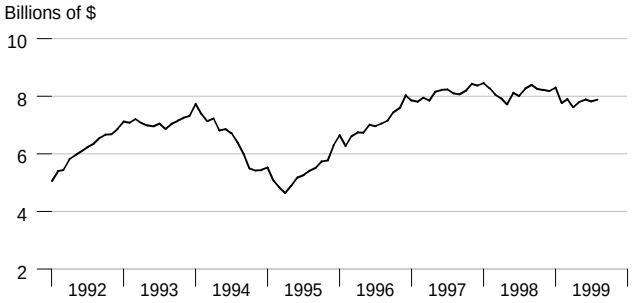
## Adjusted and Required Reserves



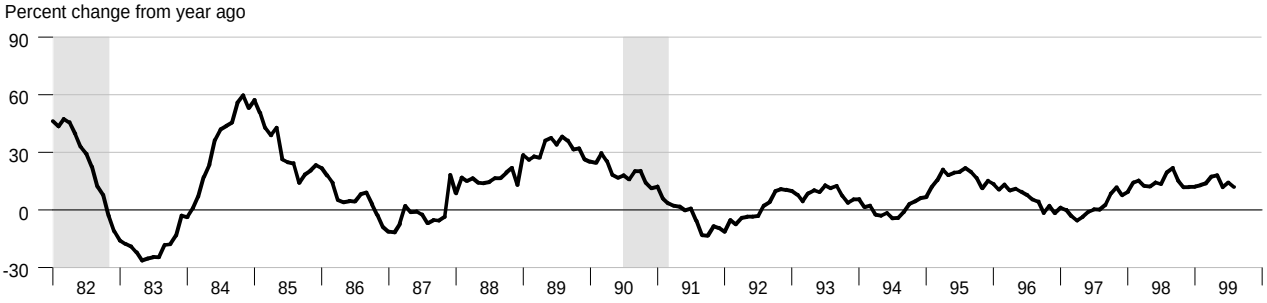

## Total Borrowings, nsa



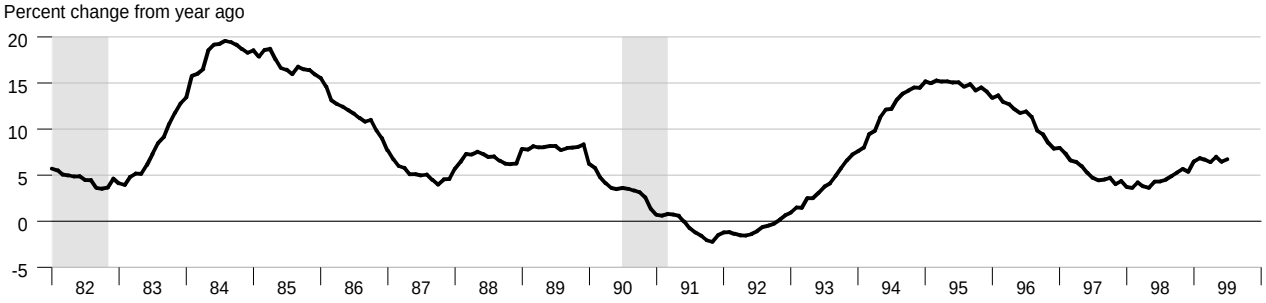

## Excess Reserves plus RCB Contracts



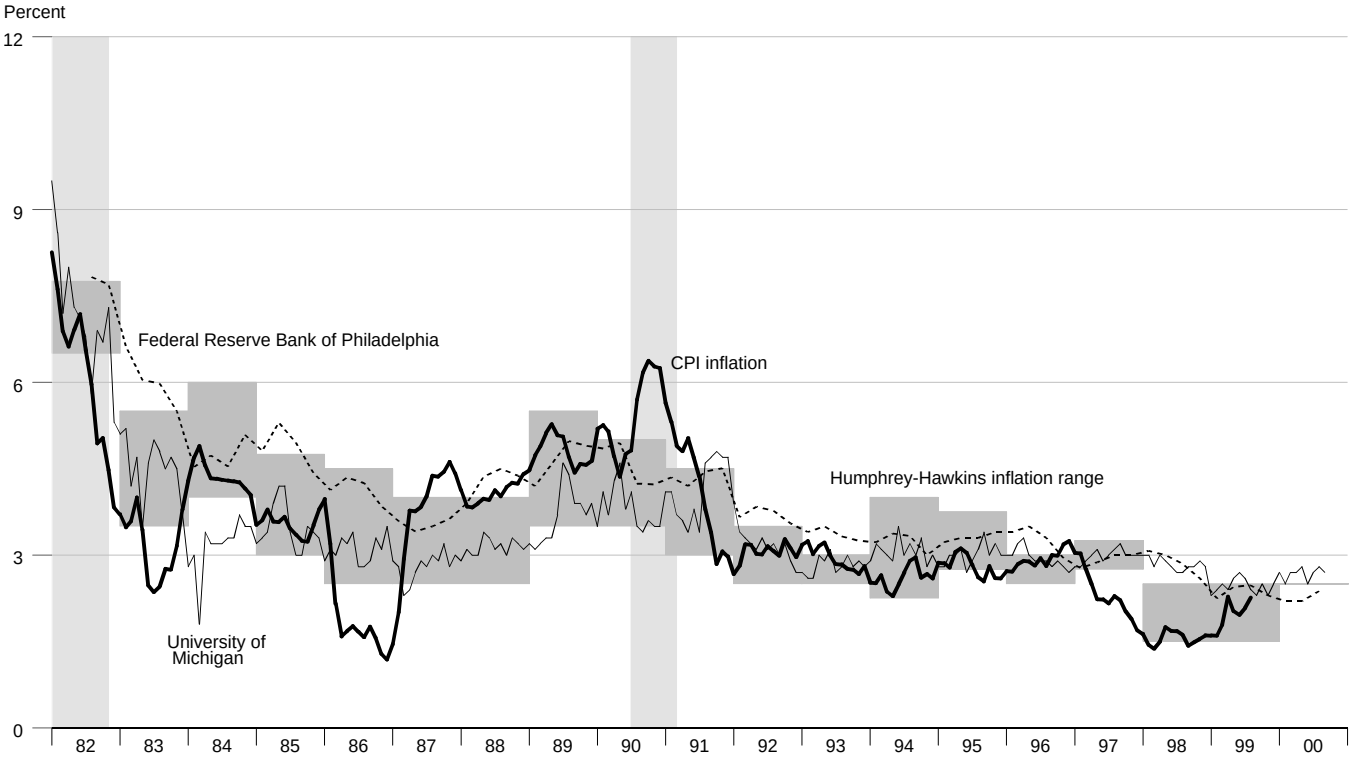

## Nonfinancial Commercial Paper




## Consumer Credit

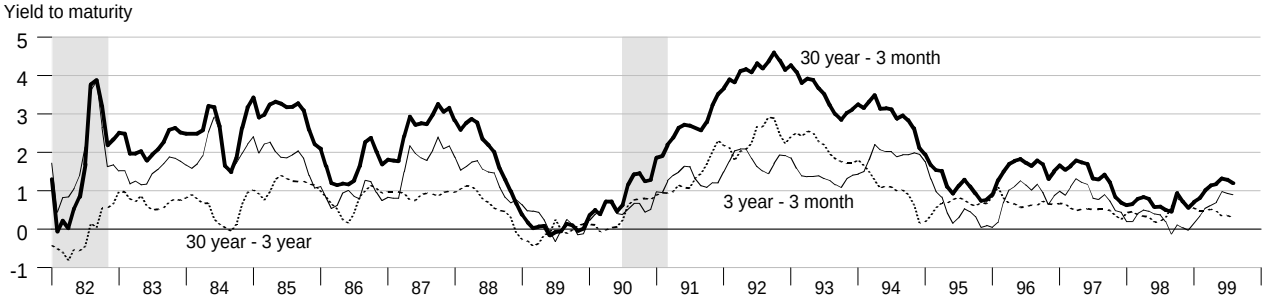


## Inflation and Inflation Expectations

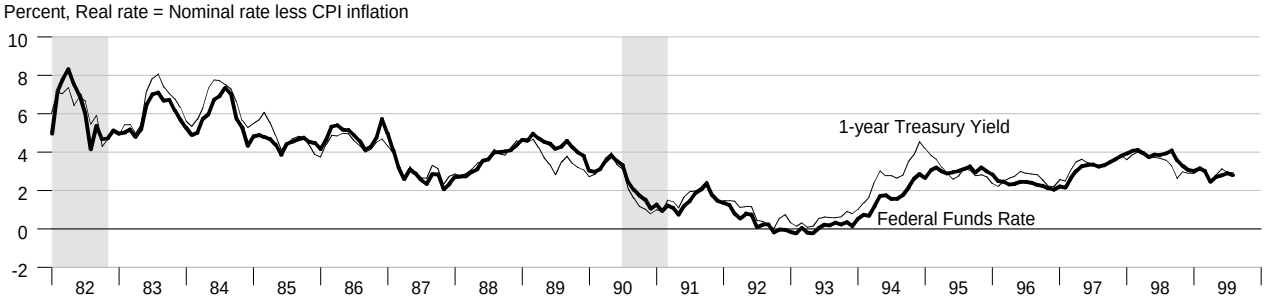



The shaded region shows the Humphrey-Hawkins CPI inflation range. See page 19 for information.

