

# Economic Trends

June 2012 (May 11, 2012-June 12, 2012)

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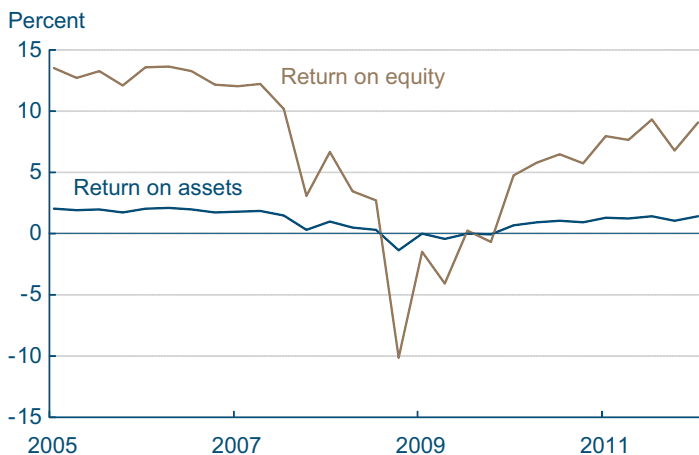
FEDERAL RESERVE BANK  
*of* CLEVELAND

## Subdued Business Lending

05.30.12

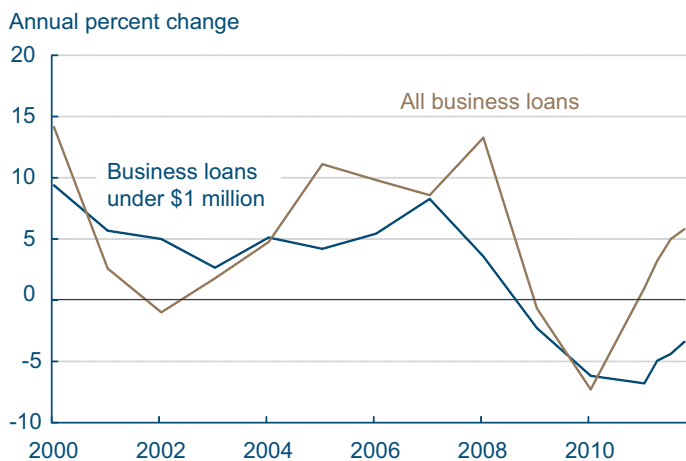
by Matthew Koepke and James B. Thomson

### Bank Profitability



Source: FDIC.

### Small Business Loan Balances



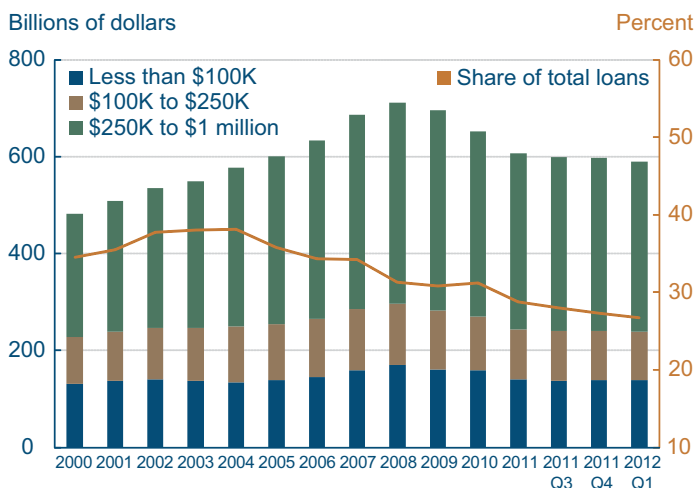
Source: FDIC.

The financial crisis and subsequent recession caused bank profitability to decline significantly. Banks responded to the crisis by reducing lending. However, as the economy muddles through the recovery, there are signs that banks' profitability is improving, potentially creating a more favorable lending environment.

According to the most recent data from the FDIC, since June 2009, the pre-tax return on assets at commercial banks has risen 188 basis points to 1.46 percent, while the return on equity at FDIC-insured commercial banks has risen even more, increasing 1318 basis points from -4.0 percent to 9.1 percent. Furthermore, it appears that the improved bank profitability has translated into a more favorable lending environment for businesses, particularly small businesses. According to the April 2012 Senior Loan Officer Survey, 98.2 percent of senior loan officers reported no change in lending standards for C&I loans or credit lines for businesses with revenues less than \$50 million, and 1.8 percent reported an easing in standards. However, despite the improved profitability at banks, small business loan growth at FDIC-insured banks and thrifts continues to be subdued.

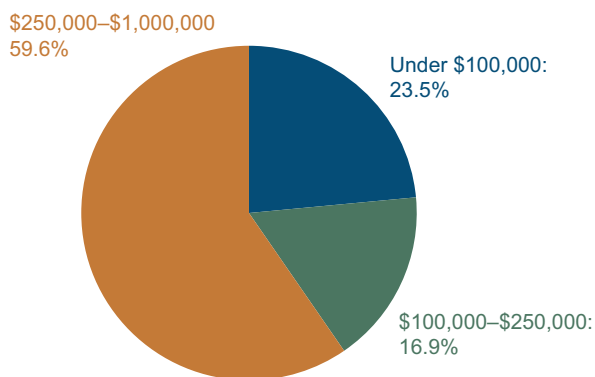
After declining precipitously through the recession, small business loan balances (loans under \$1 million) at FDIC-insured banks and thrifts have continued to fall through the economic recovery. After growing at an average annual rate of 5.5 percent from 2000 to 2008, small business loan balances have declined steadily to their lowest levels since 2005. Comparatively, total business loan balances have fared better over the same period. Like small business loan balances, total business loan balances declined during the recession and recovery, falling an average of 2.3 percent from June 2009 to June 2011. Unlike small business loan balances, however, total business loan balances have grown for four consecutive quarters, increasing at an average rate of 3.8 percent per quarter from June 2011

## Small Business Loan Balances



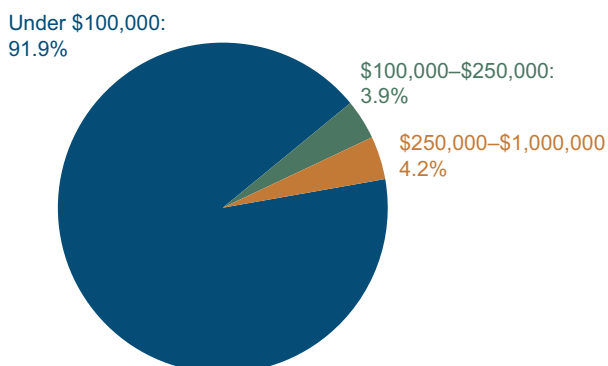
Source: FDIC.

