Monetary Trends

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

\[ R(t) = a + (b - a) e^{-c(t)}; \]

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

Yield duration is approximated as

\[ D(t) = 1 - e^{-c(t)} \]

where these rates are linear approximations to the true instantaneous forward rate, see Shiller (1990) for a discussion of the use of forward rates as indicators of inflation expectations.

Shiller (1997). Rates on 3-month Eurodollar Futures and Rates on Selected Federal Funds Futures Contracts trace through time the yields on specific contracts. Rates on Federal Funds Futures on Selected Dates displays a single-day 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 5. 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 7/22/2015, the current U.S. note has a maturity date of 8/26/2015, and the current U.S. note has a maturity date of 11/15/2017. 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 unsecured secondary security maturity.

Page 12: Velocity (for M2 and M3) equals the ratio of GDP, measured in current dollars, to the level of the monetary aggregate. M2 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, measured in chained 2000 dollars. The Gross Domestic Product Price Index is the implied 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 1-year-over-1-year changes in the U.S. all-items Consumer Price Index.

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

Sources

Agency for Foreign Affairs: French note yields.
Bank of Canada: Canadian note yields.
Bank of England/UK note yields.

Research Division

This document is a product of the Research Division of the Federal Reserve Bank of St. Louis. The views expressed are not necessarily those of the Federal Reserve System.

Another Window: The Term Auction Facility

On December 12, 2007, the Federal Reserve and four other central banks announced they were taking measures to alleviate pressures in short-term financial markets. One measure the Federal Reserve instituted was the establishment of a temporary Term Auction Facility (TAF), designed to lend directly to depository institutions for a fixed term (thus far, for 28 or 35 days). Two auctions of term loans were held in December, two were held in January 2008, and two more were held in February 2008. Although the TAF is a temporary program, the Fed announced it is considering a permanent facility for auctioning term credit.

The TAF was created in part because the volume of discount window borrowing has remained low despite persistent stress in interbank lending markets, possibly because of a perceived stigma associated with such borrowing. Moreover, most discount window loans have been overnight loans, even though restrictions on discount window loans were relaxed on August 17, 2007, permitting loans of up to 30 days. The TAF offers an anonymous source of term funds without the stigma attached to discount window borrowing.

TAF loans are made against any collateral that is normally accepted for discount window borrowing. However, the operations of the TAF and the discount window program differ in several respects. Traditional discount window loans are made at interest rates set by the Federal Reserve, with no limits on the aggregate volume of loans that can be extended on any given day. By contrast, under the TAF, the Federal Reserve determines in advance the dollar amount of funds it will lend at each auction and the interest rate charged on those loans is determined from the auction itself. For example, at its auction on December 17, 2007, the Federal Reserve offered $20 billion with a 28-day term and received bids totaling $61,535 billion. Bids offering the highest interest rates were accepted until the full $20 billion had been allocated, though all successful bids were funded at the lowest accepted bid rate ($46.5 percent).

Has the TAF helped ease financial market pressures? Short-term financial markets began to show signs of substantial strain in August 2007, as rising U.S. mortgage defaults caused market participants to question the values of asset-backed securities and the net worth of institutions that hold those securities. One indication of the scarcity for liquidity, shown in the chart, was a sharp increase in the interest rates offered by banks on one-month bank certificates of deposit relative to the Federal Reserve’s federal funds rate target. Although money market pressures eased in September and October, strains in the markets reappeared in November and early December. Once again, term deposit rates rose sharply even though market forecasters expected the Fed to lower its federal funds rate target. Market interest rates generally fell after the December 12 announcement, suggesting that market participants viewed the coordinated bank action as likely to ease money market pressures, especially during the year-end period when the demand for liquidity typically is high. The impact of the auctions themselves is difficult to determine, however, as seasonal patterns, expectations of future monetary policy actions, and other factors all influence interest rates and other indicators of financial market conditions.

—David C. Wheelock


2 See www.federalreserve.gov/m?id=20071207a.htm

Federal Funds Target and 1-Month Certificate of Deposit Rates

<table>
<thead>
<tr>
<th>Date</th>
<th>Federal Funds Target</th>
<th>1-Month Certificate of Deposit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dec. 12</td>
<td>5.00%</td>
<td>6.00%</td>
</tr>
<tr>
<td>Dec. 19</td>
<td>5.00%</td>
<td>6.00%</td>
</tr>
<tr>
<td>Dec. 26</td>
<td>5.00%</td>
<td>6.00%</td>
</tr>
</tbody>
</table>

Views expressed do not necessarily reflect official positions of the Federal Reserve System.
Contents

Monetary and Financial Indicators at a Glance
4
Monetary Aggregates and Their Components
5
Monetary Aggregates: Monthly Growth
7
Reserves Markets and Short-Term Credit Flows
9
Measures of Expected Inflation
10
Interest Rates
11
Policy-Based Inflation Indicators
12
Implied Forward Rates, Futures Contracts, and Inflation-Indexed Securities
13
Velocity, Gross Domestic Product, and M2
14
Bank Credit
15
Stock Market Index and Foreign Inflation and Interest Rates
16
Reference Tables
17
Definitions, Notes, and Sources
18

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: \( \left( \frac{X_t - X_{t-1}}{X_{t-1}} \right) \times 1200 \). 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: \( \left( \frac{X_t - X_{t-12}}{X_{t-12}} \right) \times 100 \).