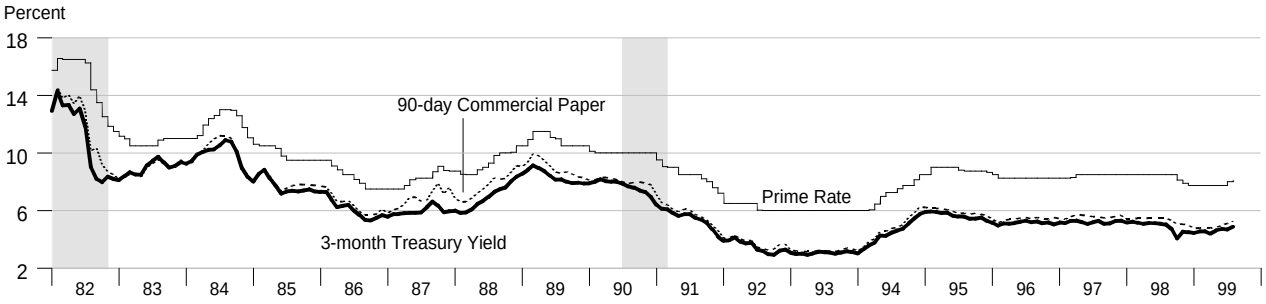
## Treasury Security Yield Spreads



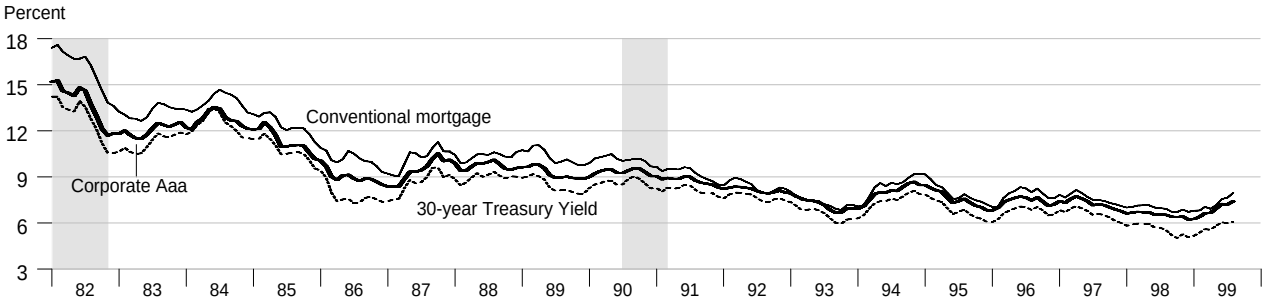

## Real Interest Rates



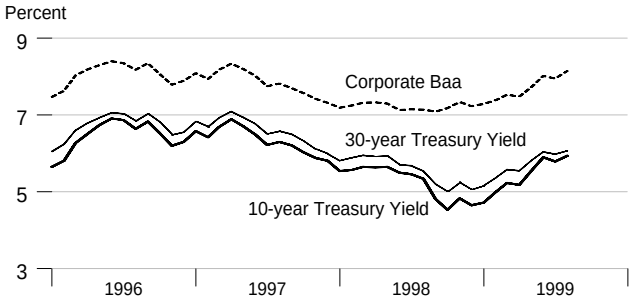
## Short Term Interest Rates



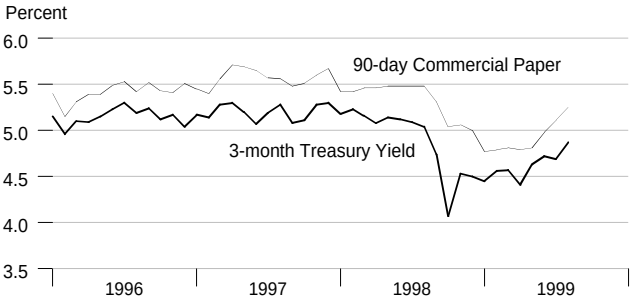

## Long Term Interest Rates



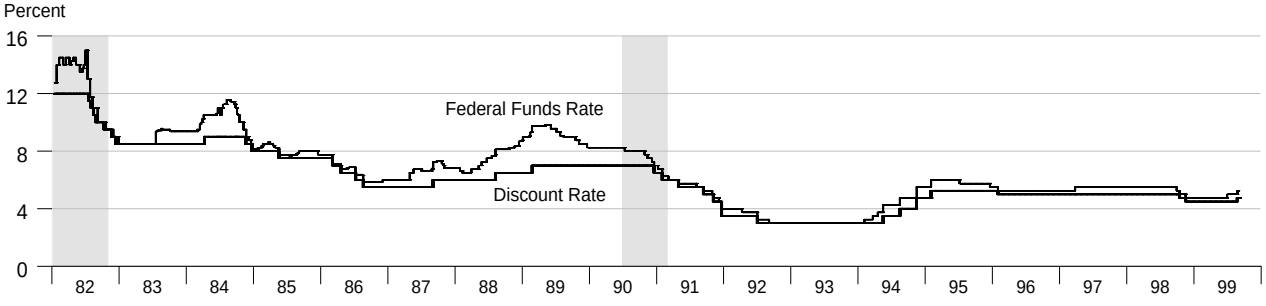

## Long Term Interest Rates



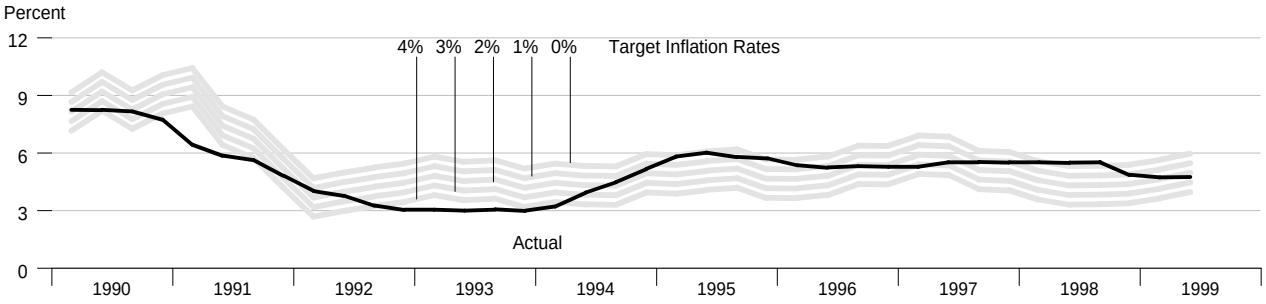

## Short Term Interest Rates




## FOMC Expected Federal Funds Rate and Discount Rate

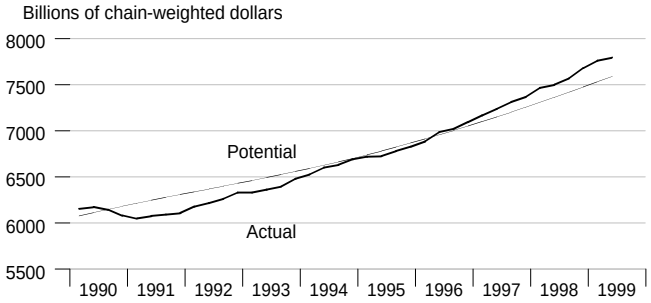


## Federal Funds Rate and Inflation Targets

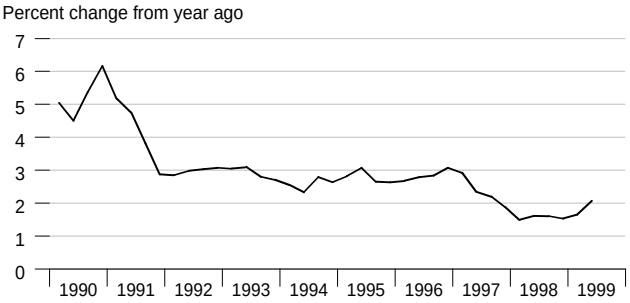



Calculated federal funds rate is based on Taylor's rule. See notes on page 19.