## Small Business Share of the Total Dollar Amount of Business Loans, 2012:Q1



Source: FDIC.

## Small Business Share of the Total Volume of Business Loans, 2012:Q1



Source: FDIC.

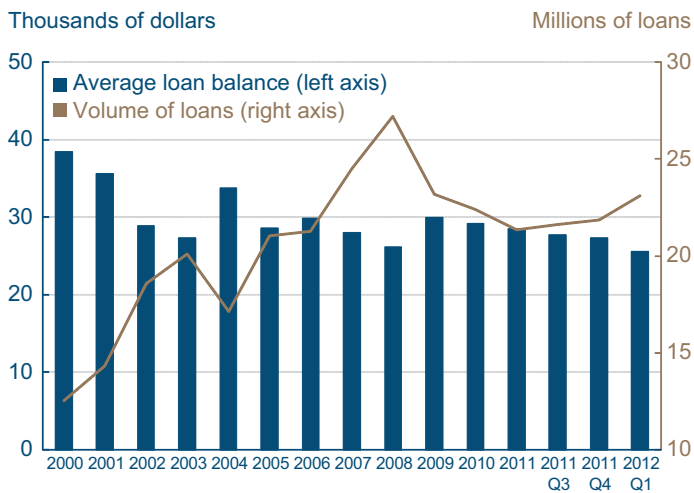
to March 2012. It is difficult to tell if small business loan balances have trailed total business loan balances because of weak demand or an inadequate supply of credit. Nonetheless, while the improvement in bank profitability has coincided with an increase in total business loan balances, small business loan balances at FDIC-insured institutions have struggled to grow.

The struggle to grow is apparent across all loan segments. Overall, small business loans peaked in June 2008 at \$711 billion. Since then, total holdings of small business loans have declined 17.0 percent through the first quarter of 2012 to \$590 billion. Loans in every segment contributed to the total decline: Loans under \$100,000 fell 18.5 percent, loans between \$100,000 and \$250,000 fell 20.9 percent, and loans between \$250,000 and \$1 million fell 15.3 percent. The continued decline in small business loan portfolios, coupled with the growth in total business loans, has caused the share of small business loan balances in total business loan balances to decrease to 26.7 percent.

Banks and thrifts have changed the composition of their small business loan portfolios. Over the past year, loans under \$100,000 grew as a percent of total small business loans in terms of the amount (an increase of 70 basis points) and volume (increase of 110 basis points). Comparatively, the share of loans between \$100,000 and \$250,000 and \$250,000 and \$1 million fell both in terms of amount and volume. Over the past year, loans between \$100,000 and \$250,000 fell 30 basis points to 16.9 percent of the total dollar amount of loans and 50 basis points to 3.9 percent of the total volume of loans. Similarly, loans between \$250,000 and \$1 million fell 30 basis points to 59.6 percent in terms of the total amount of loans and 60 basis points to 4.2 percent in terms of total volume of loans.

The composition of bank loan portfolios can explain the decline in small business loan balances. From March 2010 to March 2012, total balances for loans under \$1 million fell 5.7 percent on average, while volumes for loans under \$1 million were flat. Over the last two years, a modest increase in loan volume was seen in loans under \$100,000. These smaller loans rose an average 0.3 percent over

## Small Business Loans under \$1 Million



Source: FDIC.

the last two years and 2.0 percent over the last year. Comparatively, over the same period, volumes fell for loans between \$100,000 and \$250,000 (falling 5.8 percent) and loans between \$250,000 and \$1 million (falling 6.5 percent). Over the last year, the decline in balances for loans under \$100,000 coupled with an increase in volume has caused the average loan balance under \$100,000 to decline 9.6 percent to \$6,500. Over the same period, balances and loan volume fell for loans between \$100,000 and \$250,000 and loans between \$250,000 and \$1 million, but the declines had different effects on the two loan segments. For loans between \$100,000 and \$1 million, the average loan balance fell 2.6 percent to \$110,000; however, because loan volume fell faster than loan balances for loans between \$250,000 and \$1 million, the average loan balance for that category actually rose 1.3 percent to \$360,000. Overall, the average loan balance for all loans under \$1 million fell 11.1 percent to \$25,500.

## A Historical Perspective On the Current Recovery

06.05.12

by Pedro Amaral and Margaret Jacobson

The second estimate for real GDP growth in the first quarter of 2011 came in at 1.9 percent, a decrease from the previously estimated 2.2 percent. This also represents a substantial deceleration from the fourth quarter of 2011, when GDP grew at a 3 percent rate. Personal consumption expenditures, GDP's main component, actually grew faster in the first quarter of this year, at 2.7 percent, than in the last quarter of 2011, when it grew at only 2.1 percent. But substantial decreases in private investment, where residential investment was the only bright spot, meant that overall GDP growth slowed down.

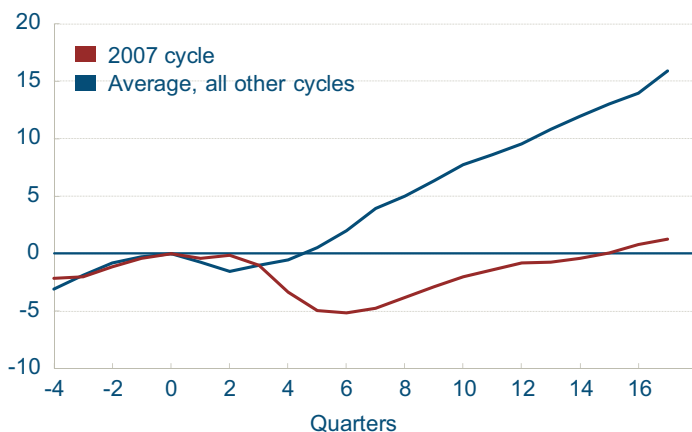
By now, everybody is well-aware that the current recovery is a slow one. The chart below compares the evolution of GDP in this recession (indexed to the peak of the business cycle) to the average post-WWII recession. Not only is the recent recession deeper and longer than the average post-WWII recession, but following the trough, 6 quarters into the episode, the divergence between the current recovery and the average of previous recoveries is apparent. In particular, the fact that the gap is widening compared to where it was at the recession's trough means that it is not just GDP levels that are different this time around. Growth rates continue to be below average.

Not all sectors of the economy are performing in the same way vis-à-vis the average recession episode. The nonfarm business sector—the whole economy excluding the economic activities of the general government, private households, nonprofit organizations serving individuals, and farms, representing about three quarters of the economy—was hit harder than the economy as a whole, even after accounting for the fact that the average output of the nonfarm business sector decreases by more than GDP in an economic downturn.

