

# Economic Trends

**April 2010** (March 12, 2010 to April 8, 2010)

## In This Issue:

### **Inflation and Prices**

- Survey-Based Measures of Inflation Expectations

### **Financial Markets, Money and Monetary Policy**

- Market Expectations for Monetary Policy in the U.S. and Europe

### **Households and Consumers**

- Personal Savings Up, National Savings Down

### **Labor Markets**

- Hours and Labor Market Slack

### **Banking and Financial Institutions**

- Commercial Bank Lending

### **Growth and Production**

- An Immoderate Inventory Cycle

FEDERAL RESERVE BANK  
*of* CLEVELAND

## Survey-Based Measures of Inflation Expectations

---

04.05.10

by Mehmet Pasaogullari and Tim Bianco

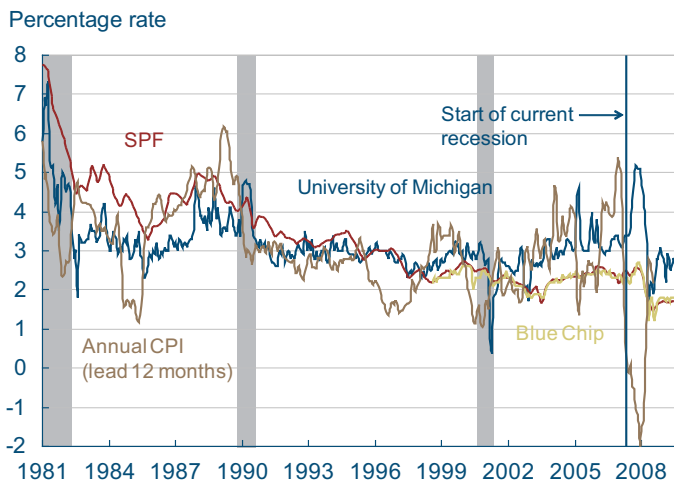
Expectations play a central role in economics. When faced with a pricing or an investment decision, people typically consider what they expect the future to look like and base their decisions accordingly. Their expectations for inflation not only reflect their perceptions about the future, they also directly affect actual levels of current and future inflation. Because of their importance in shaping economic outcomes, the expectations about the future price level are one of the major areas on which central banks focus.

There are two sources of data on inflation expectations. One is derived from market prices of various financial securities; the other is surveys of the general public and professional forecasters and economists. A well-known market-based measure uses the spread between the yields of nominal Treasuries and TIPS. Another is inflation swap rates. (For a new, model-based measure of inflation expectations that uses these market prices, see this Economic Commentary). Popular surveys of expectations include the University of Michigan's Survey of Consumer Attitudes and Behavior (U of M survey), the Survey of Professional Forecasters (SPF), and the Blue Chip Survey.

Here we look at recent trends in these survey-based measures of inflation expectations. Survey-based measures provide some information that most market measures don't, including shorter-term expectations and distributions among different survey participants.

The respondents of the U of M survey are consumers. Among other things, they are asked how much they expect prices to change over next 12 months, but in general terms, not relative to any price statistic or consumption basket. In contrast, the SPF and the Blue Chip Survey ask participants—professionals and economists—for their inflation expectations with respect to particular measures including the CPI. The SPF and Blue Chip Sur-

## One-Year-Ahead Inflation Expectations and CPI Inflation



Sources: University of Michigan, Federal Reserve Bank of Philadelphia, Blue Chip Newsletter, Bureau of Labor Statistics and NBER.

vey ask respondents about their inflation expectations for specific quarters, and the annual inflation expectations are computed from the quarterly figures. In addition, the SPF is conducted quarterly, whereas the other two are conducted monthly. We interpolated monthly figures for the SPF from the quarterly ones.

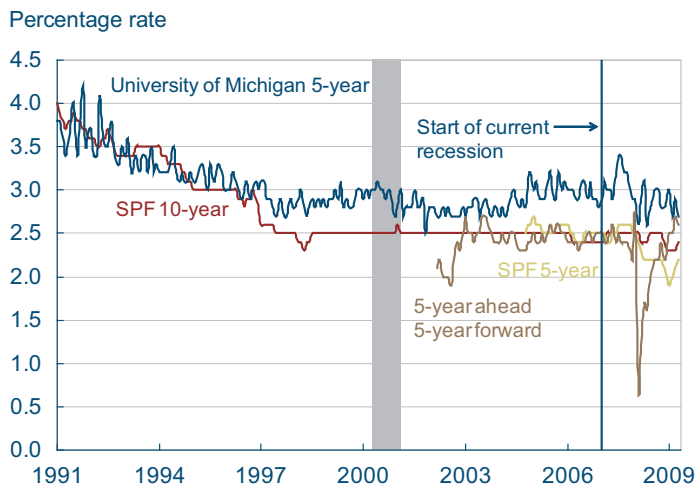
When the inflation expectations calculated from these three surveys (specifically, the median expectation for the next year) are plotted alongside CPI inflation that has been shifted 12 months forward (to line up expectations with the inflation they predict), we see that the survey-based estimates are imperfect predictors of actual inflation. In relatively stable periods, they are better in forecasting, but they generally fail to predict big movements in inflation. Another observation is that early in recessions, expectations generally exceed actual inflation. This may reflect the difficulty in predicting recessions since recessions are generally associated with less inflationary pressure.

Median short-term inflation expectations increased at the onset of the recession, but they dropped sharply during the financial crisis. They have picked up to moderate levels since March 2009. The swings following the recession were substantial; for example, U of M expectations declined to 1.7 percent in December 2008 from 5.2 percent in May 2008. For the other two surveys, the declines were not as large, but they were still significant: 1.1 percent for the SPF from the second quarter of 2008 to the first quarter of 2009, and 1.5 percent for the Blue Chip Survey from May 2008 to March 2009. Since then, U of M inflation expectations have displayed a rising trend, reaching 2.7 percent in February 2010, while both of the other measures have hovered around 1.7 percent to 1.8 percent.

What about longer-term inflation expectations? Median 5-year inflation expectations from the U of M survey have shown a declining pattern since mid-2008. The 5-year inflation expectation from the SPF declined until recently, while the 10-year expectation hardly moved except for the last quarter of 2009. These two measures bounced up in the first quarter of 2010.