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

or to:
stlFRED@stls.frb.org

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

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.

M2: M1 minus large-denomination time deposits, transactions account balances at Federal Reserve Banks, and deposits that have been excluded from M3.

M2: M1 plus savings deposits (including money market deposit accounts) and large-denomination (over $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 non-U.S. banks address 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 nonprofit firms. End-of-period basis.

Adjusted Monetary Base: The sum of currency 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 depository institutions. This series is a chained index, see Anderson and Rasche (1996a, 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 depository institutions. This series is a chained index, see Anderson and Rasche (1996a, 2001, 2003).

Monetary Service 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 Neumuller (1997). Indexes are shown for the assets included in M2, with additional data at research.stls.frb.org/indices.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 1.25. M2, M3, and Adjusted Monetary Base, Adjusted Reserves, and Monetary Service Indices 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 total sweep programs that realign transactions deposits (demand deposits and other checkable deposits as savings deposits overnight, thereby reducing bank's required reserve), see Anderson and Rasche (2003) and research.stls.frb.org/aggreg/widata.html. Primary Credit Rate, Discount Rate, and Extended 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 cumulative maturity yields calculated by the U.S. Treasury for securities 1, 5, 7, 10, and 20 years to maturity. Inflation-Indexed Treasury Yield Spread 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.stls.frb.org/widata.html. See also Statistical Supplement to the Federal Reserve Bulletin, table 1.35. The 10-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 account deposits and certificate and time deposit series. Time Deposits series is the total amount of time deposits held by all depository institutions in the U.S. Total time deposits include those held in M3 and excluded from M3. The label MZM was coined by William Poole (1994); the aggregate itself was proposed earlier by Mosely (1988).

Page 7: Reserve Balances 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 1.35.

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 2000 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 in inflation range; the FOMC then switched to the PCE chained price index excluding food and energy prices ("core"") beginning July 2004. Accordingly, data are not shown on this chart. CPI inflation is the percentage change from a year ago in the consumer price index for all urban consumers. Real Interest Rates are expressed as nominal (myn) minus year-over-year 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 targeted 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

\[ r = a + b \cdot y + c \cdot (\pi - \pi^*)^2 \]

where \( r \) is the observed federal funds rate, \( y \) is the level of the funds rate implied by applying Taylor's (1993) equation, and \( \pi \) and \( \pi^* \) are the actual and expected inflation rates.

Notes:

Research Division
Federal Reserve Bank of St. Louis

Monetary Trends

Monthly Trends are published monthly by the Research Division of the Federal Reserve Bank of St. Louis. Visit the Research Division's website at research.stls.frb.org to download the current version of this publication or register for e-mail notification updates. For more information or data on the publication, please visit research.stls.frb.org or call (513) 444-4659.
## Monetary Trends