Despite having been hit harder, the nonfarm business subsector has had a stronger recovery relative

### Economy-Wide Output

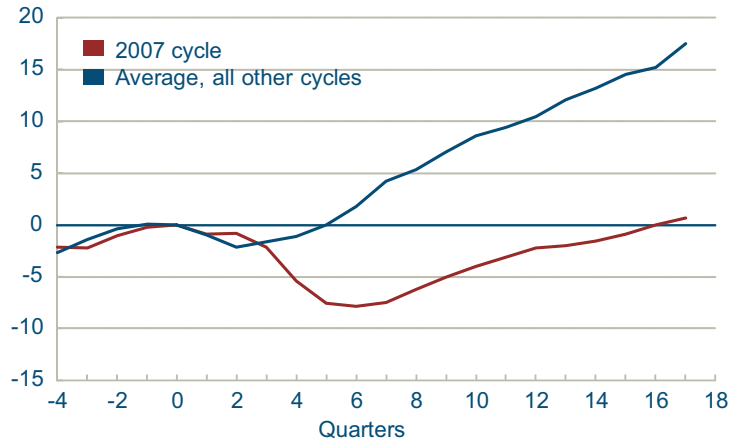
Percentage change from NBER business cycle peak



Sources: GDP, Bureau of Economic Analysis.

## Nonfarm Business Sector Output

Percentage change from NBER business cycle peak

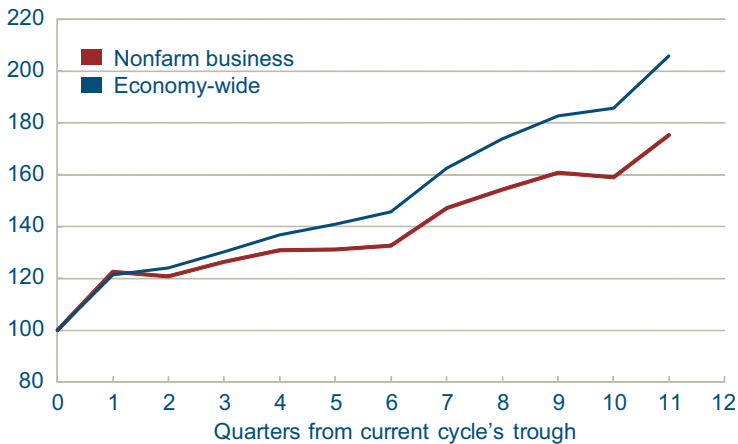


Source: Bureau of Labor Statistics.

to the whole economy when compared to its average historical recovery. This is shown in the chart below, where the gap between the recent recession and the average recession's GDP is indexed to 100 at the trough of the business cycle. Here we see that the gap has doubled since the trough. If we look only at the nonfarm business sector, though, the increase in the gap is much smaller, at about 75 percent, meaning that businesses are going through a better recovery (while still poor in historical terms) than general government, sole proprietorships, and nonprofits.

## Historical Recovery Gap

Index (trough=100)



Source: Bureau of Labor Statistics; Bureau of Economic Analysis; authors' calculations.

## Measuring Small Business Employment over the Business Cycle

05.22.2012

by Emily Burgen and Dionissi Aliprantis

Many analysts have tried to understand why the pace of job growth has been so slow since the end of the Great Recession. This issue has focused attention recently on the hiring behavior of small businesses during the recovery. It turns out that simply measuring the hiring practices of small businesses can be difficult.

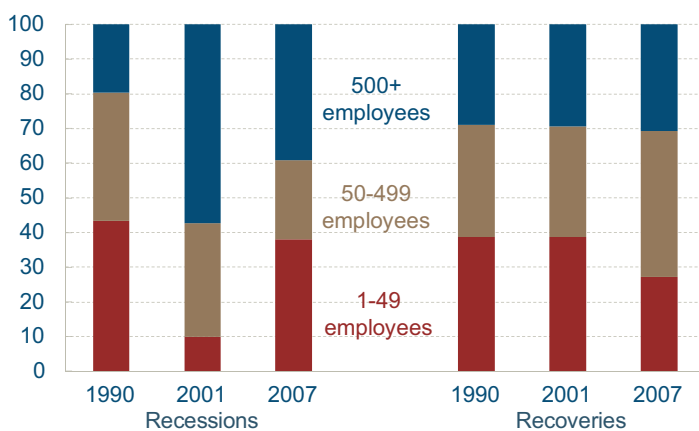
To examine trends in small business employment, we first analyzed data from the Business Employment Dynamics (BED) series of the Bureau of Labor Statistics (BLS). These data represent a quarterly census of all establishments under state unemployment insurance programs and characterize about 98 percent of all employment on nonfarm payrolls. We looked at three classes of firms: small (1-49 employees), medium (50-499 employees), and large (500 or more employees).

Prior to the recession, large firms accounted for 44 percent of overall employment, medium-size firms 30 percent, and small firms 26 percent. Comparing shares of employment losses for these different sizes of firms during each of the three most recent recessions, we can see that the smallest firms played a less significant role in the 2001 recession than in the other recessions, while employment losses for large firms were relatively muted in 1990. In the last recession, employment losses were proportional to the employment shares of each group, so it appears that all groups were hit evenly.

Comparing shares of gains in employment during the three most recent expansions, we focus on the share of gains going to firms above and below 500 employees (a commonly used demarcation between large and small firms). The most recent recovery looks very similar to the two preceding recoveries. Smaller firms accounted for about 70 percent of employment gains during the recovery phases of the last three cycles, well above their overall employment share. However, if we focus on firms under 50 employees, we can see that the smallest firms make

### Employment Change over the Business Cycle, Share by Firm Size

Percent, seasonally adjusted

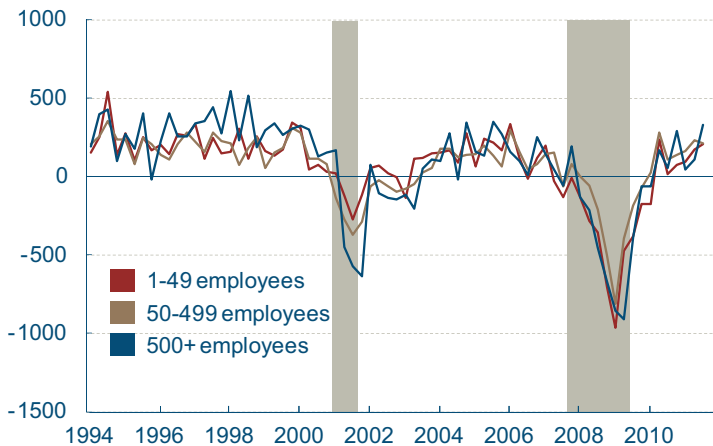


Source: Business Employment Dynamics, Bureau of Labor Statistics.



## Net Job Creation by Firm Size

Thousands, seasonally adjusted



Notes: Shaded bars indicate recessions. Data are quarterly.  
Source: Business Employment Dynamics, Bureau of Labor Statistics.

