Monetary Trends

reported yields. These yields are smoothed by fitting the regression suggested by Nelson and Siegel (1987),
\[ R(t) = a + b_1(1-e^{-t/\tau_1}) + b_2(1-e^{-t/\tau_2}) + \epsilon_t, \]
and forward rates are calculated from these smoothed yields using equation (a) in table 13.1 of Shiller (1990),
\[ f(t) = [\ln(1 + R(t)) - \ln(1 + d)] + [\ln(1 + d) - \ln(1 + d)]. \]
where duration is approximated as \[ D(t) = (1 - e^{-t/\tau_1}) + (1 - e^{-t/\tau_2}). \] These ratios 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 of Inflation, the Effective Federal Funds Rate, and Monthly Core Inflation: Futures and Rates on Selected Federal Funds Futures Contracts trace through time the yield on these specific contracts. Rates on Federal Funds Futures on Selected Days displays a single-day’s yield of yields for contracts expiring in the months shown on the horizontal axis. Inflation-Indexed Treasury Securities are yields on the most recently issued inflation-indexed securities of 10- and 30-year original maturities. Inflation-Indexed 10-Year Government Notes shows the yield of a yield-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 6/29/2025, and the current U.S. note has a maturity date of 7/15/2040. Inflation-Indexed Treasury Yield Spreads and Yield-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 aggregate. Prior to 1982, the 3-month T-bill rates are secondary market yields. From 1982 forward, rates are 3-month constant maturity rates.

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. 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 Televes: French note yields.
Bank of Canada: Canadian note yields.
Board of Governors of the Federal Reserve System: Monetary aggregates and components: H.6 release; Bank credit and components: H.18 release; Consumer credit: G.19 release; Required reserves, excess reserves, clearing balance contracts, and discount window borrowing: H.4 and H.16 releases. Interest rates: H.15 release; Nonfinancial commercial paper: Board of Governors website; Nonfinancial debt: Z.1 release; M.2 own rates.
Board 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 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 ratios, stock price composite index.
University of Michigan Survey Research Center: Medium expected price change.

References


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

Swiss Market Money Rates

<table>
<thead>
<tr>
<th>Date</th>
<th>5-month LIBOR</th>
<th>3-month LIBOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004-04-01</td>
<td>0.5%</td>
<td>0.7%</td>
</tr>
<tr>
<td>2004-05-01</td>
<td>0.6%</td>
<td>0.7%</td>
</tr>
<tr>
<td>2004-06-01</td>
<td>0.7%</td>
<td>0.8%</td>
</tr>
<tr>
<td>2004-07-01</td>
<td>0.8%</td>
<td>0.9%</td>
</tr>
<tr>
<td>2004-08-01</td>
<td>0.9%</td>
<td>1.0%</td>
</tr>
</tbody>
</table>

Swiss National Bank sought to implement the smallest initial rise in the repo rate that would achieve their new target for the LIBOR. The fact that the 3-month Swiss LIBOR rate rose by the full 25 basis points, while the repo rate rose by only about 15 basis points, suggests that the Swiss National Bank used open market operations to increase the rate spread above its usual level of 15 basis points. By the time of the second change target in September 2004, however, the Swiss National Bank did not achieve its objective of raising the Swiss LIBOR rate by 25 basis points (to a level of 75 basis points) until it had raised the repo rate to a level of approximately 60 basis points—that is, not until the typical rate spread of about 15 basis points was restored. Together, these two episodes suggest that policy announcements—open market operations—can cause rate spreads to deviate temporarily from their expected levels, although not necessarily on a regular basis or for an extended period of time.

—Michael J. Duckers and Andreas M. Fischer

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 in transit in process of collection and Federal Reserve float.

M2: Money, money market mutual funds.

M3: Money minus demand deposits, plus institutional money market mutual funds that is, those included in M2 but excluded from M2. The label M3 was coined by William Volker (1994); the aggregate itself was proposed earlier by Mosk (1988).

