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 funds 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 that it is considering a permanent facility for auctioning term credit.1

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, to permit 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 loans. 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 date. 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.2 For example, at its auction on December 17, 2007, the Federal Reserve offered $20 billion with a 28-day term and received bids totaling $61.553 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 (4.65 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 scramble 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 central 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

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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
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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

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Monetary Trends

Updated through 02/19/08

MZM and M1
Percent change from year ago

M2
Percent change from year ago

M3*
Percent change from year ago

*See table of contents for changes to the series.

Monetary Services Index - M2**
Percent change from year ago

**We will not update the MSI series until we revise the code to accommodate the discontinuation of M3.
*Actual values for September and October 2001 are 55.87 and -38.35 percent rate, respectively.

*Actual value for September 2001 is 39.41 percent rate.

*Actual value for September 2001 is 24.90 percent rate.

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

Billions of dollars

- **Adjusted**
- **Required**

**Total Borrowings, nsa**

Billions of dollars

- *Total borrowings include loans to depository institutions for primary, secondary, and seasonal credit, but exclude term auction credit.*

**Excess Reserves plus RCB Contracts**

Billions of dollars

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

**Nonfinancial Commercial Paper**

Percent change from year ago

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.

**Consumer Credit**

Percent change from year ago
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**

Yield to maturity

**Real Interest Rates**

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

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Monetary Trends

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Monetary Trends

Short-Term Interest Rates

Percent

Long-Term Interest Rates

Percent

Long-Term Interest Rates

Percent

Short-Term Interest Rates

Percent

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

Percent

Data available as of January 2008.

Federal Funds Rate and Inflation Targets

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

Components of Taylor’s Rule

Actual and Potential Real GDP
Billions of chain-weighted 2000 dollars

PCE Inflation
Percent change from year ago

Monetary Base Growth* and Inflation Targets

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

Components of McCallum’s Rule

Monetary Base Velocity Growth

Real Output Growth
Percent

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**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

- 1974Q1 to 1993Q4
- 1994Q1 to present

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

- 1974Q1 to 1993Q4
- 1994Q1 to present
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

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Inflation and Long-Term Interest Rate Differentials

- Inflation differential = Foreign inflation less U.S. inflation
- Long-term rate differential = Foreign rate less U.S. rate
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Note: All values are given as a percent at an annual rate.
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*See table of contents for changes to the series.
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 (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 M2 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/ms/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. M3M, 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/aggregate/swdata.html. Primary Credit Rate, Discount Rate, and Intended Federal Funds Rate shown in the chart Reserve Market Rates are plotted as of the date of the change, while the Effective Federal Funds Rate is plotted as of the end of the month. Interest rates in the table are monthly averages from the Board of Governors H.15 Statistical Release. The Treasury Yield Curve and Real Treasury Yield Curve show constant maturity yields calculated by the U.S. Treasury for securities 5, 7, 10, and 20 years to maturity. Inflation-Indexed Treasury Yield Spreads are a measure of inflation compensation at those horizons, and it is simply the nominal constant maturity yield less the real constant maturity yield. Daily data and descriptions are available at research.stlouisfed.org/fred2/. See also Statistical Supplement to the Federal Reserve Bulletin, table 1.35. The 30-year constant maturity series was discontinued by the Treasury as of February 18, 2002.

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

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

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

\[ j_t^f = 2.5 + (\pi_t - \pi^*_{t-1})/2 + 100 \times (\gamma_t - \gamma_{t-1})/\sqrt{2} \]

to five alternative target inflation rates, \( \pi^* = 0, 1, 2, 3, 4 \) percent, where \( j_t^f \) is the implied federal funds rate, \( \pi_{t-1} \) is the previous period’s inflation rate (PCE) measured on a year-over-year basis, \( \gamma_t \) is the log of the previous period’s level of real gross domestic product (GDP), \( \gamma_{t-1} \) 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 McCallum’s (1988, 1993) equation

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

to five alternative target inflation rates, \( \pi^* = 0, 1, 2, 3, 4 \) percent, where \( \Delta MB_t^* \) 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 \((\gamma_t - \gamma_{t-40})/400\times400\), where \( \gamma_t \) is the log of real GDP. The 4-year moving average of base velocity growth is calculated similarly. To adjust the monetary base for the effect of retail-deposit sweep programs, we add to the monetary base an amount equal to 10 percent of the total amount swept, as estimated by the Federal Reserve Board staff. These estimates are imprecise, at best. Sweep program data are found at research.stlouisfed.org/aggregate/swdata.html.
Implied One-Year Forward Rates are calculated by this Bank from Treasury constant maturity yield 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),

\[
R(m) = a_0 + (a_1 + a_2)(1 - e^{-m/50})/(m/50) - a_3 \times e^{-m/50},
\]

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

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

where duration is approximated as \( D(m) = (1 - e^{-R(m) \times m})/R(m) \). These rates are linear approximations to the true instantaneous forward rates; see Shiller (1990). For a discussion of the use of forward rates as indicators of inflation expectations, see Sharpe (1997). Rates on 3-Month Eurodollar Futures and Rates on Selected Federal Funds Futures Contracts trace through time the yield on three specific contracts. Rates on Federal Funds Futures on Selected Dates displays a single day’s snapshot of yields for contracts expiring in the months shown on the horizontal axis. Inflation-Indexed Treasury Securities and Yield Spreads are those plotted on page 3. Inflation-Indexed 10-Year Government Notes shows the yield of an inflation-indexed note that is scheduled to mature in approximately (but not greater than) 10 years. The current French note has a maturity date of 7/25/2015, the current U.K. note has a maturity date of 8/16/2013, and the current U.S. note has a maturity date of 7/15/2017. 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.

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.

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.

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

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.

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/.