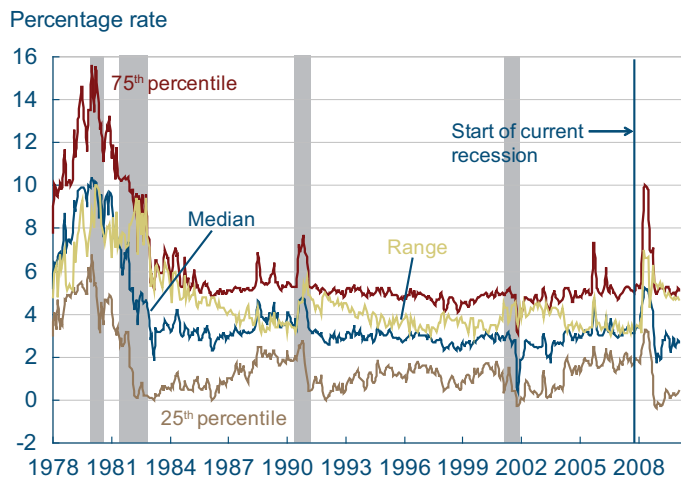
On the other hand, a market-price-based measure

## Medium-Term Inflation Expectations



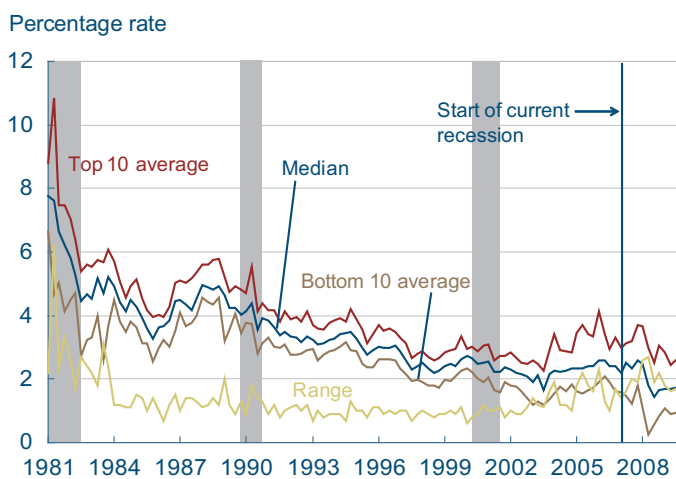
Sources: Federal Reserve Bank of Philadelphia, University of Michigan, Federal Reserve Board, NBER.

## The University of Michigan One-Year-Ahead Inflation Expectations



Sources: University of Michigan and NBER.

## SPF One-Year-Ahead Inflation Expectations



Sources: Federal Reserve Bank of Philadelphia and NBER.

of inflation expectations (from 5- and 10-year TIPS and nominal Treasury securities), which we plotted for comparison, has been quite volatile in this recession. It rapidly declined to 0.7 percent in December 2008 from its level of around 2.6 percent in the earlier months of 2008. Since then, it has gradually been increasing, and as of February 2010, it is 2.6 percent. Though we have used this measure to alleviate problems arising from liquidity and inflation risk premiums, its volatile behavior shows that it may be substantially contaminated by these effects. Overall, recent longer-term inflation expectations are below or around their historical averages, showing no substantial pressure for future inflation.

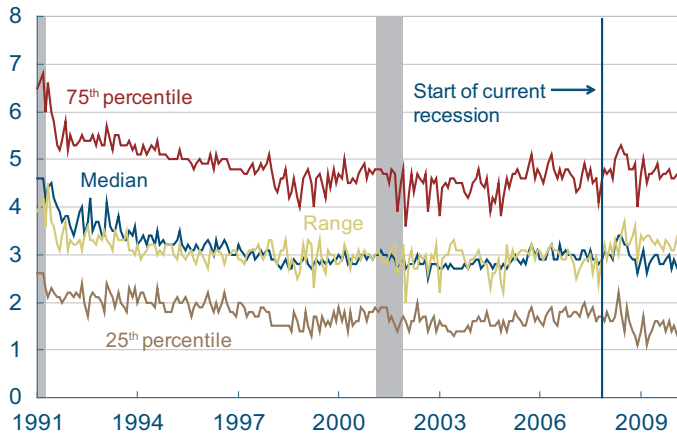
The median values from the surveys show only a general tendency for inflation expectations. When we look at the distribution of expectations among the survey respondents, we see substantial disagreement. While such disagreement used to be associated with the volatility of the economic environment, it may also arise from different perspectives, experiences, or information sources among the participants. Whatever the underlying source, the divergence of expectations for short-term inflation picked up substantially following the recession.

During the volatile period of 2008, the range between the 25th and 75th percentiles of 1-year inflation expectations from the U of M survey was at its highest level since the early 1980s disinflationary period. SPF 1-year inflation expectations also became more dispersed during this time. Some participants of the surveys expected a disinflationary or deflationary period, while others expected an increase in inflation. (The deflationary expectations can be seen in the 25th percentile of the 1-year U of M inflation expectations, which were negative between November 2008 and April 2009. Although we can see a disinflationary expectation for some SPF respondents, we don't see a negative figure for the average of the bottom 10 of the SPF.) This, in itself, shows how volatile the environment was after the financial crisis. The dispersion of expectations is still quite high, although it has declined substantially recently.

Disagreement about longer-term expectations also increased in this recession according to the U of M

## The University of Michigan Five-Year-Ahead Inflation Expectations

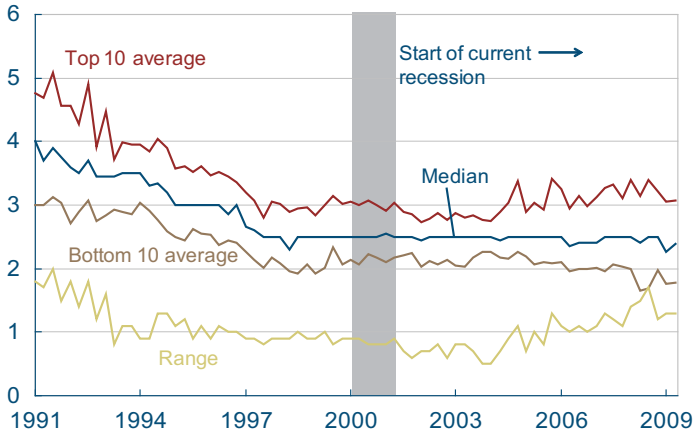
Percentage rate



Sources: University of Michigan and NBER.

## SPF 10-Year-Ahead Inflation Expectations

Percentage rate



Sources: Federal Reserve Bank of Philadelphia; NBER

Survey and the SPF. However, it did not increase quite as substantially as it did for short-term expectations.

In sum, we see that the short-term inflation expectations were very volatile following the recession and that, recently, median expectations have hovered around 2 percent and 2.5 percent (respectively, for professional forecasters and consumers). However, there was substantial disagreement about future inflation expectations early in the recession, reflecting opposite concerns among survey participants: some fear deflation or disinflation and others fear higher inflation. The longer-term inflation expectations are currently around their historical levels, and the dispersion for these expectations also reflects a better anchoring of inflation rates over the longer term.