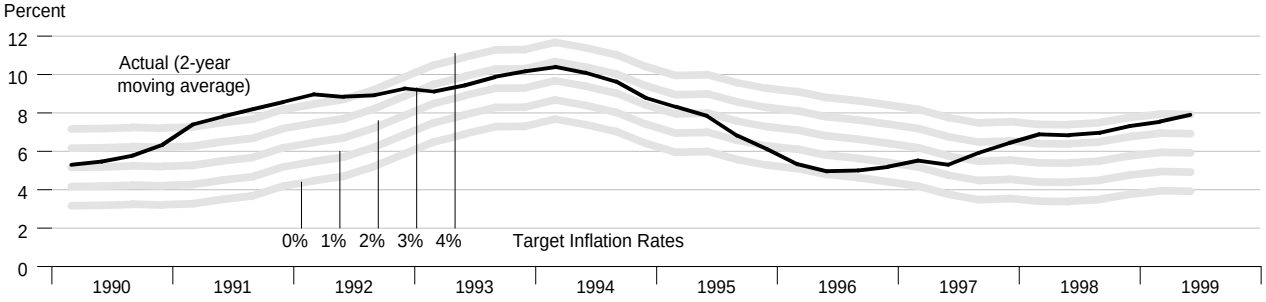
## Actual and Potential Real GDP




## Actual CPI Inflation

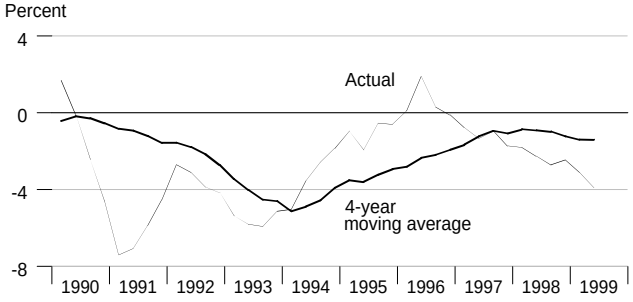



## Monetary Base Growth* and Inflation Targets

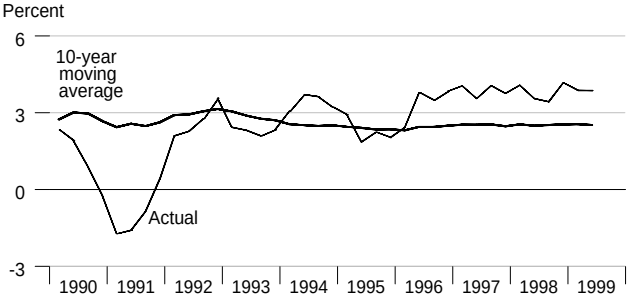



*Modified for the effects of sweeps programs on reserve demand.
Calculated base growth is based on McCallum's rule. See notes on page 19.

