Can You Hear Me Now?

On November 14, 2007, the Federal Open Market Committee (FOMC) announced several changes designed to “improve the accountability and public understanding of monetary policy making.”¹ These changes included increasing the frequency of the economic projections of the FOMC participants (governors and Reserve Bank presidents) from two to four times per year; extending the maximum projection horizon from two to three years; and quantifying, to the extent possible, the degree of uncertainty policymakers attach to their economic projections.

Increased transparency is one way to reduce the uncertainty that households, firms, and financial markets have about the current stance of monetary policy and its implications for future economic outcomes. In his remarks describing these changes, Chairman Bernanke said that increased transparency benefits society and the economy in two important ways.² First, “good communications are a prerequisite if central banks are to maintain the democratic legitimacy and independence that are essential to sound monetary policy making.” Second, “central bank transparency increases the effectiveness of monetary policy and enhances economic and financial performance.”

When the FOMC released its new economic projections on November 20, 2007, economic and financial market participants tended to focus first on the revisions to the 2007-08 projections that were published July 18, 2007, in the Monetary Policy Report to the Congress. The new projections indicated that FOMC policymakers had become modestly less optimistic about real GDP growth in 2008 compared with three months earlier (the mid-point of the central tendency was reduced from 2.5 percent to 2.15 percent), but their expectation for core PCE inflation in 2008 was virtually unchanged from three months earlier (the mid-point of the central tendency is 1.8 percent).³ In view of the recent turbulence associated with developments in the housing and mortgage finance sector, the market’s focus on the revisions to the near-term outlook is consistent with the FOMC’s risk management strategy. If, for example, the risk of weaker economic growth exceeds the risk of higher inflation (asymmetric risk), “the appropriate policy gives more weight to a very damaging outcome that has a low probability than to a less damaging outcome with a greater probability.”⁴

Analysts then focused on the FOMC’s projections for overall and core PCE inflation in 2010. According to the central tendency, inflation—whether measured by the PCE or core PCE—is expected to be between 1.6 percent and 1.9 percent for the four quarters ending in 2010:Q4. From 2007 to 2009, though, overall inflation is projected to slightly exceed, on average, core inflation. Extending the projection horizon by one year is potentially an important innovation in the monetary policy communication process. For one thing, it reinforces the fact that monetary policy is the main determinant of inflation over longer horizons. Second, it also reinforces the fact that, over time, the overall inflation rate—which households and firms care most about—should be no different from the core inflation rate, which the FOMC uses as a measure of the underlying inflation rate. This is because food and energy price shocks tend to be temporary.

Some economic analysts appear to have interpreted the mid-point of the 2010 central tendency as the Committee’s long-term inflation preference—despite no explicit policy statement to that effect. Nevertheless, if this interpretation persists, and if expectations are crucial for ensuring good macroeconomic outcomes, then the FOMC’s longer-term inflation projection must be viewed as credible. One way to achieve credibility is by ensuring that the three-year-ahead projection errors are zero, on average. Attaining this outcome may be made more difficult because (i) the composition of the FOMC may change over time and (ii) each member may have a different view of what an “appropriate” policy stance is.

—Kevin L. Kliesen

³ The central tendency removes the three highest and lowest projections.
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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: \( \left( \frac{x_t}{x_{t-1}} - 1 \right) \times 1200 \). 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: \( \left( \frac{x_t}{x_{t-12}} - 1 \right) \times 100 \).

We welcome your comments addressed to:

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

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

or to:

stlsFRED@stls.frb.org
Monetary Trends

Updated through 01/09/08

M2 and MZM
Billions of dollars

Adjusted Monetary Base
Percent change at an annual rate

Real Treasury Yield Curve
Percent

Reserve Market Rates
Percent

Inflation-Indexed Treasury Yield Spreads
Percent

Data available as of January 2008.

Research Division
Federal Reserve Bank of St. Louis
Monetary Trends

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

*See table of contents for changes to the series.

**We will not update the MSI series until we revise the code to accommodate the discontinuation of M3.
M1
Percent change at an annual rate

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

M2
Percent change at an annual rate

*Actual value for September 2001 is 39.41 percent rate.

M3*
Percent change at an annual rate

*See table of contents for changes to the series.
Adjusted and Required Reserves

![Graph showing Adjusted and Required Reserves](image)

**Adjusted and Required Reserves**

- **Billions of dollars**
- **Adjusted** and **Required**

Total Borrowings, nsa

![Graph showing Total Borrowings, nsa](image)

**Total Borrowings, nsa**

- **Billions of dollars**
- *Actual value for September 2001 is $3.4 billion.*

Excess Reserves plus RCB Contracts

![Graph showing Excess Reserves plus RCB Contracts](image)

**Excess Reserves plus RCB Contracts**

- **Billions of dollars**
- *Actual value for September 2001 is $26.43 billion.*

Nonfinancial Commercial Paper

![Graph showing Nonfinancial Commercial Paper](image)

**Nonfinancial Commercial Paper**

- **Percent change from year ago**
- As of April 10, 2006, the Federal Reserve Board made major changes to its commercial paper calculations.
- For more information, please refer to [http://www.federalreserve.gov/releases/cp/about.htm](http://www.federalreserve.gov/releases/cp/about.htm)

Consumer Credit

![Graph showing Consumer Credit](image)

**Consumer Credit**

- **Percent change from year ago**
- -5 to 20
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

Percent, Real rate = Nominal rate less year-over-year CPI inflation
Short-Term Interest Rates

Percent

90-Day Commercial Paper
Prime Rate
3-Month Treasury Yield

Long-Term Interest Rates

Percent

Conventional Mortgage
Corporate Aaa
10-Year Treasury Yield

Data available as of November 2007.