For the Federal Reserve Bank of Cleveland's *Commentary* "A New Approach to Gauging Inflation Expectations" visit <http://www.clevelandfed.org/research/commentary/2009/0809.cfm>

## Market Expectations for Monetary Policy in the U.S. and Europe

03.24.10

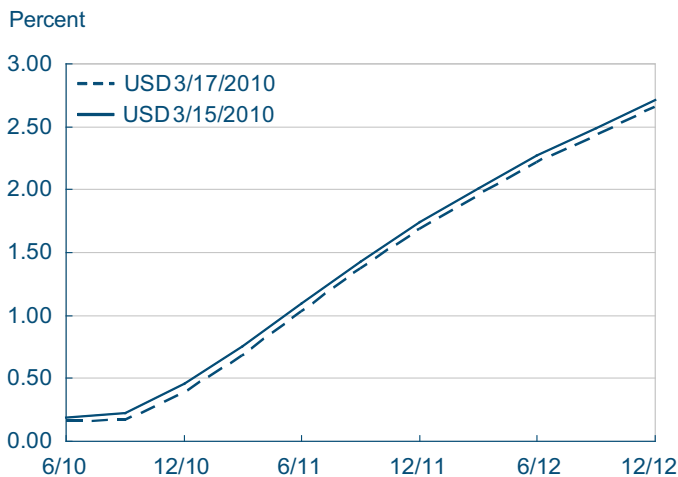
by Tim Bianco, Kent Cherny, Ben Craig, and John Lindner

On March 16, the Federal Open Market Committee (FOMC) released a statement saying it would hold the Federal Funds target rate at 0 to 1/4 percent, and that “low rates of resource utilization, subdued inflation trends, and stable inflation expectations, are likely to warrant exceptionally low levels of the federal funds rate for an extended period.” The Committee also confirmed that the end of March would see the sunset of Fed purchases of agency mortgage-backed securities and agency debt, which have been executed in the amounts of approximately \$1.25 trillion and \$175 billion, respectively, over the past year.

Was the market surprised by anything in this statement? One measurement of expectations—Eurodollar futures—suggests not. Eurodollar deposit rates are the rates paid on large deposits of dollars in foreign banks. Eurodollar futures are contracts to lend Eurodollars at a given interest rate for a particular length of time at a specified future date. The market for these instruments is heavily traded, and therefore it provides a reliable gauge of how the capital markets expect short-term, dollar-denominated interest rates to move in a set period of time. (Typically, we would look at federal funds futures to gauge market expectations for short-term rates, but this market has not been functioning normally with fed funds rates near zero.)

The chart at left shows the interest rates associated with 90-day Eurodollar futures to be delivered between June 2010 and December 2012. The upward slope of the curve indicates that markets are pricing in an increase in short-term interest rates over the next year and half. Since there is not much room for rates to go anywhere but up, this isn’t really surprising or insightful. It is more useful to compare the curve prior to the March 16 FOMC meeting and after it. Doing so, we see that the curve experienced a parallel shift of about 5 basis points (0.05 percent) following the meeting. There

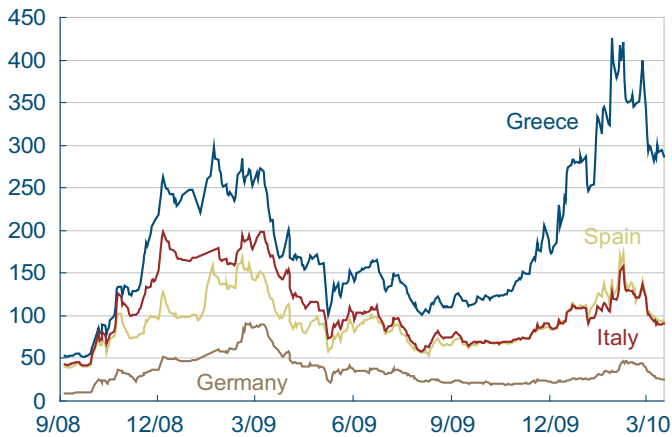
### Eurodollar Forward Rate Curves



Note: Derived from 3-month Eurodollar and Euribor Futures.  
Source: Bloomberg

## Sovereign Credit Default Swaps

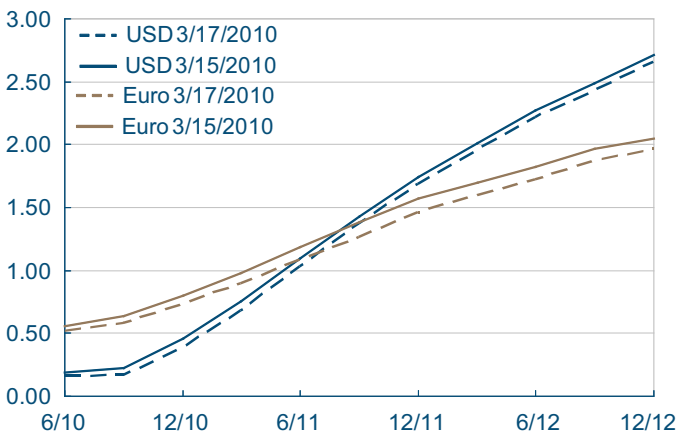
Spread on 5-year swaps, in basis points



Source: Bloomberg.

## Eurodollar Forward Rate Curves

Percent



Note: Derived from 3-month Eurodollar and Euribor Futures.  
Source: Bloomberg

was some downward revision of expectations, but not much—the market basically got what it expected from the FOMC statement: low rates for an “extended period.”

Interest rates on euro-denominated contracts, however, have fallen further than their dollar-denominated counterparts. In the same period around the FOMC meeting, expectations for short-term euro rates fell 9 or 10 basis points. What’s more, the crossing of the dollar and euro curves shows that while euro rates are currently above those of dollar rates, the market expects the monetary policy in the euro-area to stay looser for longer than in the United States. This may have to do, in part, with fiscal concerns about a number of European countries.

As has been heavily reported in the financial press, Greece’s budget deficit this year (in the double-digits as a percentage of GDP) has prompted concern about the near-term sustainability of its fiscal policy. Although Greece is small relative to many of its European neighbors, its fiscal situation and debt market troubles have also brought suggestions that other, larger EU countries—like Spain and Italy—may themselves be increasingly risky to creditors because of similar fiscal imbalances.