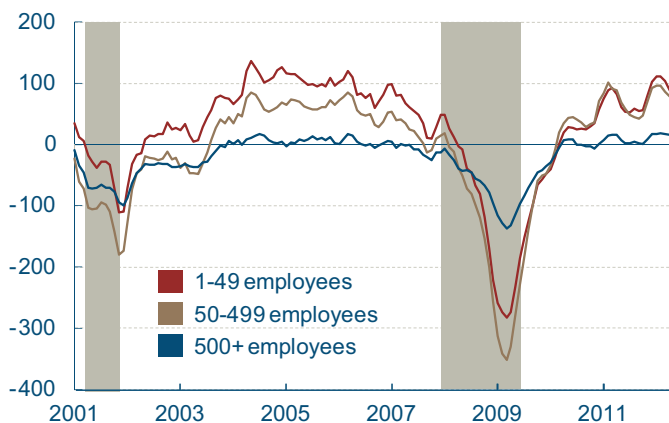
up a less significant share of the gains in employment during the current expansion compared to the earlier ones.

The time-series patterns of net job creation look fairly similar across firm size. This is especially true in the last cycle, where both employment losses and employment gains moved in concert across the size classes.

One limitation of the BED data set is that it is available only with a time lag of about eight to ten months. For example, as of May 14, 2012, the most recent BED data set is from the third quarter of 2011. There are more timely data on private small business hiring. One prominent example is the Automated Data Processing, Inc. (ADP) national employment data set. These numbers represent about 344,000 U.S. businesses and 21 million U.S. employees, and are obtained as an anonymous subset of the approximately 500,000 business clients who process their payrolls through ADP.

## Monthly Change in Nonfarm Payrolls

Thousands, seasonally adjusted



Notes: Shaded bars indicate recessions. Data are monthly three-month moving averages.  
Source: Automated Data Processing, Inc.

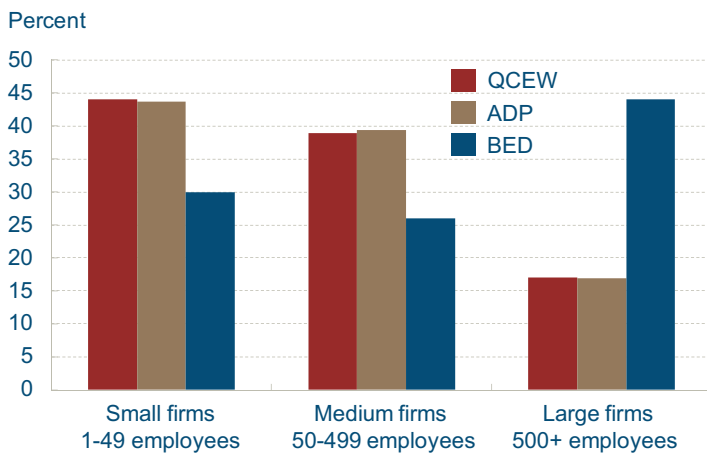
The patterns of net job creation by business size look strikingly different in the ADP and BED data sets. The ADP data show that smaller businesses lost markedly more employment than larger businesses during the recession and have added significantly more employment during the recovery. Indeed, the ADP data indicate almost no growth in payroll employment for large companies during the recovery, which stands in sharp contrast to the patterns reported in the BED data.

Part of this difference is due to definitional differences. The ADP is constructed to be representative of the national distribution of establishments, while the BED is reported at the level of firms. An establishment is typically a distinct business location—a store, hospital, mine, or manufacturing plant. It may be an individual firm—a mom-and-pop grocery store—or it may be an outlet of a large retail chain. A large firm can potentially own many distinct establishments of various sizes. A firm in the BED data is a tax entity and includes all establishments that file under a specific tax ID.

The implication of this definitional difference is that the firm-size distributions are very different in the two datasets. While in the BED firms



## Pre-Recession Employment Shares



Sources: Automated Data Processing, Inc.(ADP); Quarterly Census of Employment and Wages (QCEW); Business Employment Dynamics (BED), Bureau of Labor Statistics.

with more than 500 employees accounted for 44 percent of employment in 2007, their share was only 17 percent in the ADP. To be sure, ADP is not matching to the size distribution of firms, but rather to the size distribution of establishments. We can see this by comparing employment shares in the Quarterly Census of Employment and Wages (QCEW)—an establishment survey—to ADP employment shares. They are nearly identical.

Given the fact that the BED has a much greater share of employment in the large size classes, it is not surprisingly that large firms contribute more to employment gains and losses over the cycle in the data. Our sense is that the BED definition comes much closer to how one typically thinks about firm size and is likely a better data source for assessing the relative contribution of large and small firms to employment change. Thus while the ADP is available for analysis sooner, we feel that the BED data are more appropriate to look at for employment growth by business size.

# On Target

05.23.2012

by Brent Meyer

## April Price Statistics

	Percent change, last					2011 average
	1mo. <sup>a</sup>	3mo. <sup>a</sup>	6mo. <sup>a</sup>	12mo.	5yr. <sup>a</sup>	
Consumer Price Index						
All items	0.4	3.0	2.1	2.3	2.2	3.0
Excluding food and energy (core CPI)	2.9	2.3	2.2	2.3	1.7	2.2
Median <sup>b</sup>	2.3	2.1	2.3	2.4	1.9	2.3
16% trimmed mean <sup>b</sup>	1.9	2.0	2.0	2.3	2.0	2.6
Sticky price <sup>c</sup>	2.4	2.1	2.4	2.2	2.0	2.1

a. Annualized.

b. Calculated by the Federal Reserve Bank of Cleveland.

c. Author's calculations.

Source: Bureau of Labor Statistics.

The CPI was flat in April, largely because falling gasoline prices offset modest increases elsewhere in the basket. But the real news in the latest price report was that on a year-over-year basis the CPI is up just 2.3 percent as of the end of April, continuing its slowdown since it hit a high of 3.9 percent last September.

This is the first month since October 2009 that the longer-term (12-month) trend in the CPI has been at or below the trend in the core CPI. In fact, just about every CPI-based underlying inflation measure we track was within a tenth of a percent of 2.3 percent. Moreover, the recent trajectories of these measures haven't signaled much of a departure from their respective 12-month growth rates.