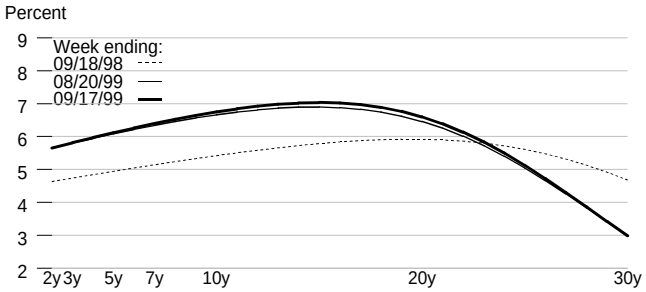
## Monetary Base Velocity Growth



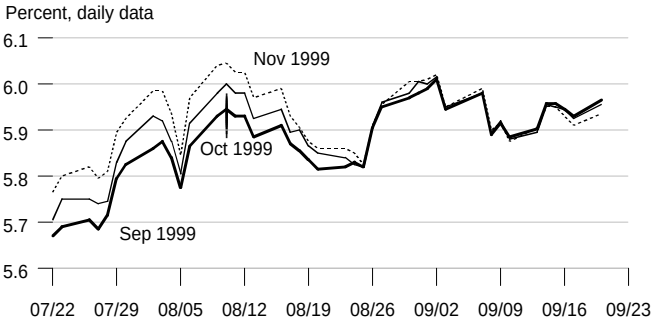

## Real Output Growth



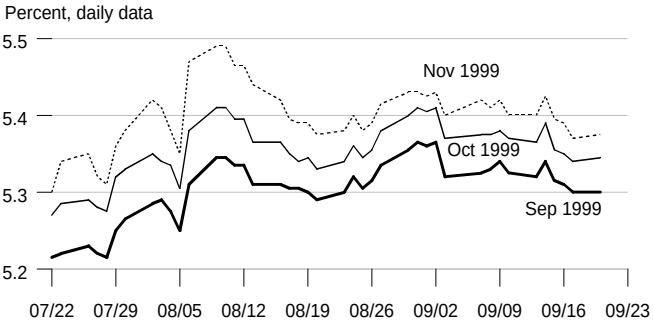
## Implied One-Year Forward Rates



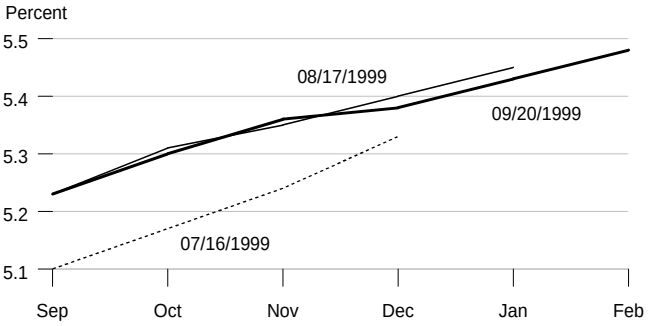

## Rates on 3-Month Eurodollar Futures




## Rates on Selected Fed Funds Futures Contracts



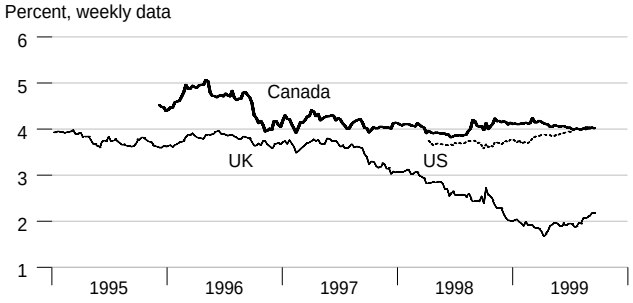

## Implied Yields on Fed Funds Futures



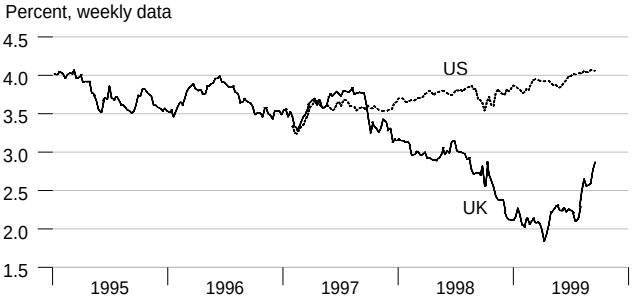

## Inflation-Protected Treasury Yields


## Inflation-Protected Treasury Yield Spreads

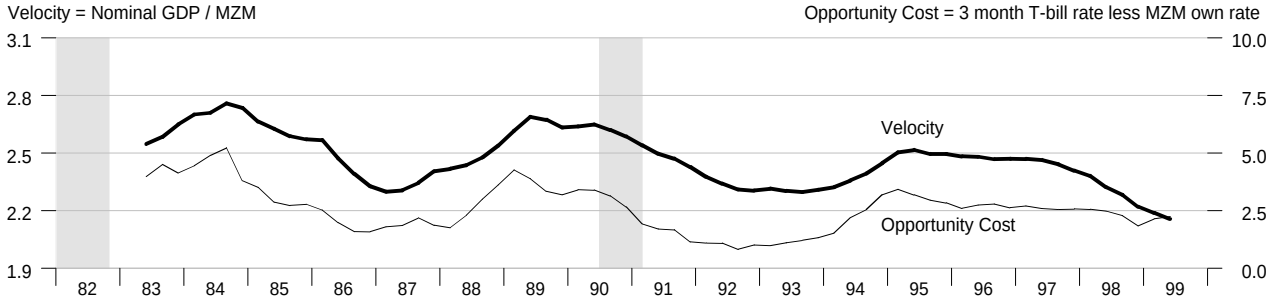

## Inflation-Indexed 30-Year Bonds



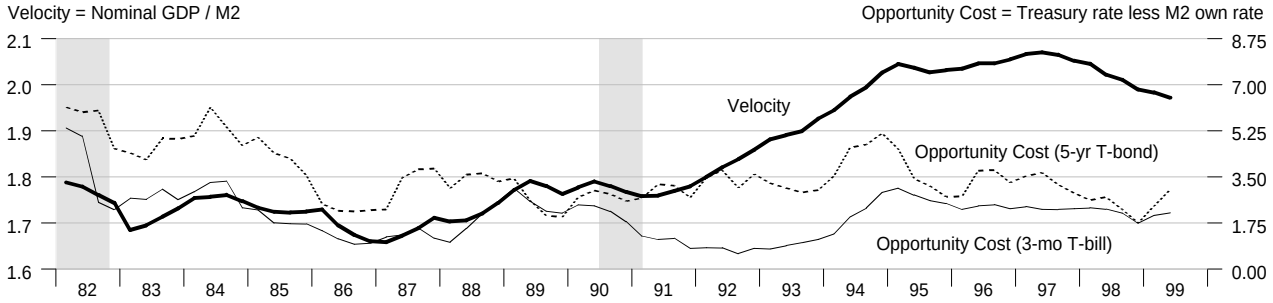

## Inflation-Indexed 10-Year Bonds



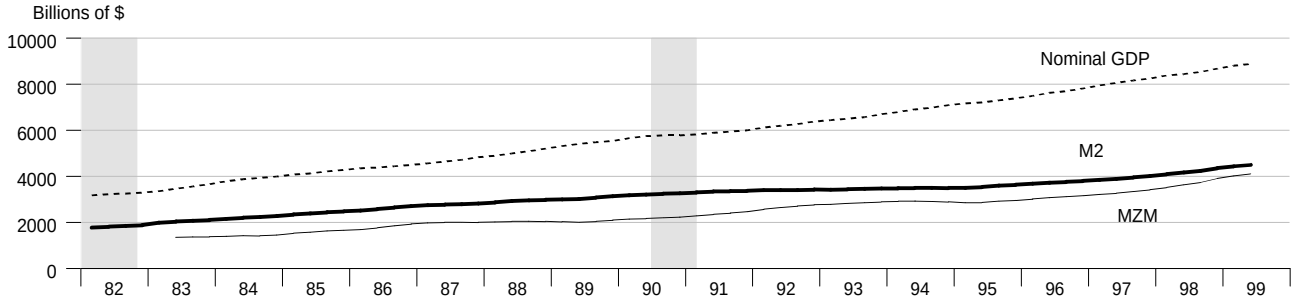
## MZM Velocity and Opportunity Cost



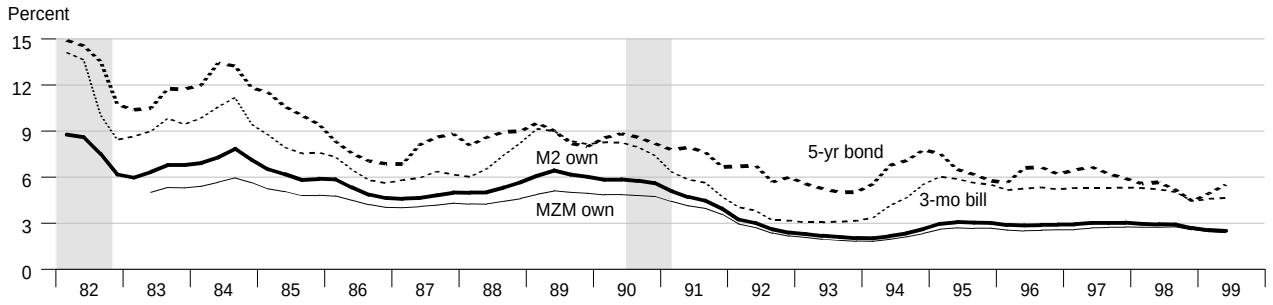

## M2 Velocity and Opportunity Cost




## M2, MZM and Nominal GDP

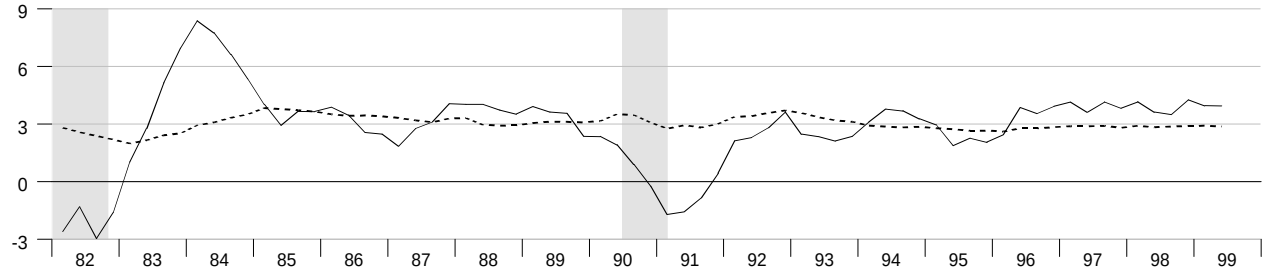



## Interest Rates



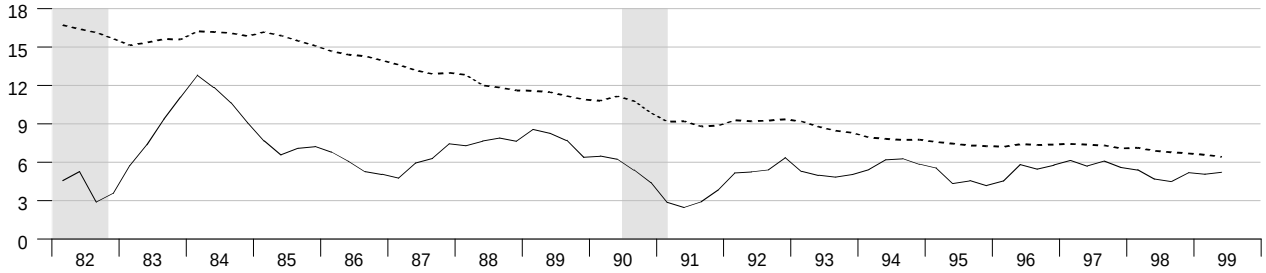
## Real Gross Domestic Product

Percent change from year ago



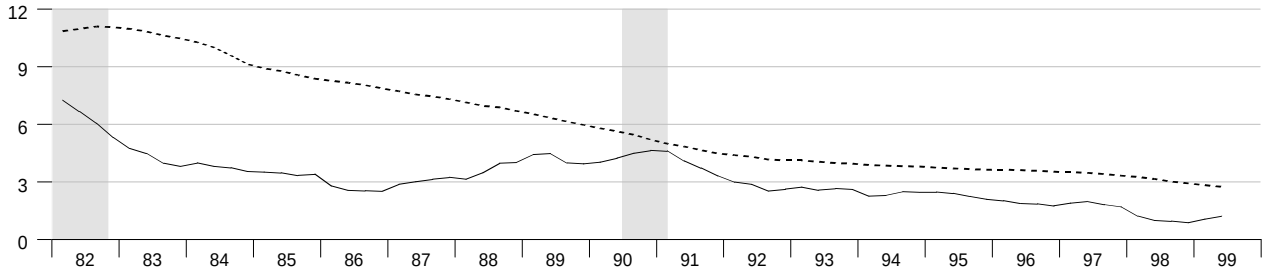

## Gross Domestic Product

Percent change from year ago



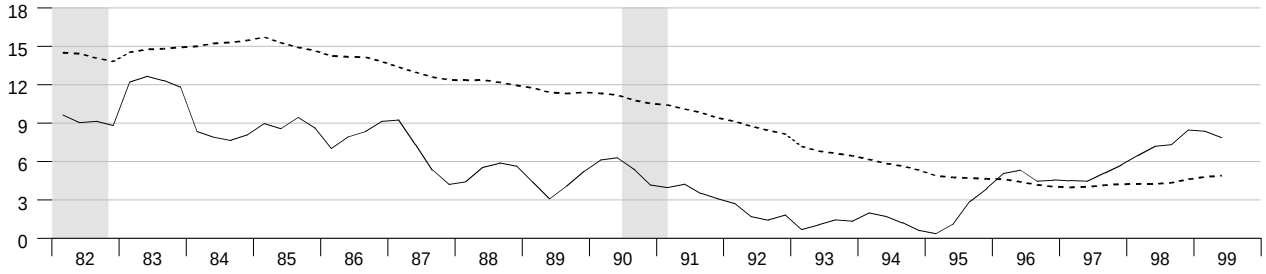

## Gross Domestic Product Price Index

Percent change from year ago




## M2

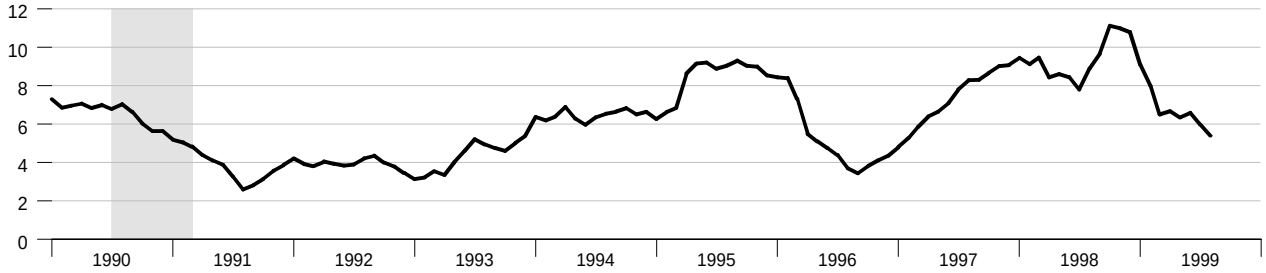
Percent change from year ago




Dashed lines indicate 10-year moving averages

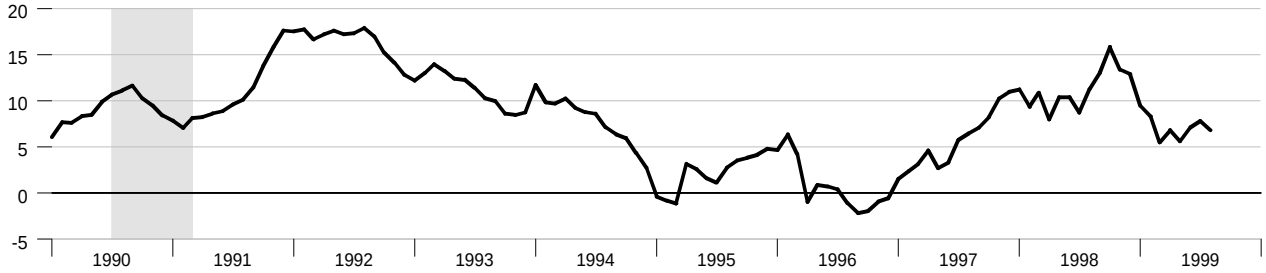
## Bank Credit

Percent change from year ago



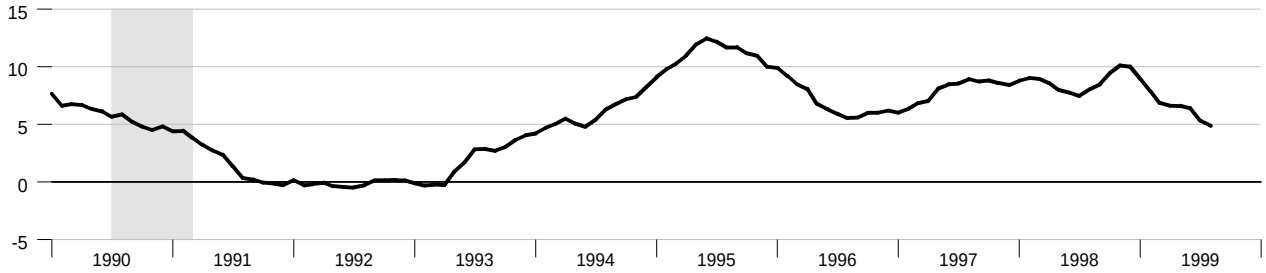

## Investment Securities in Bank Credit at Commercial Banks

Percent change from year ago



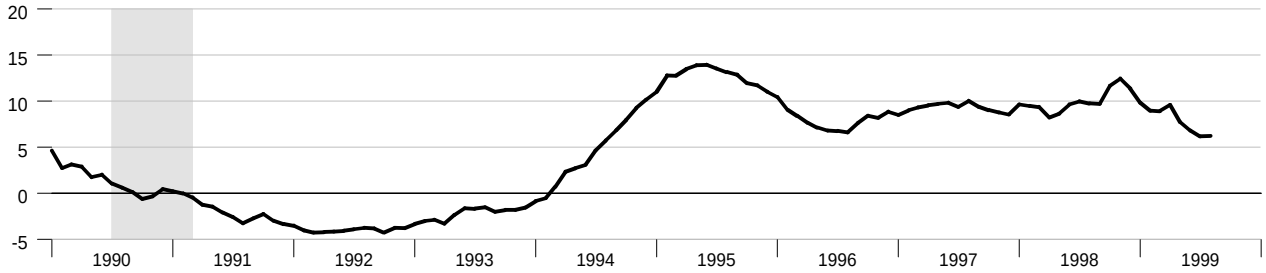

## Total Loans and Leases in Bank Credit at Commercial Banks

Percent change from year ago

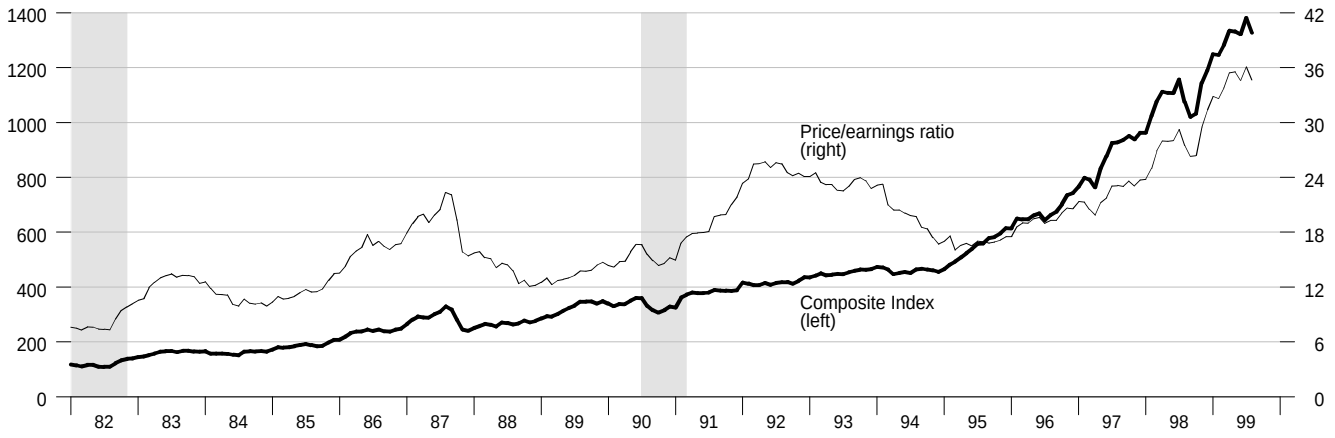



## Commercial and Industrial Loans at Commercial Banks

Percent change from year ago



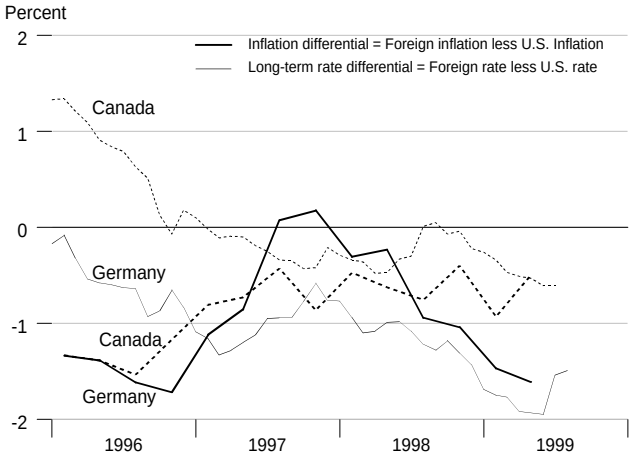
## Standard and Poor's 500

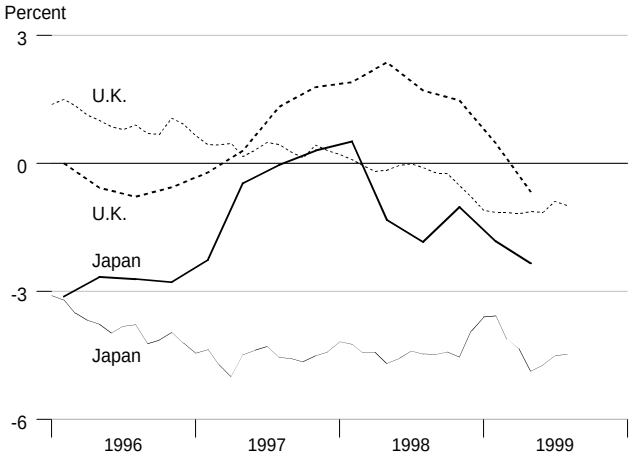



## Inflation and Long-Term Interest Rates

| | Trend in Consumer Price Inflation Rates<br>Percent change from year ago | | | | Recent Long-Term Government Bond Rates<br>Percent | | | |
|---|---|---|---|---|---|---|---|---|