The perceived credit risk of these countries is best seen in their credit default swap spreads. Protection against a Greek government default is more than six times as expensive as similar protection against a default by Germany, which is the largest EU economy and one with a stronger fiscal outlook. Protection against default for two other large European countries—Spain and Italy—is more than twice as expensive as for Germany. The implications of these fiscal developments for issues of financial stability and economic fragility may well keep monetary policy, and thus short-term interest rates, loose in the euro area longer than in the United States.

FOMC March 16 statement:  
<http://www.federalreserve.gov/newsevents/press/monetary/20100316a.htm>

Federal Funds Rate predictions from FRBC:  
<http://www.clevelandfed.org/research/data/fedfunds/index.cfm>

*Economic Commentary* “Credit Default Swaps and Their Market Function”:  
<http://www.clevelandfed.org/research/commentary/2009/0709.cfm>

## Personal Savings Up, National Savings Down

03.19.10.

by Daniel Carroll and Beth Mowry

Saving is the engine that drives long-run economic growth by providing funds for investment in capital and projects, which then produce output in the future. Since the early 1980s the personal savings rate, the fraction of after-tax (or disposable) income households save, has trended downward. Household savings end up as investment either directly, like when a household directly purchases equity, or indirectly, when a household puts its savings in a bank, which uses those funds for lending.

In 1982, the personal savings rate was nearly 11 percent of disposable income. In contrast, by 2005 personal savings represented only 1.4 percent of disposable income. This steady decline in the savings rate of U.S. households has concerned economists, so it may be seen as promising that the trend reversed direction during the latest downturn. In 2008, the personal savings rate rose to 2.6 percent and in 2009 reached 4.3 percent, its highest level since 1998.

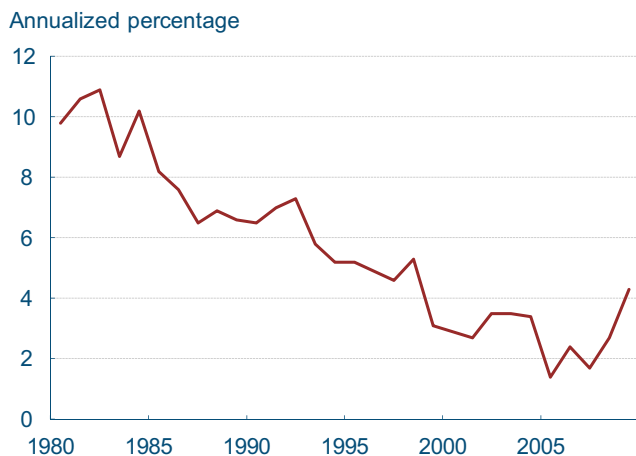
To understand the reason for this uptick, it helps to know how the savings rate is calculated. The personal savings rate can be expressed as one minus the ratio of household personal outlays (that is, spending) to disposable income (personal income minus personal taxes). This leads to the following simple equation:

$$\text{Personal Savings Rate} = 100 * \left(1 - \frac{\text{Personal outlays}}{\text{Personal income} - \text{Personal taxes}}\right) \text{ percent}$$

This equation shows that changes in the personal savings rate must be associated with at least one of the following: increased personal income, reduced personal outlays, or decreased personal taxes. Let's take a look at the trends in each of these components in turn.

Over the past five years, personal income growth has slowed. Personal income grew at annual rates of 7.5 percent in 2006 and 5.6 percent in 2007, but following the onset of the last recession, income slowed to 2.9 percent in 2008 and fell in 2009 to

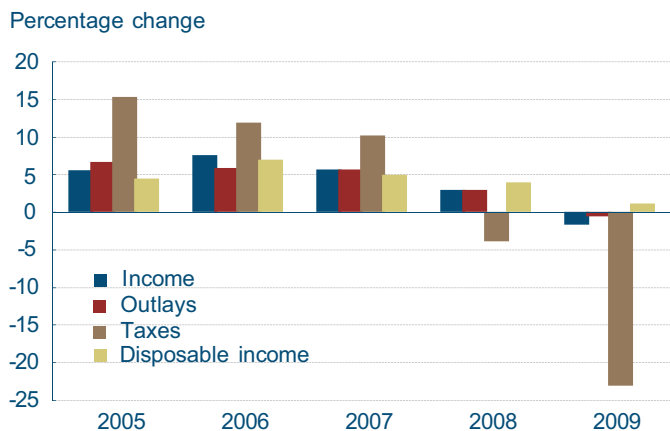
### Personal Savings Rate



Source: Bureau of Economic Analysis.



## Percentage Change in Components of Personal Savings Rate



Source: Bureau of Economic Analysis.

-1.7 percent. Taken in isolation, a declining trend in personal income reduces the personal savings rate. Since the personal savings rate has risen, the cause for the increase must be found in the other two factors.

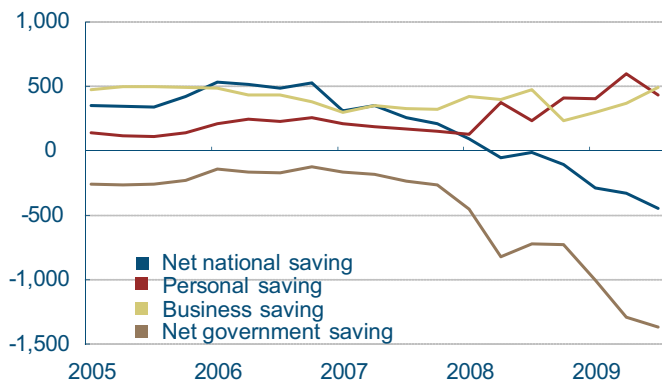
Turning to the second component, personal outlays, primarily households' expenditures on consumption goods and services, have also declined, though less precipitously than personal income. After growing at an average annual rate of 5.7 percent from 2005-2007, personal outlays grew in 2008 by only 2.9 percent, and in 2009 shrank slightly (-0.6 percent). A decline in outlays does move the personal savings rate upward, but it cannot be the main factor behind the rise in the rate because personal income fell by an even greater percentage.

The rise in the personal savings rate then must be driven by the third component, personal taxes. The tax cuts in the 2008 and 2009 stimulus packages caused personal current taxes to fall by annual rates of 3.9 percent and 23.1 percent. This decline in tax liability more than offset the fall in personal income, meaning disposable income rose by 3.9 percent and 1.1 percent in 2008 and 2009, respectively. The positive growth in disposable income generated by these large reductions in tax liabilities, combined with the modest reductions in household expenditures, has led to the recent increase in the personal saving rate.