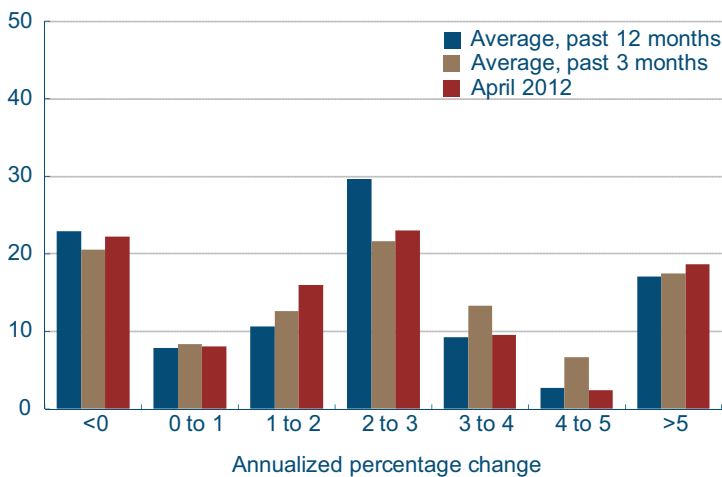
Importantly, a 2.3 percent growth rate in CPI-based inflation measures is roughly equivalent to a 2.0 percent trend in PCE-based inflation measures. This is due to a variety of differences between the two price indexes (here's a quick overview of the differences). Given that the medium-term explicit inflation target of the Federal Open Market Committee (FOMC) is 2.0 percent on PCE inflation, measured inflation is already "on target." The Committee also appears to be expecting roughly "on target" inflation over the next few years, as the central tendency of its PCE inflation projections remains within a few tenths of 2.0 percent throughout the forecast horizon.

Despite worries about an impending bout of higher inflation or another deflation scare, there is some recent evidence that appears to support the more sanguine view that inflation will remain fairly close to target.

First, the underlying CPI-component-price-change distribution hasn't moved around much in recent months. This is consistent with the view that inflation has been roughly stable lately, and that the aggregate readings haven't been driven by one or two outliers in the data.

## CPI Component Price Change Distribution

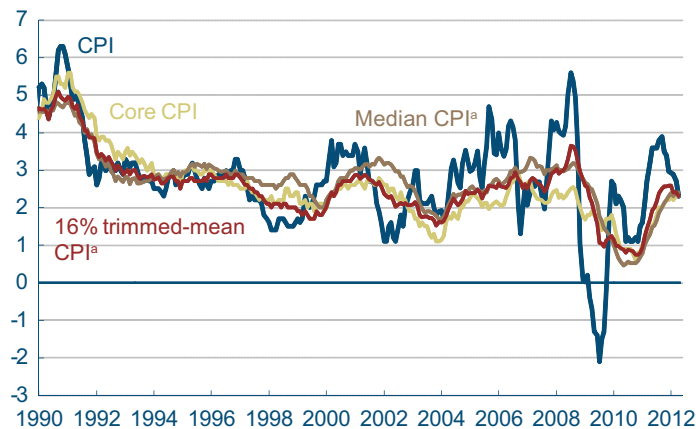
Weighted frequency



Source: Bureau of Labor Statistics; author's calculations.

## Consumer Price Index

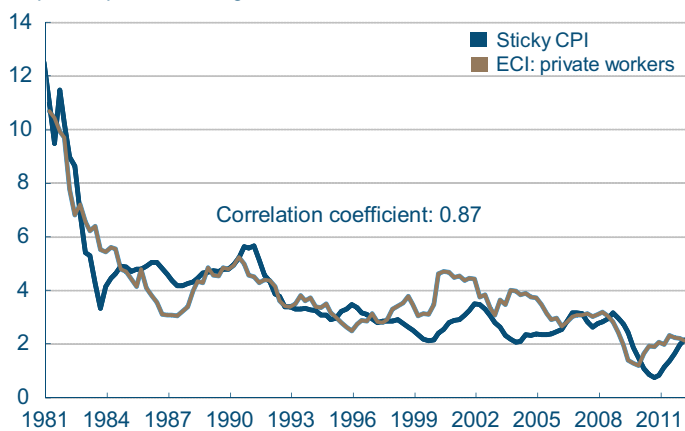
12-month percent change



a. Calculated by the Federal Reserve Bank of Cleveland.  
Sources: U.S. Department of Labor; Bureau of Labor Statistics; Federal Reserve Bank of Cleveland.

## Employment Costs and Sticky Inflation

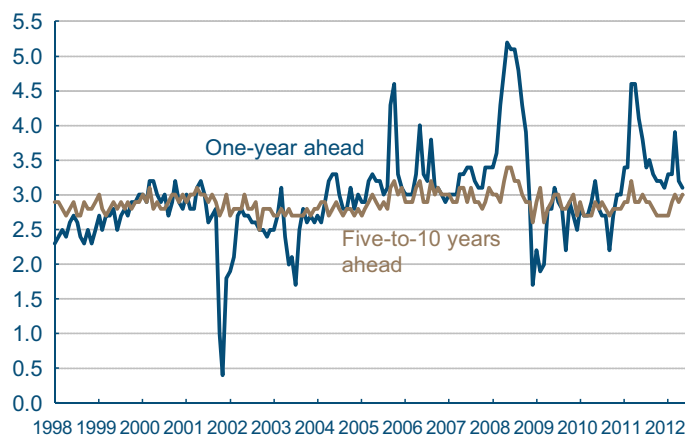
4-quarter percent change



Sources: Federal Reserve Bank Cleveland; Federal Reserve Bank of Atlanta; Bureau of Labor Statistics.

## Household Inflation Expectations

12-month percent change



Note: Median expected change as measured by the University of Michigan's Survey of Consumers.  
Source: University of Michigan.

Second, a measure of the connection between wages and inflation suggests that inflation is still somewhat subdued. While that connection—that increases in compensation will bid up retail prices and feed into an increase in inflation—is contested because the direction of causality is not clear, analysts often refer to it for clues about where inflation is headed. Setting aside the validity of the connection for the moment, it does appear that an oft-cited measure of compensation growth is highly correlated with the sticky CPI—a forward-looking inflation measure that comprises the most persistent (or stickiest) components in the retail market basket. The correlation coefficient between the sticky CPI and the Employment Cost Index (ECI) for private workers is 0.87. If wage pressures do indeed cause inflation, then the recent trend in the ECI suggests, if anything, a slightly disinflationary signal. The ECI is up 2.1 percent on a year-over-year basis, compared to its average growth rate over the past 10 years of 2.8 percent.

Finally, household inflation expectations still appear stable. Despite a modest blip up in the median year-ahead expectation (likely due to the recent gasoline-price increase), which has since ebbed, longer-run (5–10-year-ahead) expectations haven't moved much at all. In May, the median longer-run inflation expectation stood at 3.0 percent, 0.1 percentage point above its 10-year average.

## Monetary Policy and the FOMC’s Economic Projections

05.17.2012

by Charles Carlstrom and John Lindner

The Federal Reserve has further increased its transparency over the last couple of years. In 2007, for example, the Federal Open Market Committee (FOMC) introduced the Survey of Economic Projections (SEP), which reports Committee participants’ projections for GDP growth, unemployment, and inflation. In January of 2012, the projections were expanded to include the federal funds rate. These projections are based on each participant’s view of appropriate monetary policy.