| | 1998Q3 | 1998Q4 | 1999Q1 | 1999Q2 | May99 | Jun99 | Jul99 | Aug99 |
| United States | 1.62 | 1.48 | 1.73 | 2.09 | 6.04 | 6.31 | 6.22 | 6.37 |
| Canada | 0.86 | 1.08 | 0.80 | 1.59 | 5.51 | 5.70 | 5.61 | . |
| France | 0.73 | 0.37 | 0.26 | 0.36 | 4.45 | 4.94 | 5.02 | 5.17 |
| Germany | 0.67 | 0.44 | 0.26 | 0.48 | 4.01 | 4.36 | 4.68 | 4.88 |
| Italy | 2.04 | 1.74 | 1.39 | 1.44 | 4.31 | 4.65 | 4.95 | 5.16 |
| Japan | -0.22 | 0.46 | -0.10 | -0.25 | 1.17 | 1.59 | 1.71 | 1.90 |
| United Kingdom | 3.32 | 2.96 | 2.20 | 1.42 | 4.91 | 5.16 | 5.33 | 5.38 |

## Inflation and Long-Term Interest Rates Differentials



| | | Money Stock | | | | Bank | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | M1 | MZM | M2 | M3 | Credit | Monetary Base | Reserves | MSI M2 |
| | 1994 | 1145.340 | 2919.235 | 3500.100 | 4303.777 | 3229.047 | 421.574 | 80.684 | 205.514 |
| | 1995 | 1142.820 | 2905.387 | 3572.376 | 4499.721 | 3499.794 | 443.511 | 76.849 | 210.302 |
| | 1996 | 1106.126 | 3095.474 | 3745.602 | 4796.153 | 3682.682 | 455.586 | 73.415 | 217.734 |
| | 1997 | 1069.573 | 3317.480 | 3931.295 | 5176.320 | 3950.710 | 478.753 | 68.918 | 226.990 |
| | 1998 | 1079.456 | 3702.138 | 4221.138 | 5700.668 | 4322.356 | 508.978 | 66.952 | 242.089 |
| 1997 | 1 | 1076.381 | 3221.703 | 3849.846 | 5012.635 | 3829.205 | 470.027 | 70.409 | 222.780 |
| | 2 | 1065.603 | 3274.106 | 3895.394 | 5109.916 | 3909.821 | 473.896 | 68.177 | 225.080 |
| | 3 | 1068.155 | 3347.031 | 3956.934 | 5228.843 | 3990.069 | 480.945 | 68.565 | 228.280 |
| | 4 | 1068.155 | 3427.080 | 4023.005 | 5353.888 | 4073.746 | 490.144 | 68.519 | 231.820 |
| 1998 | 1 | 1076.826 | 3521.466 | 4099.036 | 5490.882 | 4186.770 | 498.387 | 67.711 | 235.857 |
| | 2 | 1079.349 | 3635.433 | 4175.386 | 5628.141 | 4241.754 | 502.060 | 66.084 | 239.787 |
| | 3 | 1074.077 | 3741.066 | 4246.608 | 5748.823 | 4340.702 | 511.592 | 66.951 | 243.463 |
| | 4 | 1087.571 | 3910.588 | 4363.523 | 5934.823 | 4520.196 | 523.871 | 67.063 | 249.250 |
| 1999 | 1 | 1095.220 | 4025.483 | 4442.084 | 6047.049 | 4515.453 | 536.301 | 67.557 | 252.997 |
| | 2 | 1104.712 | 4118.712 | 4504.701 | 6128.673 | 4518.712 | 545.930 | 66.311 | 256.413 |
| 1997 | Aug | 1072.076 | 3350.325 | 3960.722 | 5232.179 | 3989.729 | 481.011 | 68.465 | 228.440 |