Policy-Based Inflation Indicators

Implied Forward Rates, Futures Contracts, and Inflation-Indexed Securities

Velocity, Gross Domestic Product, and M2

Bank Credit

Stock Market Index and Foreign Inflation and Interest Rates

Reference Tables

Definitions, Notes, and Sources

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, a percent change at an annual rate in month x between month x - 1 and the current month x t is: \[ \frac{[(x_t - x_{t-1})/x_{t-1}] - 1} {12} \times 100 \]. 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 month x between month x - 12 and the current month x t is: \[ [(x_t/12 - x_{t-12})/x_{t-12}] - 1 \] \times 100.

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St. Louis, MO 63166-0442

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Notes

Page 9: Readers are cautioned that, since early 1994, the level and growth of M1 have been depressed by retail sweep programs that reallocate transactions deposits (demand deposits and other checkable deposits) as savings deposits overnight, thereby reducing banks' required reserves, see Anderson and Rorke (2003) and research.stls.frb.org/gsg/sgwdn/hdata.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 average from the Board of Governors 1915 Statistical Release. The Treasury Yield Curve shows current maturity yields calculated by the U.S. Treasury Bureau of the Budget. For securities with m = 1, 2, 3, 5, and 10 years to maturity, Daily and data summaries are available at research.stls.frb.org/fgd2. See also Statistical Supplement to the Federal Reserve Bulletin, table 1.35. The 50-year constant maturity series was discontinued by the Treasury as of January 6, 2002.

Page 5: Checkable Deposits is the sum of demand and other checkable deposits. Savings Deposits is the sum of money market account deposits and savings and small-savings accounts. Time Deposits have a minimum 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 components. Earning Deposits represent the change in total retail deposits plus loans to earn interest.

Page 7: Excess Reserves plus BCR (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 Survey 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 expenditure (PCE) price index to report inflation; the FOMC then switched to the PCE chain-type price index excluding food and energy prices (“core”) beginning July 2004. Accordingly, none 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 post-mortem, equal to nominal rates minus CPI inflation. 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 show the observed federal funds rate, quarterly, and the level of the funds rate implied by applying Taylor's 1993 equation \[ \frac{\pi - 2.5}{\gamma} + \frac{(\pi - 2.5)^2}{\gamma^2} ^{\pi - 2.5} + \frac{(\pi - 2.5)^2}{\gamma^2} \] to five alternative target inflation rate, \( \pi_t = 0, 1, 2, 3, 4 \) percent, where \( \pi_t \) is the implied federal funds rate and \( \pi_t > 2.5 \) is the period’s inflation rate (PCE) measured on a year-on-year basis, \( \gamma \) is the log of the period’s level of real gross domestic product (GDP), and \( \gamma^2 \) is the log of an estimate of the previous period’s level of potential output. Potential Real GDP is computed as estimated by the Congressional Budget Office.

Monetary Base Growth and Inflation Targets show the quarterly growth of the monetary base (modified to include an estimate of the effect of sweep programs) implied by applying McCulley’s 1988, 1993 equation \[ \frac{\Delta M_t}{\Delta t} - \pi_t = \pi (10-year moving average growth of real GDP) \] to five alternative target inflation rate, \( \pi_t = 0, 1, 2, 3, 4 \) percent, where \( \Delta M_t \) is the implied growth rate of the adjusted monetary base. The 10-year moving average growth of real GDP for a quarter is calculated as the average quarterly growth during the previous 40 quarters, at an annual rate, by the formula \( (\gamma t - \gamma t-40)/40 \), where \( \gamma_t \) is the log of real GDP. The 4-year moving average of base 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. Those estimates are imprecise, at best. Sweep program data are found at research.stls.frb.org/gsg/sgwdn/hdata.html.