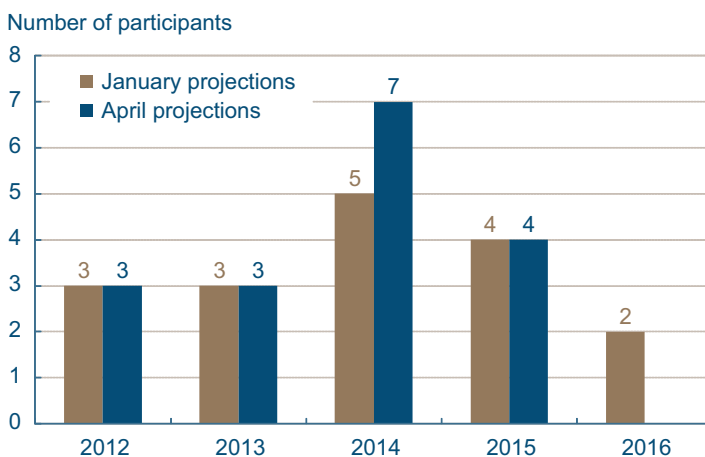
The inclusion of interest rate projections allows a rare opportunity to see whether a simple “guide post” might accurately describe participants’ views on appropriate policy. Monetary policy is frequently discussed in terms of guideposts, and often these are presented in the form of Taylor-type rules.

The original Taylor rule posited that the current federal funds rate is set as a function of the long-run interest rate, deviations of inflation from the FOMC’s target (currently 2 percent), and deviations of economic output from its potential. One common modification of this rule, which is more consistent with the Committee’s dual mandate of promoting price stability and maximum employment, is to look at deviations of unemployment from long-run unemployment instead of GDP from its potential. Until interest rates hit near-zero and could not be lowered any further, this rule tracked the actual funds rate fairly closely.

We look at how this rule lines up with the Committee’s statement that the current extraordinary monetary policy accommodation will continue until late 2014. Since the Committee’s statement reflects the consensus opinion, we will also see how well the rule does in describing the entire distribution of Committee members’ interest rate projections, reported in the SEP.

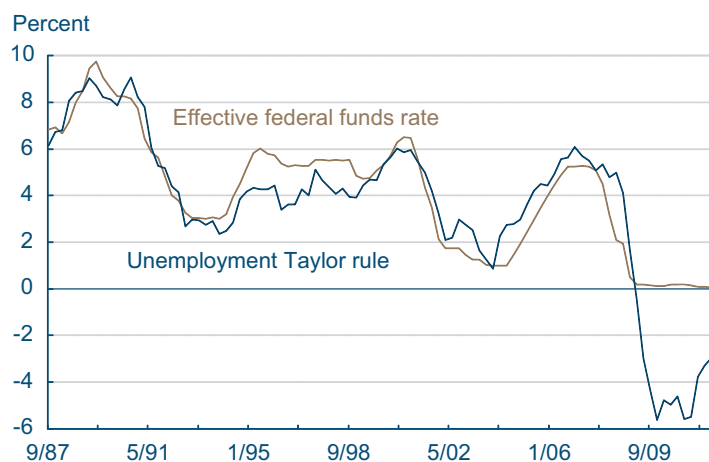
First let us summarize the FOMC participants’ stated views. In both January and April, the Committee’s statement said “economic conditions are likely

### Appropriate timing of policy firming



Source: Federal Reserve Board.

## Estimated Unemployment Taylor Rule



Note: The coefficients used in the Taylor rule are 1.73 for inflation and  $-1.77$  for unemployment.

Sources: Federal Reserve Bank of Philadelphia; Bureau of Economic Analysis; Bureau of Labor Statistics; authors' calculations.

to warrant exceptionally low levels of the federal funds rate at least through late 2014.” Similarly, in the SEP released after those meetings, the median Committee member set the time for leaving the zero lower bound—“liftoff”—somewhere during that year. While two participants expected this hike to occur in 2016 at the January meeting, by April there were no participants expecting the hike to occur that late.

Looking at individual projections for real economic variables, we see that in April, FOMC participants were expecting lower unemployment and higher inflation in the short term than they were in January. Yet by 2014, the forecasts are largely unchanged.

Next, we use the economic projections from the January and April SEP to produce a federal funds rate path into the future using the Taylor rule discussed earlier. We then compare the federal funds rate path implied by the Taylor rule to the liftoff dates implied by participants’ interest rate projections.

## Economic Projections of FOMC Members, January and April 2012

Variable	Central tendency				Range			
	2012	2013	2014	Longer run	2012	2013	2014	Longer run
Percent change in real GDP								
April	2.4–2.9	2.7–3.1	3.1–3.6	2.3–2.6	2.1–3.0	2.4–3.8	2.9–4.3	2.2–3.0
January	2.2–2.7	2.8–3.2	3.3–4.0	2.3–2.6	2.1–3.0	2.4–3.8	2.8–4.3	2.2–3.0
Unemployment rate								
April	7.8–8.0	7.3–7.7	6.7–7.4	5.2–6.0	7.8–8.2	7.0–8.1	6.3–7.7	4.9–6.0
January	8.2–8.5	7.4–8.1	6.7–7.6	5.2–6.0	7.8–8.6	7.0–8.2	6.3–7.7	5.0–6.0
PCE inflation								
April	1.9–2.0	1.6–2.0	1.7–2.0	2.0	1.8–2.3	1.5–2.1	1.5–2.2	2.0
January	1.4–1.8	1.4–2.0	1.6–2.0	2.0	1.3–2.5	1.4–2.3	1.5–2.1	2.0
Core PCE inflation								
April	1.8–2.0	1.7–2.0	1.8–2.0		1.7–2.0	1.6–2.1	1.7–2.2	
January	1.5–1.8	1.5–2.0	1.6–2.0		1.3–2.0	1.4–2.0	1.4–2.0	

Source: Bureau of Economic Analysis.

We assume that the Committee participant predicting the earliest hike in the interest rate has the highest long-term interest rate projections, the lowest unemployment projections, the highest long-run unemployment rate projections, and the highest inflation projections. This is necessary since we do not have the data to map which inflation rate goes with which unemployment rate, interest rate,

etc. We do this for the upper and lower ranges, the upper and lowest central tendency of the projections (which excludes the three highest and three lowest projections for each variable in each year), and the median path or the midpoint of the projections.

According to the Taylor rule paths, the first fed funds rate increase for the median Committee participant would be in the second quarter of 2014 for January and the fourth quarter of 2013 for April. Recall that the median Committee participant set a liftoff date of 2014 in both the January and April SEP.