### Updated through 02/19/08

<table>
<thead>
<tr>
<th></th>
<th>M1</th>
<th>M2M</th>
<th>M2</th>
<th>M3</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>6.46</td>
<td>7.41</td>
<td>6.98</td>
<td>6.40</td>
</tr>
<tr>
<td>2004</td>
<td>5.57</td>
<td>3.97</td>
<td>4.71</td>
<td>5.09</td>
</tr>
<tr>
<td>2005</td>
<td>2.03</td>
<td>2.23</td>
<td>4.44</td>
<td>5.97</td>
</tr>
<tr>
<td>2006</td>
<td>0.21</td>
<td>4.08</td>
<td>4.80</td>
<td>4.95</td>
</tr>
<tr>
<td>2007</td>
<td>-0.40</td>
<td>9.11</td>
<td>5.93</td>
<td></td>
</tr>
<tr>
<td>2005 Jan</td>
<td>4.38</td>
<td>7.50</td>
<td>7.70</td>
<td>10.49</td>
</tr>
<tr>
<td>Feb</td>
<td>1.18</td>
<td>2.92</td>
<td>4.69</td>
<td>6.55</td>
</tr>
<tr>
<td>Mar</td>
<td>3.47</td>
<td>1.29</td>
<td>2.68</td>
<td></td>
</tr>
<tr>
<td>Apr</td>
<td>-4.22</td>
<td>2.80</td>
<td>3.32</td>
<td></td>
</tr>
<tr>
<td>May</td>
<td>3.41</td>
<td>1.89</td>
<td>1.64</td>
<td></td>
</tr>
<tr>
<td>Jun</td>
<td>-7.53</td>
<td>5.46</td>
<td>5.12</td>
<td></td>
</tr>
<tr>
<td>Jul</td>
<td>-3.65</td>
<td>3.55</td>
<td>4.85</td>
<td></td>
</tr>
<tr>
<td>Aug</td>
<td>-0.69</td>
<td>3.69</td>
<td>3.59</td>
<td></td>
</tr>
<tr>
<td>Sep</td>
<td>-7.65</td>
<td>3.32</td>
<td>4.11</td>
<td></td>
</tr>
<tr>
<td>Oct</td>
<td>6.14</td>
<td>10.16</td>
<td>9.07</td>
<td></td>
</tr>
<tr>
<td>Nov</td>
<td>2.43</td>
<td>7.71</td>
<td>6.15</td>
<td></td>
</tr>
<tr>
<td>Dec</td>
<td>-3.92</td>
<td>12.42</td>
<td>7.18</td>
<td></td>
</tr>
<tr>
<td>2007 Jan</td>
<td>5.01</td>
<td>7.67</td>
<td>8.52</td>
<td></td>
</tr>
<tr>
<td>Feb</td>
<td>-4.42</td>
<td>6.97</td>
<td>4.67</td>
<td></td>
</tr>
<tr>
<td>Mar</td>
<td>2.42</td>
<td>12.50</td>
<td>8.52</td>
<td></td>
</tr>
<tr>
<td>Apr</td>
<td>6.71</td>
<td>12.37</td>
<td>7.84</td>
<td></td>
</tr>
<tr>
<td>May</td>
<td>-2.50</td>
<td>9.29</td>
<td>3.28</td>
<td></td>
</tr>
<tr>
<td>Jun</td>
<td>-7.79</td>
<td>7.46</td>
<td>2.83</td>
<td></td>
</tr>
<tr>
<td>Jul</td>
<td>2.09</td>
<td>8.52</td>
<td>3.59</td>
<td></td>
</tr>
<tr>
<td>Aug</td>
<td>-0.72</td>
<td>19.17</td>
<td>8.19</td>
<td></td>
</tr>
<tr>
<td>Sep</td>
<td>-1.82</td>
<td>15.99</td>
<td>4.92</td>
<td></td>
</tr>
<tr>
<td>Oct</td>
<td>2.57</td>
<td>18.80</td>
<td>4.38</td>
<td></td>
</tr>
<tr>
<td>Nov</td>
<td>-3.74</td>
<td>13.53</td>
<td>5.35</td>
<td></td>
</tr>
<tr>
<td>Dec</td>
<td>-0.24</td>
<td>10.33</td>
<td>5.91</td>
<td></td>
</tr>
<tr>
<td>2008 Jan</td>
<td>0.29</td>
<td>12.46</td>
<td>8.30</td>
<td></td>
</tr>
</tbody>
</table>

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

---

### Treasury Yield Curve

Percent change at an annual rate

### Adjusted Monetary Base

Percent change at an annual rate

### Real Treasury Yield Curve

Percent

### Reserve Market Rates

Percent

### Inflation-Indexed Treasury Yield Spreads

Percent

---

Research Division, Federal Reserve Bank of St. Louis
Inflation and 1-Year-Ahead 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

Percent, Real rate = Nominal rate less year-over-year CPI inflation

Gross Domestic Product

Real Gross Domestic Product

Gross Domestic Product Price Index

M2

Dashed lines indicate 10-year moving averages.
Monetary Trends

Federal Funds Rate and Inflation Targets

Percent

4% 3% 2% 1% 0% Target Inflation Rates

Actual

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
Billions of chain-weighted 2000 dollars

PCE Inflation
Percent change from year ago

Monetary Base Growth* and Inflation Targets

Percent

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

Components of McCulham’s Rule

Monetary Base Velocity Growth
Percent

Real Output Growth
Percent

Implied One-Year Forward Rates
Percent, daily data

Rates on Selected Federal Funds Futures Contracts
Percent, daily data

Rates on Federal Funds Futures on Selected Dates
Percent

Inflation-Indexed Treasury Securities
Weekly data

Inflation-Indexed Treasury Yield Spreads
Percent

Inflation-Indexed 10-Year Government Notes
Percent, weekly data

Inflation-Indexed 10-Year Government Yield Spreads
Percent, weekly data

Research Division
Federal Reserve Bank of St. Louis