Page 12: Implied One-Year Forward Rates are calculated from this Bank from Treasury constant maturity yields. Yields are calculated from the 3-month maturity, (0.25), for securities with m = 1, 2, 3, 5, 10 years to maturity are obtained by linear interpolation between

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### Monetary Trends

#### Money Stock

<table>
<thead>
<tr>
<th>Year</th>
<th>M1</th>
<th>MEZM</th>
<th>M2</th>
<th>M3</th>
<th>Bank Credit</th>
<th>Adjusted Base</th>
<th>Reserves</th>
<th>MSI M2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>1110.461</td>
<td>4170.400</td>
<td>4055.778</td>
<td>6270.090</td>
<td>4577.660</td>
<td>574.181</td>
<td>88.864</td>
<td>229.377</td>
</tr>
<tr>
<td>2000</td>
<td>1133.415</td>
<td>5209.045</td>
<td>4801.426</td>
<td>8681.426</td>
<td>5326.146</td>
<td>667.106</td>
<td>84.511</td>
<td>262.164</td>
</tr>
<tr>
<td>2001</td>
<td>1136.880</td>
<td>5221.945</td>
<td>5219.362</td>
<td>7643.244</td>
<td>5236.437</td>
<td>641.167</td>
<td>85.923</td>
<td>263.713</td>
</tr>
<tr>
<td>2002</td>
<td>1192.000</td>
<td>5891.329</td>
<td>5614.522</td>
<td>8256.727</td>
<td>5297.300</td>
<td>697.072</td>
<td>87.914</td>
<td>285.710</td>
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<tr>
<td>2003</td>
<td>1293.999</td>
<td>6232.136</td>
<td>5988.490</td>
<td>8778.116</td>
<td>5102.619</td>
<td>740.674</td>
<td>92.828</td>
<td>326.768</td>
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#### Adjusted Monetary Base

<table>
<thead>
<tr>
<th>Year</th>
<th>Percent change from year ago</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>18%</td>
</tr>
<tr>
<td>2003</td>
<td>26%</td>
</tr>
</tbody>
</table>

#### Domestic Nonfinancial Debt

<table>
<thead>
<tr>
<th>Year</th>
<th>Total</th>
<th>Commercial Bank</th>
<th>Savings</th>
<th>Money Market Funds</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>48.6%</td>
<td>42.9%</td>
<td>9.4%</td>
<td>43%</td>
</tr>
<tr>
<td>2003</td>
<td>48.6%</td>
<td>42.9%</td>
<td>9.4%</td>
<td>43%</td>
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</table>

#### Currency Held by the Nonbank Public

<table>
<thead>
<tr>
<th>Year</th>
<th>Federal</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>18%</td>
<td>20%</td>
</tr>
<tr>
<td>2003</td>
<td>18%</td>
<td>20%</td>
</tr>
</tbody>
</table>

#### Time Deposits

<table>
<thead>
<tr>
<th>Year</th>
<th>Percent change from year ago</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>20%</td>
</tr>
<tr>
<td>2003</td>
<td>20%</td>
</tr>
</tbody>
</table>

#### Checkable and Savings Deposits

<table>
<thead>
<tr>
<th>Year</th>
<th>Percent change from year ago</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>20%</td>
</tr>
<tr>
<td>2003</td>
<td>20%</td>
</tr>
</tbody>
</table>

#### Money Market Mutual Fund Shares

<table>
<thead>
<tr>
<th>Year</th>
<th>Percent change from year ago</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>20%</td>
</tr>
<tr>
<td>2003</td>
<td>20%</td>
</tr>
</tbody>
</table>

#### Repurchase Agreements and Eurodollars

<table>
<thead>
<tr>
<th>Year</th>
<th>Billions of dollars</th>
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</thead>
<tbody>
<tr>
<td>2002</td>
<td>18%</td>
</tr>
<tr>
<td>2003</td>
<td>18%</td>
</tr>
</tbody>
</table>

*All values are given in billions of dollars.*

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Monetary Trends

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

M2 Velocity and Interest Rate Spread
Ratio Scale

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

Short-Term Interest Rates
Percent

Long-Term Interest Rates
Percent

Long-Term Interest Rates
Percent

Short-Term Interest Rates
Percent