One may wonder if this change in household savings signifies a long-lasting change in households' saving behavior. For now, the answer is not certain. Surely, some of the decline in consumption expenditures has been caused by the sizeable downward adjustments to households' net worth from the financial crisis. As the economy recovers and net worth increases, households may revert back to their previous low levels of saving. We cannot look to persistent increases in disposable income from tax breaks to keep increasing the personal savings rate either. The federal government cannot continue to shrink tax liabilities at the current rates because it must manage future budget challenges. Over the long term, increases in the personal savings rate must come from reductions in household

## Net National Savings and its Components Quarterly, 2005:Q1 to 2009:Q3

Billions of U.S. dollars



Source: Bureau of Economic Analysis.

consumption relative to income, not from short-run tax breaks.

Finally, we should consider whether the current increase in private savings has had much impact on national savings. National savings consists of personal, business, and government savings. Of these, personal savings has made up nearly 55 percent of net savings by the private sector over the last thirty years. Yet despite the rise in the household savings rate and a similar rise in business savings, net national savings have declined rapidly. In fact, in 2008 net national savings became negative for the first time since the Great Depression. As a result, the shortfall in national savings must be made up through borrowing and investment from abroad. The costs to the U.S. of using more foreign financing are that a fraction of the gains from future growth must be paid back.

How is this decline in national savings possible given the documented rise in household and business savings? The answer is that government savings has become so negative that it overwhelms the savings of the private sector. This has been due in large part to increases in government spending, but the reduction in government tax revenues has also played a role. The recent gains to personal savings from decreased tax liabilities to households were completely offset by corresponding losses to government savings from reduced tax revenue.

## Hours and Labor Market Slack

04.07.10

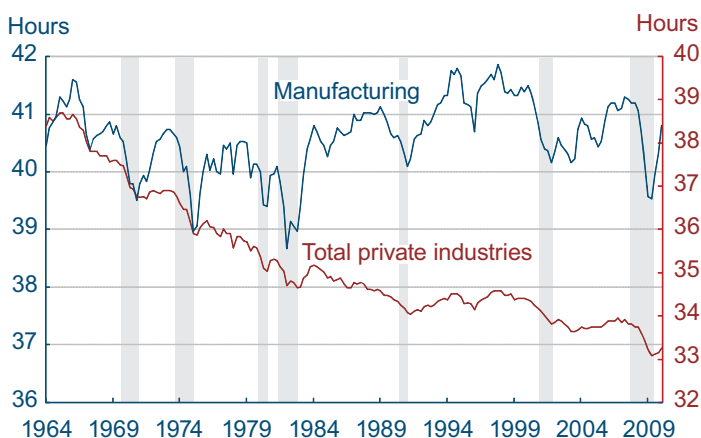
by Murat Tasci and Beth Mowry

Payroll employment has declined substantially over the course of past two years. Since December 2007, when the most recent recession began, payrolls declined by more than 8.4 million, about 6.1 percent. At the same time, we experienced one of the sharpest increases in the unemployment rate in U.S. history, from 5 percent to 10.1 percent this past October, before coming down to 9.7 percent. Even though it is widely thought that the aggregate economy came out of the recession in the second quarter of 2009, we have not yet seen a major improvement in the labor market. As a result, many are concerned about the potentially “jobless” nature of the recovery (see our Commentary on the topic). Measures of the demand for labor are still weak, and firms could get away without hiring because there is a significant pool of workers who could, in principle, supply more hours.

One way employers can increase production before hiring new workers is to increase the average hours of their workforces. If the demand for their products is uncertain as the recovery is taking hold, firms have the option of adjusting hours per worker and avoiding a costly recruitment. It turns out that during the recent downturn, average hours declined substantially, so employers have a significant margin to work with before they have to start adding to payrolls.

The average weekly hours of production and nonsupervisory workers was at 33.9 hours at its peak, right before the beginning of the recession. It declined to 33.1 in the second quarter of 2009, which was a record low. It is currently at 33.1. This measure has shown a significant trend decline over time, but it still reveals a lot of high-frequency movements around the business cycle turning points. Namely, when the economy enters a recession, job cuts and reductions in hours translate into a decline in average hours. The decline during the most recent recession was one of the largest. We are still somewhat below the implied trend level,

### Average Weekly Hours of Production Workers



Note: Shaded bars indicate recessions.  
Source: Bureau of Labor Statistics.

so there is still some room for employers to adjust hours per worker. However, if the more general trend decline continues, we may never see a significant uptick back to prerecession levels.

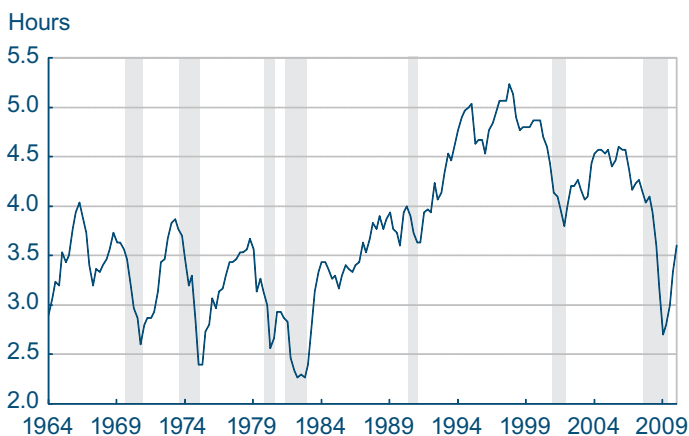
The average weekly hours in manufacturing has always been a more volatile series relative to that of the total private sector. The decline in the average workweek in manufacturing during the most recent recession was also quite striking by historical standards. The good news is that, since the sharp drop to 39.5 hours, the average workweek in this sector has started to improve. It is around 40.8, which is quite close to the average of the past 30 years. Indeed, once manufacturing hours started to improve, job losses in manufacturing declined and, finally, after two years of decline, manufacturing employment gained modestly in the first quarter of 2010.

The average hours of weekly overtime is another potential labor buffer in which we can see the effects of business cycle fluctuations. Throughout the most recent recession we have seen one of the largest drops in this measure, but it started to rise during the past two quarters. Adjusting overtime hours can be only a temporary solution for firms, but it might give many of them just a little more flexibility before they must start to hire again.

Measures of the average hours in a workweek, either for manufacturing or the total private sector, are aggregate measures. They do not distinguish between part-time or full-time workers. One troubling trend we saw in the most recent recession was the increase in the number of workers who work part-time for economic reasons. The figure climbed to 6.7 percent of total employment, the highest it has been since the 1981-82 recession. Workers are classified in this group in the BLS's Current Population Survey for two possible reasons: They work part-time because business is slack, or they could not find a full-time job even though they wanted to.