| | Sep | 1064.818 | 3377.073 | 3981.314 | 5268.874 | 4005.350 | 483.012 | 68.333 | 229.560 |
| | Oct | 1062.064 | 3399.477 | 3999.803 | 5305.715 | 4039.084 | 485.892 | 67.709 | 230.560 |
| | Nov | 1067.528 | 3424.764 | 4022.827 | 5352.541 | 4079.072 | 490.783 | 68.772 | 231.750 |
| | Dec | 1074.873 | 3457.000 | 4046.385 | 5403.407 | 4103.081 | 493.756 | 69.076 | 233.150 |
| 1998 | Jan | 1073.810 | 3486.131 | 4071.076 | 5448.172 | 4157.945 | 496.198 | 68.918 | 234.430 |
| | Feb | 1076.021 | 3521.706 | 4100.450 | 5483.148 | 4186.299 | 499.555 | 67.414 | 235.900 |
| | Mar | 1080.646 | 3556.561 | 4125.581 | 5541.327 | 4216.066 | 499.408 | 66.801 | 237.240 |
| | Apr | 1082.094 | 3601.279 | 4154.526 | 5586.189 | 4218.912 | 499.601 | 66.000 | 238.870 |
| | May | 1078.171 | 3634.842 | 4173.935 | 5627.871 | 4240.820 | 502.385 | 66.134 | 239.650 |
| | Jun | 1077.782 | 3670.178 | 4197.696 | 5670.364 | 4265.530 | 504.193 | 66.117 | 240.840 |
| | Jul | 1075.365 | 3694.535 | 4215.098 | 5690.425 | 4285.201 | 507.677 | 66.366 | 241.950 |
| | Aug | 1072.214 | 3735.309 | 4240.558 | 5746.351 | 4344.432 | 511.093 | 67.434 | 243.160 |
| | Sep | 1074.653 | 3793.355 | 4284.168 | 5809.694 | 4392.474 | 516.006 | 67.052 | 245.280 |
| | Oct | 1080.404 | 3854.353 | 4325.546 | 5871.776 | 4487.889 | 520.803 | 67.055 | 247.330 |
| | Nov | 1088.956 | 3912.146 | 4364.036 | 5936.876 | 4527.052 | 524.379 | 67.183 | 249.300 |
| | Dec | 1093.354 | 3965.264 | 4400.986 | 5995.818 | 4545.646 | 526.432 | 66.952 | 251.120 |
| 1999 | Jan | 1091.000 | 3993.526 | 4424.981 | 6016.975 | 4535.952 | 531.713 | 68.375 | 252.230 |
| | Feb | 1092.648 | 4034.796 | 4445.634 | 6064.790 | 4520.460 | 538.145 | 67.918 | 253.060 |
| | Mar | 1102.011 | 4048.127 | 4455.636 | 6059.383 | 4489.946 | 539.045 | 66.379 | 253.700 |
| | Apr | 1108.379 | 4093.070 | 4488.177 | 6102.405 | 4500.020 | 539.623 | 63.827 | 255.550 |
| | May | 1104.703 | 4119.532 | 4505.115 | 6127.467 | 4509.742 | 548.349 | 68.239 | 256.420 |
| | Jun | 1101.054 | 4143.534 | 4520.812 | 6156.146 | 4546.375 | 549.818 | 66.868 | 257.270 |
| | Jul | 1099.455 | 4162.328 | 4540.992 | 6181.441 | 4541.287 | 553.082 | 66.802 | 258.430 |
| | Aug | 1101.984 | 4191.475 | 4561.784 | 6207.626 | 4578.692 | 556.697 | 67.335 | 259.530 |

