The current housing crisis has been long and severe. Some areas of the country—particularly California, Florida, and Arizona—have been hit much harder than other areas, such as the Midwest. A less-discussed issue is that home price tiers—high-priced, mid-priced, and lower-priced homes—each responded differently to the mortgage boom and subsequent implosion.

Many factors caused the run-up in home prices. Interest rates were at unprecedented lows. Mortgage market innovations, including products such as interest-only loans and negative amortization loans, attracted many additional borrowers. Many first-time buyers rushed to buy a home, hoping to “get in” before it was too late and homes became even more unaffordable. Also, the ability to finance all, or nearly all, of the purchase price artificially buoyed home prices, as individuals could “afford” more because a lower down payment was required.

Middle- and upper-tier homebuyers were more insulated from many of these factors. They had less need for the newer mortgage products, as most of these consumers were not first-time buyers. As homeowners, they had equity to put toward their purchase, in contrast to most lower-tier first-time homebuyers.

The pattern individual cities display is the same across the country. Before the boom, house prices in all tiers grew at roughly the same rate. Sharp appreciation of home prices in all tiers followed, but prices for the lower tier increased at a much steeper rate. As home prices fell, the tiers also fell disproportionately. The chart tells the story vividly for four metropolitan areas: Boston, Cleveland, Tampa, and Phoenix. These communities are representative of the country’s 17 largest metropolitan statistical areas. Each plot shows four lines: lower-tier, middle-tier, and upper-tier home price indices and a national home price average. The data are quarterly and each line is normalized to 100 beginning in 1993.

Each city paints a different picture about the current state of the housing crisis. If we consider the picture of price stability to be the three lines reconverging to move in tandem again, many still have far to go. Cleveland, which had less of a spike than the other areas, appears to have leveled off and may be near the end of the downslide. Phoenix, on the other hand, may have overcorrected, with the lower-tier home price index plunging well below middle- and upper-tier home price indices. Interestingly, Phoenix’s middle- and upper-tier home prices spiked nearly as sharply as those in the lower tier, and it is the only city in which upper-tier prices peaked above middle-tier prices.

The chart implies hopeful recovery for some but continued hemorrhaging for others. In most cases, though, the declines in house prices have moved toward convergence and recent home price data do suggest that prices have stopped falling as dramatically. Current governmental policy offers an $8,000 tax credit to all first-time homebuyers, and the Fed continues to keep the federal funds rate low. Whether these actions, and the correction that has already taken place thus far, will stabilize home prices remains to be seen.

—Michelle T. Armesto and Carlos Garriga
Monetary Trends is published monthly by the Research Division of the Federal Reserve Bank of St. Louis. Visit the Research Division’s website at research.stlouisfed.org/publications/mt to download the current version of this publication or register for e-mail notification updates. For more information on data in the publication, please visit research.stlouisfed.org/fred2 or call (314) 444-8590.
M2 and MZM
Billions of dollars

Adjusted Monetary Base
Percent change at an annual rate

Reserve Market Rates

Inflation-Indexed Treasury Yield Spreads
Percent

Note: Effective December 16, 2008, FOMC reports the intended Federal Funds Rate as a range.
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

M2
Percent change at an annual rate

M3*
Percent change at an annual rate

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

**Adjusted and Required Reserves**
Billions of dollars

**Total Borrowings, nsa**
Billions of dollars

**Excess Reserves plus RCB Contracts**
Billions of dollars

**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

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Federal Reserve Bank of St. Louis
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 the notes section for an explanation of the chart.
Monetary Trends

Updated through 08/04/09

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Short-Term Interest Rates

Percent

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

Long-Term Interest Rates

Percent

Conventional Mortgage
Corporate Aaa
10-Year Treasury Yield

Long-Term Interest Rates

Percent

Corporate Baa
10-Year Treasury Yield

Short-Term Interest Rates

Percent

90-Day Commercial Paper
3-Month Treasury Yield

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

Percent

Intended Federal Funds Rate
Discount Rate
Primary Credit Rate

Federal Funds Rate and Inflation Targets

Percent

Calculated federal funds rate is based on Taylor's rule.

Components of Taylor's Rule

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

- PCE Inflation
  Percent change from year ago

Components of McCallum's Rule

- 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.

Monetary Base Velocity Growth

Real Output Growth

Percent

1-Year Moving Average

10-Year Moving Average
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

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

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

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

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

Research Division
Federal Reserve Bank of St. Louis
Recent Inflation and Long-Term Interest Rates

### Consumer Price Inflation Rates

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<th>Country</th>
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<th>2009Q1</th>
<th>2009Q2</th>
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### Long-Term Government Bond 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
## Money Stock

<table>
<thead>
<tr>
<th>Year</th>
<th>M1</th>
<th>MZM</th>
<th>M2</th>
<th>M3*</th>
<th>Bank Credit</th>
<th>Adjusted Monetary Base Reserves</th>
<th>MSI M2**</th>
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<tr>
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## Money Stock

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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>
<thead>
<tr>
<th>Year</th>
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<th>Primary Credit Rate</th>
<th>Prime Rate</th>
<th>3-mo CDs</th>
<th>3-mo Treasury Yields</th>
<th>3-yr Treasury Yields</th>
<th>10-yr Treasury Yields</th>
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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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<td>3.63</td>
</tr>
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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: M1 plus savings deposits (including money market deposit accounts) and small-denomination (under $10,000) 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 nonprofit 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. M3, 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/aggrep/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.

From 1991 to the present the source of the long-term PCE inflation expectations data is the Federal Reserve Bank of Philadelphia’s Survey of Professional Forecasters. Prior to 1991, the data were obtained from the Board of Governors of the Federal Reserve System. Realized (actual) inflation is the annualized rate of change for the 40-quarter period that corresponds to the forecast horizon (the expectations measure). For example, in 1965:Q1, annualized PCE inflation over the next 40 quarters was expected to average 1.7 percent. In actuality, the average annualized rate of change measured 4.8 percent from 1965:Q1 to 1975:Q1. Thus, the vertical distance between the two lines in the chart at any point is the forecast error.

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 $f_t^* = 2.5 + \pi_{t-4} + (\pi_{t-1} - \pi_t^*) / 2 + 100 \times (y_{t-1} - y_{t-4}) / 2$ to five alternative target inflation rates, $\pi_t^* = 0, 1, 2, 3, 4$ percent, where $f_t^*$ is the implied federal funds rate, $\pi_{t-1}$ is the previous period’s inflation rate (PCE) measured on a year-over-year basis, $y_{t-1}$ is the log of the previous period’s level of real gross domestic product (GDP), and $y_{t-4}$ 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 $\Delta MB_t = \pi_t^* + (10\text{-year moving average growth of real GDP}) - (4\text{-year moving average of base velocity growth)}$ to five alternative target inflation rates, $\pi_t^* = 0, 1, 2, 3, 4$ 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
$(y_t - y_{t-a})/400$, where $y_t$ 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/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),

$$R(m) = a_0 + (a_1 + a_2)(1 - e^{-um^5})/(m50) - a_3 e^{-um^5},$$

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** show 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.S. note has a maturity date of 8/16/2013, and the current U.S. note has a maturity date of 1/15/2018. **Inflation-Indexed 10-Year Government 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 weight 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 2005 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 releases.

**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**