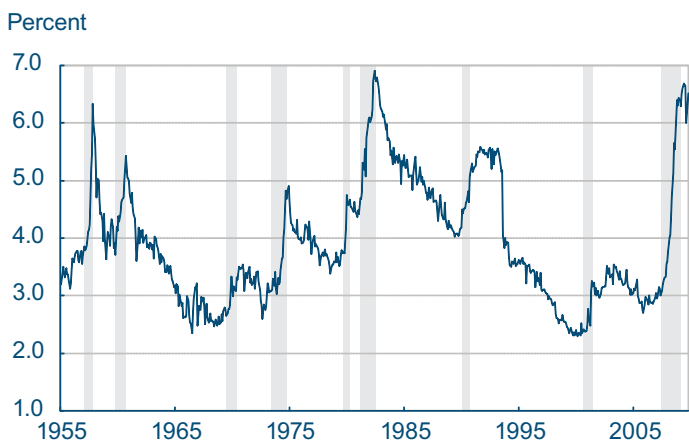
It turns out that the rise in this group's share of total employment was due to the growing number of those in the former group. The number of workers who worked part-time due to economic reasons

## Average Weekly Overtime: Manufacturing



Note: Shaded bars indicate recessions.  
Source: Bureau of Labor Statistics.

## Part-Time Workers for Economic Reasons as a Percentage of Total Employment



Note: Shaded bars indicate recessions.  
Source: Bureau of Labor Statistics.

## Part-Time Workers by Reason as a Percentage of Total Employment



Note: Shaded bars indicate recessions.  
Source: Bureau of Labor Statistics.

was around 4.5 million at the onset of the recession (around 3 percent of total employment), which increased to more than 9.2 million (6.7 percent) by last November. More than 80 percent of those additional 4.5 million workers are working part-time not because they could find only part-time jobs but because their employers could afford only part-time workers, given the demand for their business.

As we have argued above, these workers constitute a large enough pool that firms could ramp up production and still avoid costly hiring and recruitment by just moving these part-time workers to full-time. Currently, the fraction of these workers is still far from its long-term average, which is more consistent with prerecession levels. Fortunately though, this measure has started to decline in the past four months. The sooner firms use up these underutilized resources, the sooner they will start hiring new workers.

---

For the Federal Reserve Bank of Cleveland's *Commentary* "Are Jobless Recoveries the New Norm?" visit <http://www.clevelandfed.org/research/commentary/2010/2010-1.cfm>

03.12.10

by James B. Thomson and Kent Cherny

As the economy emerges from its economic winter, concerns remain about the fragility and robustness of the recovery, in part because of anecdotal evidence that credit flows have yet to return to normal. The most recent data from one of the most important credit channels, commercial bank lending, adds credence to these concerns.

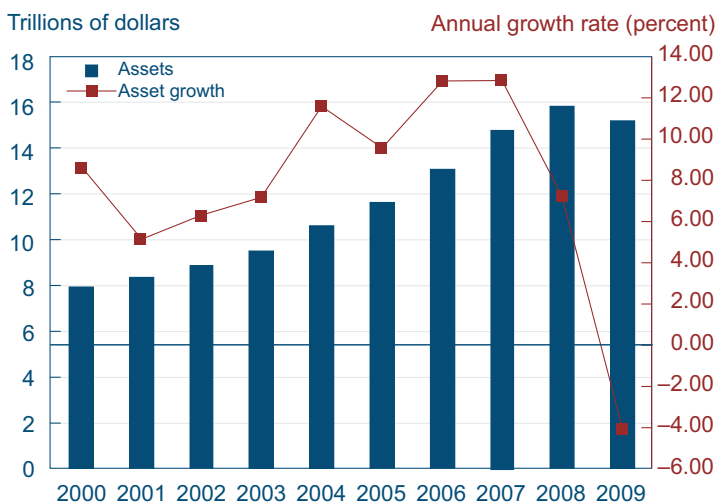
In terms of commercial banks' total assets, the U.S. banking system grew at an average rate of 9 percent from 2000 through 2008, with yearly growth ranging from just over 5 percent in 2001 to nearly 13 percent in both 2006 and 2007. Banking system growth slowed in 2008 to just over 7 percent, before turning negative in 2009, as the industry shrank by over 4 percent.

The trend in commercial bank assets tells only part of the story. Over the past decade, lending has accounted for only 52 percent of bank assets on average (lending consists of net loans and leases). This means that changes in bank assets may not provide an accurate picture of what is happening with bank credit. This is especially true in 2008 and 2009, as Federal Reserve actions to contain the financial crisis and restore credit flows more than doubled the level of bank reserves—bank reserves rose from an average of 5 percent of assets from 1998 through 2007 to over 8 percent of assets in 2008 and 2009.

The growth of net loans and leases mirrors that of bank assets through 2007. (Net loans and leases are total loans and leases less reserves set aside for loan losses.) Loan growth is much weaker than asset growth after 2007, as bank loan growth in 2008 fell to under 3 percent in 2008 and shrank at a rate of 6 percent in 2009.

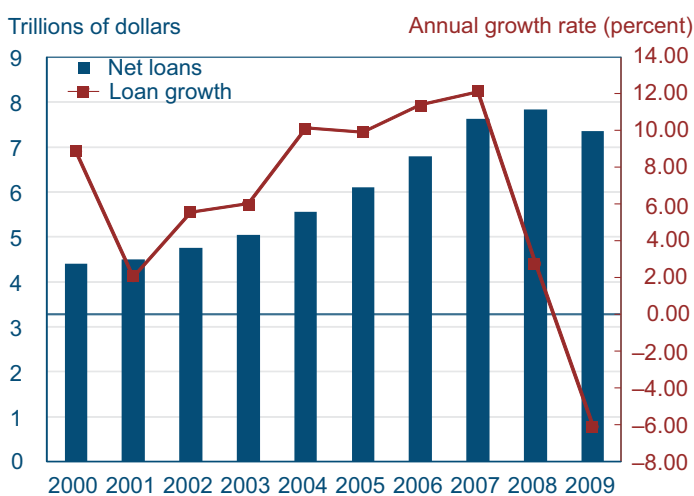
From the standpoint of an economic recovery, two forms of bank lending are especially important, commercial and industrial (C&I) lending and commercial real estate (CRE) lending. These represent a major source of credit for businesses of all sizes, but particularly small and medium-sized firms. Com-

## Bank Assets



Source: Bank Call Reports.

## Net Loans and Leases



Source: Bank Call Reports.

mercial and industrial loans contracted at a rate of 20 percent in 2009. Commercial real estate loans have fared slightly better than net loans and leases and much better than commercial and industrial loans, as this category of lending shrank only 4 percent in 2009. By all measures discussed so far—from total assets to commercial real estate loans—bank credit declined in 2009.