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

Percent

Intended Federal Funds Rate
Discount Rate
Primary Credit Rate

Data available as of November 2007.
Monetary Trends

Federal Funds Rate and Inflation Targets

Percent

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

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

Actual and Potential Real GDP

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 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

Percent

Real Output Growth

Percent

Research Division
Federal Reserve Bank of St. Louis
Monetary Trends

updated through 01/09/08

Research Division
Federal Reserve Bank of St. Louis

Implied One-Year Forward Rates

Week Ending:
- 01/05/08
- 12/07/07
- 01/04/08

Rates on 3-Month Eurodollar Futures

Week Ending:
- 01/04/08
- 12/07/07
- 01/05/07

Rates on Selected Federal Funds Futures Contracts

Percent, daily data

Rates on Federal Funds Futures on Selected Dates

Percent

Inflation-Indexed Treasury Securities

Percent, weekly data

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

Inflation-Indexed 10-Year Government Notes

Percent, weekly data

Inflation-Indexed 10-Year Government Yield Spreads

Percent, weekly data

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

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

- **MZM**
- **M2**

**Interest Rates**
Percent

- **3-Month T-Bill**
- **M2 Own**
- **MZM Own**

**MZM Velocity and Interest Rate Spread**
Ratio Scale

- Interest Rate Spread = 3-Month T-Bill less MZM Own Rate

**M2 Velocity and Interest Rate Spread**
Ratio Scale

- Interest Rate Spread = 3-Month T-Bill less M2 Own Rate

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Federal Reserve Bank of St. Louis
Monetary Trends

Gross Domestic Product
Percent change from year ago

Real 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.
Recent Inflation and Long-Term Interest Rates

<table>
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<tr>
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<th>2006Q4</th>
<th>2007Q1</th>
<th>2007Q2</th>
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<th>Sep07</th>
<th>Oct07</th>
<th>Nov07</th>
<th>Dec07</th>
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Inflation and Long-Term Interest Rate Differentials

-6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6

Inflation differential = Foreign inflation less U.S. inflation
Long-term rate differential = Foreign rate less U.S. rate
### Money Stock

<table>
<thead>
<tr>
<th></th>
<th>M1</th>
<th>MZM</th>
<th>M2</th>
<th>M3*</th>
<th>Bank Credit</th>
<th>Adjusted Monetary Base</th>
<th>Reserves</th>
<th>MSI M2**</th>
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<td>2002</td>
<td>1196.216</td>
<td>5890.222</td>
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<td>5595.853</td>
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<td>1273.521</td>
<td>6327.435</td>
<td>5986.754</td>
<td>8787.321</td>
<td>6118.739</td>
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Note: All values are given in billions of dollars. *See table of contents for changes to the series.

**We will not update the MSI series until we revise the code to accommodate the discontinuation of M3.
<table>
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<tr>
<th>Year</th>
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<th>Prime Rate</th>
<th>3-mo CD Yields</th>
<th>3-yr CD Yields</th>
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<td>6.12</td>
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<td>5.23</td>
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Note: All values are given as a percent at an annual rate.
### Monetary Trends

#### Percent change at an annual rate

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<th>M2</th>
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**Research Division**

Federal Reserve Bank of St. Louis
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 rate; the FOMC then switched to the PCE chain-type price index excluding food and energy prices (“core”) beginning July 2004. Accordingly, neither are shown on this graph. CPI Inflation is the percentage change from a year ago in the consumer price index for all urban consumers. Real Interest Rates are ex post measures, equal to nominal rates minus year-over-year CPI inflation.

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 to five alternative target inflation rates, π* = 0, 1, 2, 3, 4 percent, where f*T is the implied federal funds rate, πt-1 is the previous period’s inflation rate (PCE) measured on a year-over-year basis, yt-1 is the log of the previous period’s level of real gross domestic product (GDP), and yt-1 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 McCullogh’s (1988, 1993) equation to five alternative target inflation rates, π* = 0, 1, 2, 3, 4 percent, where ΔMB is the implied growth rate of the adjusted monetary base. The 10-year moving average 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 (yt - y_{t-40})/40, where yt 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 \( m = 1, \ldots, 10 \) 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),
\[ R(m) = a_0 + (a_1 + a_2)(1 - e^{-m/50})/(m/50) - a_3 e^{-m/50}, \]
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 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 7/15/2017. 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 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.
Board of Governors of the Federal Reserve System:
- 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 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.

References


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