*All values are given in billions of dollars

| | | Federal Funds | Discount Rate | Prime Rate | 3-mo CDs | Treasury Yields 3 mo | 3 yr | 30 yr | Corporate Aaa Bonds | S & L Aaa Bonds | Conventional Mortgage |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1994 | 4.20 | 3.60 | 7.14 | 4.63 | 4.37 | 6.26 | 7.37 | 7.96 | 5.77 | 8.35 |
| | 1995 | 5.84 | 5.21 | 8.83 | 5.92 | 5.66 | 6.26 | 6.88 | 7.59 | 5.80 | 7.95 |
| | 1996 | 5.30 | 5.02 | 8.27 | 5.39 | 5.15 | 5.99 | 6.70 | 7.37 | 5.52 | 7.80 |
| | 1997 | 5.46 | 5.00 | 8.44 | 5.62 | 5.20 | 6.10 | 6.61 | 7.26 | 5.32 | 7.60 |
| | 1998 | 5.35 | 4.92 | 8.35 | 5.47 | 4.91 | 5.14 | 5.58 | 6.53 | 4.93 | 6.94 |
| 1997 | 1 | 5.28 | 5.00 | 8.27 | 5.44 | 5.20 | 6.19 | 6.82 | 7.43 | 5.44 | 7.79 |
| | 2 | 5.52 | 5.00 | 8.50 | 5.69 | 5.19 | 6.42 | 6.93 | 7.57 | 5.49 | 7.93 |
| | 3 | 5.53 | 5.00 | 8.50 | 5.60 | 5.18 | 6.01 | 6.53 | 7.17 | 5.23 | 7.47 |
| | 4 | 5.51 | 5.00 | 8.50 | 5.73 | 5.23 | 5.78 | 6.14 | 6.88 | 5.14 | 7.20 |
| 1998 | 1 | 5.52 | 5.00 | 8.50 | 5.55 | 5.19 | 5.46 | 5.88 | 6.67 | 4.94 | 7.05 |
| | 2 | 5.50 | 5.00 | 8.50 | 5.59 | 5.11 | 5.57 | 5.85 | 6.64 | 5.00 | 7.09 |
| | 3 | 5.53 | 5.00 | 8.50 | 5.53 | 4.96 | 5.11 | 5.47 | 6.49 | 4.95 | 6.87 |
| | 4 | 4.86 | 4.66 | 7.92 | 5.20 | 4.37 | 4.41 | 5.11 | 6.33 | 4.82 | 6.76 |
| 1999 | 1 | 4.73 | 4.50 | 7.75 | 4.90 | 4.53 | 4.87 | 5.37 | 6.42 | 4.87 | 6.88 |
| | 2 | 4.75 | 4.50 | 7.75 | 4.98 | 4.59 | 5.35 | 5.80 | 6.93 | 5.05 | 7.20 |
| 1997 | Aug | 5.54 | 5.00 | 8.50 | 5.60 | 5.28 | 6.06 | 6.58 | 7.22 | 5.25 | 7.48 |
| | Sep | 5.54 | 5.00 | 8.50 | 5.60 | 5.08 | 5.98 | 6.50 | 7.15 | 5.19 | 7.43 |
| | Oct | 5.50 | 5.00 | 8.50 | 5.65 | 5.11 | 5.84 | 6.33 | 7.00 | 5.19 | 7.29 |
| | Nov | 5.52 | 5.00 | 8.50 | 5.74 | 5.28 | 5.76 | 6.11 | 6.87 | 5.19 | 7.21 |
| | Dec | 5.50 | 5.00 | 8.50 | 5.80 | 5.30 | 5.74 | 5.99 | 6.76 | 5.03 | 7.10 |
| 1998 | Jan | 5.56 | 5.00 | 8.50 | 5.54 | 5.18 | 5.38 | 5.81 | 6.61 | 4.88 | 6.99 |
| | Feb | 5.51 | 5.00 | 8.50 | 5.54 | 5.23 | 5.43 | 5.89 | 6.67 | 4.92 | 7.04 |
| | Mar | 5.49 | 5.00 | 8.50 | 5.58 | 5.16 | 5.57 | 5.95 | 6.72 | 5.03 | 7.13 |
| | Apr | 5.45 | 5.00 | 8.50 | 5.58 | 5.08 | 5.58 | 5.92 | 6.69 | 5.00 | 7.14 |
| | May | 5.49 | 5.00 | 8.50 | 5.59 | 5.14 | 5.61 | 5.93 | 6.69 | 5.04 | 7.14 |
| | Jun | 5.56 | 5.00 | 8.50 | 5.60 | 5.12 | 5.52 | 5.70 | 6.53 | 4.97 | 7.00 |
| | Jul | 5.54 | 5.00 | 8.50 | 5.59 | 5.09 | 5.47 | 5.68 | 6.55 | 5.01 | 6.95 |
| | Aug | 5.55 | 5.00 | 8.50 | 5.58 | 5.04 | 5.24 | 5.54 | 6.52 | 5.01 | 6.92 |
| | Sep | 5.51 | 5.00 | 8.49 | 5.41 | 4.74 | 4.62 | 5.20 | 6.40 | 4.84 | 6.72 |
| | Oct | 5.07 | 4.86 | 8.12 | 5.21 | 4.07 | 4.18 | 5.01 | 6.37 | 4.76 | 6.71 |
| | Nov | 4.83 | 4.63 | 7.89 | 5.24 | 4.53 | 4.57 | 5.25 | 6.41 | 4.87 | 6.87 |
| | Dec | 4.68 | 4.50 | 7.75 | 5.14 | 4.50 | 4.48 | 5.06 | 6.22 | 4.83 | 6.72 |
| 1999 | Jan | 4.63 | 4.50 | 7.75 | 4.89 | 4.45 | 4.61 | 5.16 | 6.24 | 4.85 | 6.79 |
| | Feb | 4.76 | 4.50 | 7.75 | 4.90 | 4.56 | 4.90 | 5.37 | 6.40 | 4.80 | 6.81 |
| | Mar | 4.81 | 4.50 | 7.75 | 4.91 | 4.57 | 5.11 | 5.58 | 6.62 | 4.96 | 7.04 |
| | Apr | 4.74 | 4.50 | 7.75 | 4.88 | 4.41 | 5.03 | 5.55 | 6.64 | 4.89 | 6.92 |
| | May | 4.74 | 4.50 | 7.75 | 4.92 | 4.63 | 5.33 | 5.81 | 6.93 | 5.05 | 7.15 |
| | Jun | 4.76 | 4.50 | 7.75 | 5.13 | 4.72 | 5.70 | 6.04 | 7.23 | 5.22 | 7.55 |
| | Jul | 4.99 | 4.50 | 8.00 | 5.24 | 4.69 | 5.62 | 5.98 | 7.19 | 5.24 | 7.63 |
| | Aug | 5.07 | 4.56 | 8.06 | 5.41 | 4.87 | 5.77 | 6.07 | 7.40 | 5.47 | 7.94 |