These measures reflect assets that are on banks' balance sheets. Increasingly, on-balance-sheet measures of credit tell an incomplete story about the bank lending channel. Some types of credit don't appear on balance sheets, and some loans have been taken off.

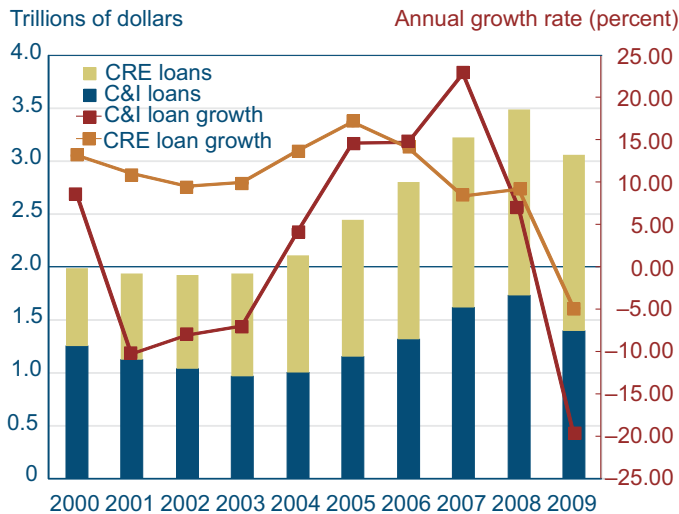
Bank lines of credit are commonly used by business customers for backup credit. Businesses that regularly fund themselves in the commercial paper market, for example, often have bank credit lines as backup sources of funding as a hedge against a disruption in their ability to borrow in the commercial paper market. In addition, a number of businesses use credit lines as liquidity facilities—drawing them down temporarily to cover unexpected expenses or to take advantage of an unforeseen investment opportunity. Letters of credit allow customers to get credit from other sources, such as a business getting trade credit from a supplier.

Both undrawn lines of credit and letters of credit represent an off-balance-sheet form of credit availability, but neither results in an on-balance-sheet asset when it is created. A credit line becomes an on-balance-sheet asset only after it is drawn on, and a letter of credit only if a bank takes over the loan backed by the letter.

Banks also sell or securitize a number of loans they make, causing on-balance-sheet loans to understate the amount of credit being intermediated.

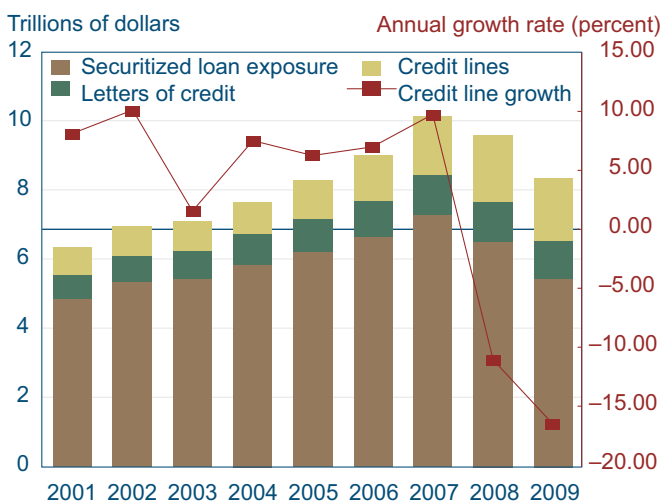
Both securitized asset exposure and letters of credit declined in 2009 at a rate exceeding 4 percent. More troubling is the sharp contraction in banks' undrawn lines of credit—this source of credit fell 11 percent in 2008 and 16 percent in 2009. With on-balance-sheet loans declining in 2009, it is clear that the declines in off-balance-sheet credit facilities

## Commercial Credit



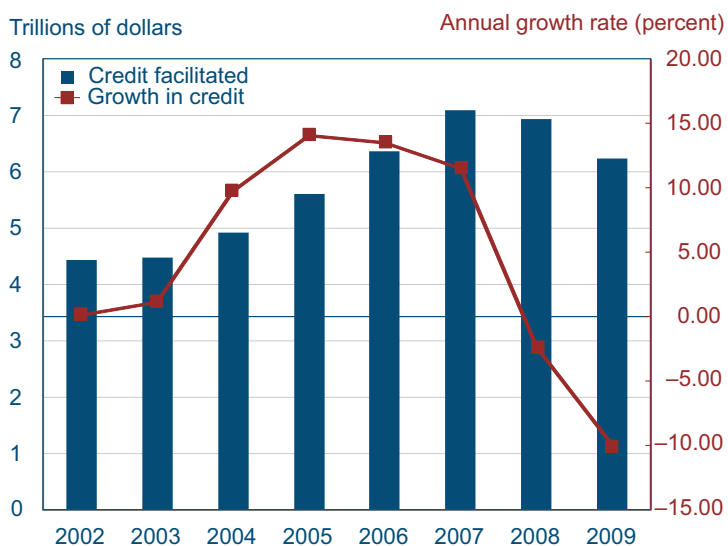
Source: Bank Call Reports.

## Off-Balance-Sheet Credit



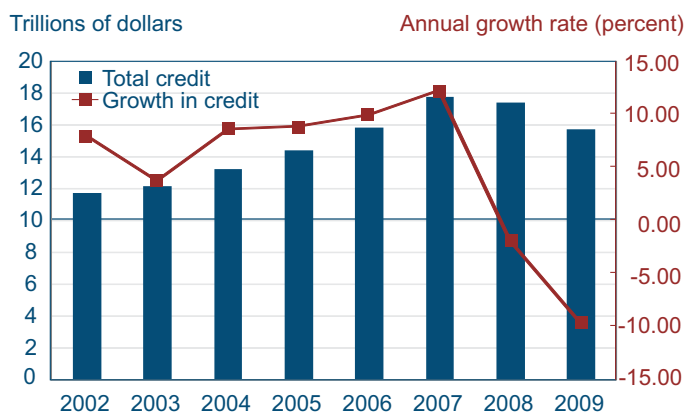
Source: Bank Call Reports.

## Commercial Credit Facilitated



Source: Bank Call Reports.

## Total Bank Credit Facilities



Source: Bank Call Reports.

are due, in part, to a retrenchment in bank credit facilities and credit substitutes.

While all of these components of the bank credit channel showed increasing weakness after the financial crisis of 2007, comprehensive measures of bank credit have also contracted. The figures below show two such measures. Commercial credit facilitated by the banking system measures on-balance-sheet business loans and off-balance-sheet credit facilities. Total bank credit activities is a measure of on-balance-sheet net loans and leases plus total off-balance-sheet credit facilities. Both commercial credit facilitated and total credit facilitated by banks peaked in 2007 and have declined subsequently. Commercial credit facilities fell by 2 percent and 10 percent in 2008 and 2009, while total credit facilities shrank by 2 percent and 9 percent over the same time period.