### Exit Timing: Taylor Rule versus Projections: 50-Basis Point Cutoff for Liftoff

	Timing of the first rate increase				
	Bottom of range	Bottom of central tendency	Median	Top of central tendency	Top of range
January 2012 SEP	2012	2013	2014	2015	2016
January Taylor rule	2012:Q3	2013:Q1	2014:Q2	2015:Q2	2016:Q1
April 2012 SEP	2012	2013	2014	2015	2015
April Taylor rule	2012:Q3	2012:Q3	2013:Q4	2015:Q3	2017:Q1

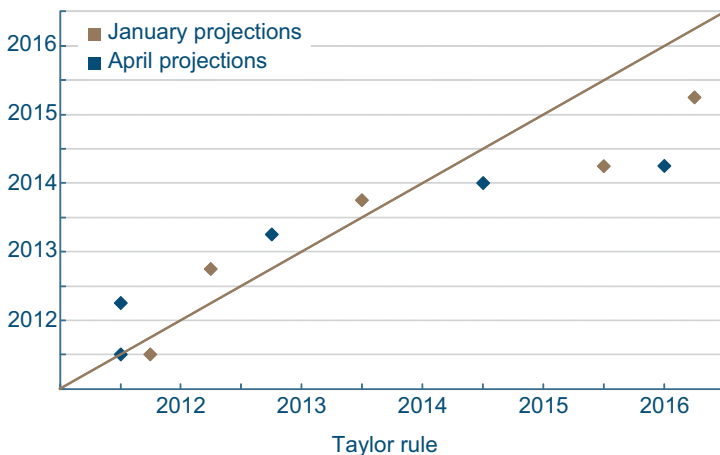
Note: The central tendency excludes the three highest and three lowest projections for each variable in each year. The range includes all participants' projections, from lowest to highest, in that year. Sources: Federal Reserve Bank of Philadelphia; Summary of Economic Projections, January 2012 and April 2012, Federal Reserve Board; Bureau of Economic Analysis; Bureau of Labor Statistics; authors' calculations.

We can expand this exercise to the rest of the projection distribution as well. If the rule perfectly describes Committee participants' views of appropriate monetary policy, the distribution of projections produced by the rule would match the distribution of projections submitted by Committee participants. That is, the rule's projections would lie on the 45-degree line when plotted against the participants' submitted predictions. The Taylor rule, at least for the median Committee participant, does a good job in matching the first projected liftoff date.

A simple way of measuring how well the rule does in matching individual participants' interest rate projections is to look at how far apart the projected liftoff dates are at each point in the distribution. According to the Taylor rule paths, the first fed funds rate increase for the median Committee participant would be in the second quarter of 2014 for the January SEP and the fourth quarter of 2013 for April. Recall that the median Commit-

### Exit Timing: Taylor Rule versus Projections

Summary of economic projections



Note: We linearly extrapolate the annual SEP projections to get quarterly observations. Sources: Federal Reserve Bank of Philadelphia; Summary of Economic Projections, January 2012 and April 2012, Federal Reserve Board; Bureau of Economic Analysis; Bureau of Labor Statistics; authors' calculations.

## Exit Timing Differences: Taylor Rule versus Projections

	Quarters apart	
	Average miss	Average absolute miss
January 2012	1.4	2.6
April 2012	1.0	2.6

Sources: Federal Reserve Bank of Philadelphia; January and April 2012 SEP; Bureau of Economic Analysis; Bureau of Labor Statistics; authors' calculations.

tee participant set a liftoff date of 2014 in both the January and April SEP. We measure the differences, or the misses, in terms of quarters. In both January and April, the average miss at the five points of the distribution was 2.6 quarters. Interestingly, the rule tended to predict later liftoff dates than the dates that were submitted in the projections. In January, the rule predicted a liftoff date that was an average of 1.4 quarters later than the dates submitted by Committee participants. By April, it had decreased to 1.0 quarter, though the difference remained.

For the upper ranges, the liftoff-date miss is quite significant. In January, the latest liftoff date in the submitted fed funds rate projections occurred 4 quarters earlier than the latest liftoff date implied by the rule. The difference was an incredible 7 quarters in April. This is actually to be expected since we assumed that the Committee participants projecting the latest funds rate hike had the highest unemployment projections, the lowest long-run unemployment rate projections, and the lowest inflation projections. We would expect that the projections based on the rule for the upper range would be later because we are putting all of the extremes into one projection. The rule-based ranges are therefore an upper limit on the timing of the exit date implied by the Taylor rule. For the lower ranges, we would anticipate the opposite. That is, we would expect the slope of the dots in the scatter plot to be flatter than the 45-degree line. This is exactly what we see.

Even then, we should not expect a perfect fit. First, Committee participants report projections only at an annual basis. To be more consistent with a quarterly Taylor rule, the interest rate projections for this analysis are linearly extrapolated from one year to the next. Second, we make the strong assumption that liftoff occurs when the projected interest rate paths exceed 50 basis points. Third, even with these caveats, it should be obvious that no Committee participant would truly think that appropriate monetary policy would be to slavishly follow such a rule. There are myriad other factors that Committee participants would also consider.

Nevertheless, this exercise illustrates that such a rule roughly captures many Committee participants'



views of appropriate monetary policy. It suggests that if the economic data continues to improve, the projected liftoff dates will be pushed sooner, and the language of the Committee will likely follow suit.

## Yield Curve and Predicted GDP Growth, May 2012

Covering April 26, 2012–May 25, 2012

by Joseph G. Haubrich and Patricia Waiwood

### Overview of the Latest Yield Curve Figures

Over the past month, the yield curve has flattened, as short rates stayed even and long rates fell. The three-month Treasury bill inched up to 0.09 percent (for the week ending May 18), just up from April's 0.08 percent and even with the March number of 0.09 percent. The ten-year rate dropped back below 2 percent, coming in at 1.74 percent, a drop of over one-quarter percentage point from April's 2.00 percent, itself a fair drop from March's 2.21. The twist dropped the slope to 165 basis points, down from April's 192 basis points, nearly half a percentage point below March's 212 basis points, and even below February's 186 basis points.