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

| | | M1 | MZM | M2 | M3 |
|---|---|---|---|---|---|
| **Percent change from previous period** | | | | | |
| | 1994 | 6.17 | 2.61 | 1.38 | 1.60 |
| | 1995 | -0.22 | -0.47 | 2.06 | 4.55 |
| | 1996 | -3.21 | 6.54 | 4.85 | 6.59 |
| | 1997 | -3.30 | 7.17 | 4.96 | 7.93 |
| | 1998 | 0.92 | 11.59 | 7.37 | 10.13 |
| 1997 | 1 | -0.47 | 1.77 | 1.19 | 1.87 |
| | 2 | -1.00 | 1.63 | 1.18 | 1.94 |
| | 3 | 0.24 | 2.23 | 1.58 | 2.33 |
| | 4 | 0.00 | 2.39 | 1.67 | 2.39 |
| 1998 | 1 | 0.81 | 2.75 | 1.89 | 2.56 |
| | 2 | 0.23 | 3.24 | 1.86 | 2.50 |
| | 3 | -0.49 | 2.91 | 1.71 | 2.14 |
| | 4 | 1.26 | 4.53 | 2.75 | 3.24 |
| 1999 | 1 | 0.70 | 2.94 | 1.80 | 1.89 |
| | 2 | 0.87 | 2.32 | 1.41 | 1.35 |
| 1997 | Aug | 0.42 | 1.11 | 0.81 | 0.90 |
| | Sep | -0.68 | 0.80 | 0.52 | 0.70 |
| | Oct | -0.26 | 0.66 | 0.46 | 0.70 |
| | Nov | 0.51 | 0.74 | 0.58 | 0.88 |
| | Dec | 0.69 | 0.94 | 0.59 | 0.95 |
| 1998 | Jan | -0.10 | 0.84 | 0.61 | 0.83 |
| | Feb | 0.21 | 1.02 | 0.72 | 0.64 |
| | Mar | 0.43 | 0.99 | 0.61 | 1.06 |
| | Apr | 0.13 | 1.26 | 0.70 | 0.81 |
| | May | -0.36 | 0.93 | 0.47 | 0.75 |
| | Jun | -0.04 | 0.97 | 0.57 | 0.76 |
| | Jul | -0.22 | 0.66 | 0.41 | 0.35 |
| | Aug | -0.29 | 1.10 | 0.60 | 0.98 |
| | Sep | 0.23 | 1.55 | 1.03 | 1.10 |
| | Oct | 0.54 | 1.61 | 0.97 | 1.07 |
| | Nov | 0.79 | 1.50 | 0.89 | 1.11 |
| | Dec | 0.40 | 1.36 | 0.85 | 0.99 |
| 1999 | Jan | -0.22 | 0.71 | 0.55 | 0.35 |
| | Feb | 0.15 | 1.03 | 0.47 | 0.79 |
| | Mar | 0.86 | 0.33 | 0.22 | -0.09 |
| | Apr | 0.58 | 1.11 | 0.73 | 0.71 |
| | May | -0.33 | 0.65 | 0.38 | 0.41 |
| | Jun | -0.33 | 0.58 | 0.35 | 0.47 |
| | Jul | -0.15 | 0.45 | 0.45 | 0.41 |
| | Aug | 0.23 | 0.70 | 0.46 | 0.42 |

# 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:** M2 minus small denomination time deposits, plus institutional money market mutual funds. The label MZM was coined by William Poole (1991) for this aggregate, proposed earlier by Motley (1988). Due to distortions caused by regulatory changes, the largest of which the introduction of money market accounts, data for MZM begin March 1983 in this publication.

**M2:** M1 plus: savings deposits (including money market deposit accounts) and small denomination (less than $100,000) time deposits issued by financial institutions; and shares in retail money market mutual funds (funds with initial investments of less than $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 firms except depository institutions and money market mutual funds.

**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).

**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 series, a 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) and http://www.stls.frb.org/research/newbase.html.

**Monetary Services Index:** an index which 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; additional data are available at http://www.stls.frb.org/research/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 *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*: **MZM,** or "Money, Zero Maturity" includes the zero maturity, or immediately available, components of M3. MZM equals M2 minus small denomination time deposits, plus institutional money market mutual funds (that is, the money market mutual funds included in M3 but excluded from M2). 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 http://www.stls.frb.org/research/swdata.html. For analytical purposes, MZM largely replaces M1. The **Discount Rate** and **Expected 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. **Treasury Yield Curve** shows constant maturity yields calculated by the U.S. Treasury Department for securities with 3 months and 1, 2, 3, 5, 7,10, 20 and 30 years to maturity. Daily data and a description are available at http://www.stls.frb.org/fred/data/wkly.html. See also *Federal Reserve Bulletin*, table 1.35.

*Page 5*: **Total Checkable Deposits** is the sum of demand and other checkable deposits. **Total Savings Deposits** is the sum of money market deposit accounts (MMDA), 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 *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 range as reported to the Congress in the February Humphrey-Hawkins Act testimony each year. **CPI Inflation** is the percentage change from a year ago in the CPI for all urban consumers. **Real Interest Rates** are ex post measures, equal to nominal rates minus CPI inflation.

*Page 9:* **FOMC Expected Federal Funds Rate** is the level (or midpoint of the range, if applicable) of the federal funds rate that the staff of the Federal Open Market Committee expected to be consistent with the desired degree of pressure on bank reserve positions.

*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

$$f_t^* = 2.0 + \pi_{t-1} + (\pi_{t-1} - \pi^*)/2 + 100 \times (y_{t-1} - y_{t-1}^P)/2$$

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

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

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

to five alternative target inflation rates $\pi^* = 0, 1, 2, 3, 4$ percent, where $\Delta MB_t^*$ 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 $((y_t - y_{t-40})/40) \times 4 \times 100$, where $y_t$ is the log of real GDP. The four-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 available at

http://www.stls.frb.org/research/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 $m = 1,...,$ 30 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)

$$f(m) = [D(m)R(m) - D(m\text{-}1)] / [D(m) - D(m\text{-}1)]$$

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. 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 Fed Funds Futures Contracts** each trace through time the yield on three specific contracts. **Implied Yields on Fed Funds Futures** displays a single day's snapshot of yields for contracts expiring in the months shown on the horizontal axis. **Inflation-Protected Treasury Yield Spreads** equal, for 5, 10, and 30 year maturities, the difference between the Treasury constant maturity yield and the yield on the most recently issued inflation-protected security. **Inflation-Indexed Bonds** for Canada are the 31-year bond with a maturity date of 12/01/2026; for the U.K., the 37.5-year bond with a maturity date of 07/17/2024 and the 12.1-year bond with a maturity date of 10/21/2004; and, for the U.S., the 30-year bond with a maturity date of 04/15/2028 and the 10-year bond with a maturity date of 01/15/2007.

*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. Two alternative opportunity costs are shown, one relative to the 3-month Treasury constant-maturity yield, the other to the 5-year constant-maturity yield.

*Page 13*: **Real Gross Domestic Product** is GDP as measured in chained 1992 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 1992 dollars.

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

# Sources

*Bank of Canada*
Canadian inflation-linked bond yields.

*Bank of England*
U.K. inflation-linked bond yields.

*Board of Governors of the Federal Reserve System*
Monetary aggregates and components, nonfinancial debt: 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 and G.13 releases; nonfinancial commercial paper: Board of Governors web site; M2 and MZM own rates.

*Bureau of Economic Analysis*
Gross domestic product.

*Bureau of Labor Statistics*
Consumer price index.

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

*Federal Reserve Bank of St. Louis*
Adjusted monetary base and adjusted total reserves, monetary services index, one-year forward rates.

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

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

*Congressional Budget Office*
Potential real GDP.

*Dow Jones and Co. (Wall Street Journal)*
Federal funds futures contracts, Eurodollar futures.

*Standard and Poors Inc.*
Stock price-earnings ratio, stock price composite index.

*U.S. Department of the Treasury*
U.S. inflation-protected security yields.

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*Note*: Articles from this Bank's *Review* are available on the Internet at www.stls.frb.org/research/reviewdat.html.