## An Immoderate Inventory Cycle

---

04.12.10

by Ken Beauchemin

The final estimate of fourth-quarter real GDP growth registered 5.6 percent, but was revised down from the second estimate of 5.9 percent. It was, nevertheless, substantially higher than the 2.2 percent pace recorded in the third quarter. To better understand the apparent strength in fourth quarter activity, it is instructive to split GDP into two basic components: final sales of gross domestic product and the change in private inventories. Because GDP measures the flow of output produced during a given quarter, the portion of product unsold at the close of the quarter is counted as an investment in inventories. Final sales represent everything else and include all of the familiar expenditure components (consumption, investment, net exports, and government purchases) and their subcomponents.

A look at each component shows that the developments in inventories were responsible for the apparently strong fourth quarter of 2010. Although firms cut inventories as in the preceding quarter, they did so less severely, so that inventory investment actually added 3.8 percentage points to growth. Final sales rose at moderate 1.7 percent pace, up slightly from the 1.5 percent rate posted in the third quarter, and contributed the remaining 1.8 percentage points to fourth quarter GDP growth. In sum, fourth quarter strength was the result of inventory liquidation happening at a slower pace than in the third quarter. In situations like the current one, final sales growth renders a clearer signal of the underlying strength of the economy. We are surely recovering from the Great Recession, but not nearly as rapidly as suggested by the latest GDP figure.

If ordinary intuition is vexed by inventory logic, then some basic arithmetic may help clear it up. In the table below, the second column gives the value of inventory investment in each quarter during the 2007-09 period. A positive number signifies an accumulation of inventories—or production in excess of sales—and a negative number indicates a decumulation (sales in excess of production). The third

column shows the value of the stock of inventories present at the end of the indicated quarter—in other words, the value unsold cars on lots, oil in storage tanks, grain in silos, and a myriad of other goods in warehouses and on store shelves. From the table, one can easily verify that the inventory stock in place at the close of given quarter is equal to the existing stock from the preceding quarter plus the amount of inventory investment during the quarter (divided by four since GDP component flows, including inventory investment, are reported at annual rates).

## Contributions of Investment and Final Sales to GDP

	Inventory investment (billions of chain-weighted dollars)	Inventory stock (billions of 2005 chain-weighted dollars)	Change in investment (billions of 2005 dollars)	Inventory contribution to GDP (percent)	Final sales contribution to GDP (percent)	GDP growth
2007:Q1	14.5	1828.8	2.6	-0.62.6	1.8	1.2
2007:Q2	23.3	1834.6	6.5	0.2	3.4	3.6
2007:Q3	29.8	1842.1	6.5	0.2	3.4	3.6
2007:Q4	10.3	1844.7	-19.5	-0.6	2.8	2.1
2008:Q1	0.6	1844.8	-9.7	-0.2	-0.5	-0.7
2008:Q2	-37.1	1835.5	-37.7	-1.3	2.7	1.5
2008:Q3	-29.7	1828.1	7.4	0.3	-2.9	-2.7
2008:Q4	-37.4	1818.8	-7.7	-0.6	-4.7	-5.4
2009:Q1	-113.9	1790.3	-76.5	-2.4	-4.1	-6.4
2009:Q2	-160.2	1750.2	-46.3	-1.4	0.7	-0.7
2009:Q3	-139.2	1715.4	21.0	0.7	1.6	2.2
2009:Q4	-19.7	1710.5	119.5	3.8	1.8	5.6

Sources: Bureau of Economic Analysis and author's calculations.

Published GDP growth rates typically compare the magnitude of real GDP in a given quarter with that of the prior quarter, with the growth rate subsequently annualized. As part of this calculation, inventory investment is naturally compared to the previous level of inventory investment. The quarter-to-quarter changes in inventory investment are reported in the table as well. The big push to GDP by inventory investment in the fourth quarter is now apparent. The change in inventory investment from the third quarter of 2009 to the fourth was a massive \$119.5 billion increase, leading to the outsized 3.8 percentage point fourth quarter contribution from inventory investment—despite the fact the stock of inventories continued to fall. They fell, but at a much slower pace than previously.

Although the outsized 3.8 percent contribution from inventory investment in the fourth quarter is not without precedent, it is the largest since the first quarter of 1984 in the wake of the severe 1982 recession—just prior to the beginning of the period dubiously dubbed “the Great Moderation.” During that period, there were only two recessions, both mild and in which firms met with more success managing inventories. Perhaps in an exercise putting the cart before the horse, some economists championed better inventory control as a driving force behind the Great Moderation. Recent experience casts that conclusion into doubt. In either a failure to properly anticipate the dramatic collapse in demand, or to adjust production levels quickly enough, inventory slashing continued well into the second half of 2009, setting up the dramatic slowdown that led to the surprise contribution of inventory to GDP in the fourth quarter.

This raises the dual question: how much further will inventories fall in the coming months, and how fast will they fall? The answer depends largely on the present size of inventories relative to current sales. Because changing the rate of production is typically costly, inventories provide a useful buffer between production and fluctuations in demand, hence the fluctuations observed over the past few years. But carrying inventories is also costly.

Over time, firms will seek to match inventories and sales by striving to maintain a target inventory-sales ratio. By my own calculations, the ratio is roughly 4.3 percent below its trend in the fourth quarter. (The ratio I applied includes the final sale of goods only. The goods-only ratio produces a better benchmark or target since inventories naturally comprise only merchandise, whereas final sales of GDP also include services.) Interpreting the trend ratio as the target and applying historical rates of “error correction,” implies that the target ratio will be virtually restored by the end of 2010. If so, we can look for rising inventory levels soon, perhaps as early as the first quarter of 2010, along with another substantial positive contribution from inventory investment to GDP growth. Inventory contributions should revert to smaller, and more historically normal levels, in the second half of the year.

---

*Economic Trends* is published by the Research Department of the Federal Reserve Bank of Cleveland.

Views stated in *Economic Trends* are those of individuals in the Research Department and not necessarily those of the Federal Reserve Bank of Cleveland or of the Board of Governors of the Federal Reserve System. Materials may be reprinted provided that the source is credited.

If you'd like to subscribe to a free e-mail service that tells you when *Trends* is updated, please send an empty email message to **[econpubs-on@mail-list.com](mailto:econpubs-on@mail-list.com)**. No commands in either the subject header or message body are required.

ISSN 0748-2922