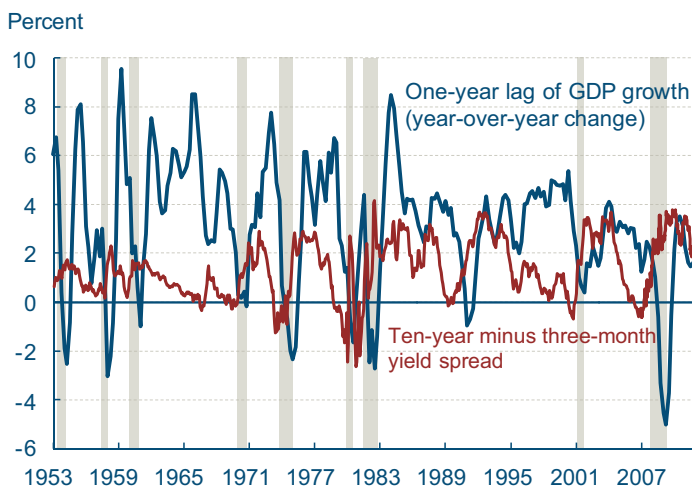
The flatter slope was not enough to cause an appreciable change in projected future growth, however. Projecting forward using past values of the spread and GDP growth suggests that real GDP will grow at about a 0.7 percent rate over the next year, equal to the past two months. The strong influence of the recent recession is leading toward relatively low growth rates. Although the time horizons do not match exactly, the forecast comes in on the more pessimistic side of other predictions but like them, it does show moderate growth for the year.

The flatter slope did lead to a less optimistic outlook on the recession front, however. Using the yield curve to predict whether or not the economy will be in recession in the future, we estimate that the expected chance of the economy being in a recession next May is 8.7 percent, up from April's 6.4 percent and from March's 5.0 percent. So although our approach is somewhat pessimistic as regards the level of growth over the next year, it is quite optimistic about the recovery continuing.

### Highlights

	April	March	February
3-month Treasury bill rate (percent)	0.09	0.08	0.09
10-year Treasury bond rate (percent)	1.74	2.00	2.21
Yield curve slope (basis points)	165	192	212
Prediction for GDP growth (percent)	0.7	0.7	0.7
Probability of recession in 1 year (percent)	8.7	6.4	5.0

### Yield Curve Spread and Real GDP Growth



Note: Shaded bars indicate recessions.

Source: Bureau of Economic Analysis, Federal Reserve Board.

## The Yield Curve as a Predictor of Economic Growth

The slope of the yield curve—the difference between the yields on short- and long-term maturity bonds—has achieved some notoriety as a simple forecaster of economic growth. The rule of thumb is that an inverted yield curve (short rates above long rates) indicates a recession in about a year, and yield curve inversions have preceded each of the last seven recessions (as defined by the NBER). One of the recessions predicted by the yield curve was the most recent one. The yield curve inverted in August 2006, a bit more than a year before the current recession started in December 2007. There have been two notable false positives: an inversion in late 1966 and a very flat curve in late 1998.

More generally, a flat curve indicates weak growth, and conversely, a steep curve indicates strong growth. One measure of slope, the spread between ten-year Treasury bonds and three-month Treasury bills, bears out this relation, particularly when real GDP growth is lagged a year to line up growth with the spread that predicts it.

### Predicting GDP Growth

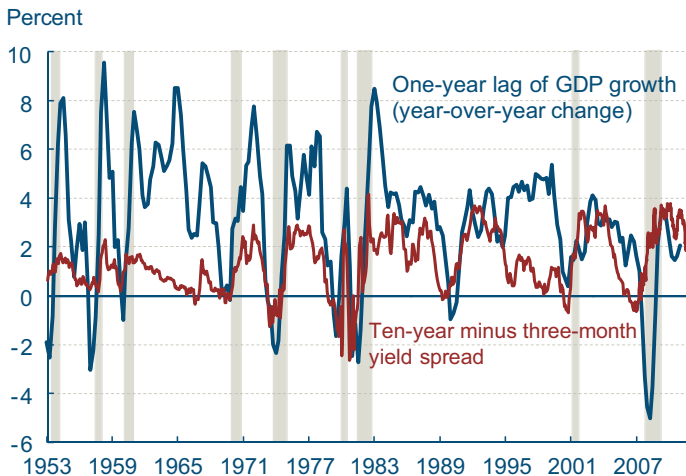
We use past values of the yield spread and GDP growth to project what real GDP will be in the future. We typically calculate and post the prediction for real GDP growth one year forward.

### Predicting the Probability of Recession

While we can use the yield curve to predict whether future GDP growth will be above or below average, it does not do so well in predicting an actual number, especially in the case of recessions. Alternatively, we can employ features of the yield curve to predict whether or not the economy will be in a recession at a given point in the future. Typically, we calculate and post the probability of recession one year forward.

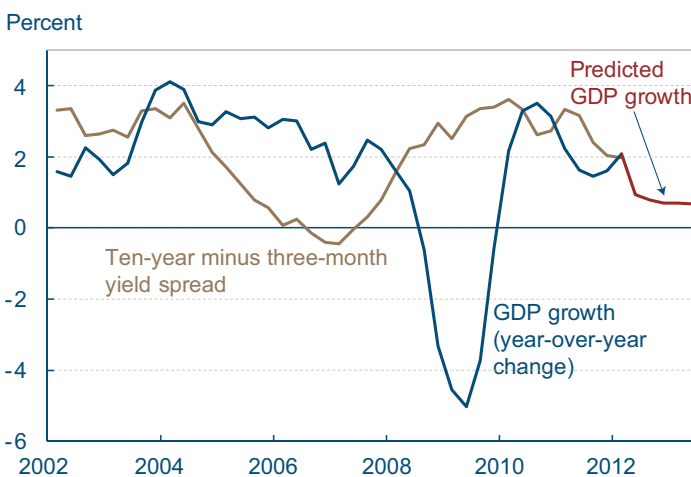
Of course, it might not be advisable to take these numbers quite so literally, for two reasons. First, this probability is itself subject to error, as is the case with all statistical estimates. Second, other researchers have postulated that the underlying determinants of the yield spread today are materi-

## Yield Spread and Lagged Real GDP Growth



Note: Shaded bars indicate recessions.  
Sources: Bureau of Economic Analysis, Federal Reserve Board.

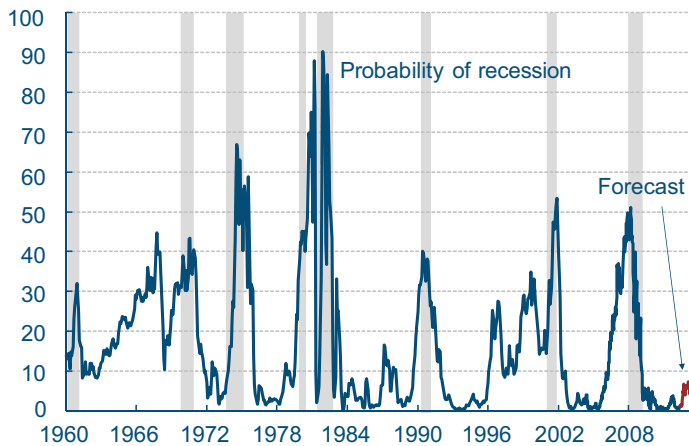
## Yield Curve Predicted GDP Growth



Sources: Bureau of Economic Analysis, Federal Reserve Board, authors' calculations.

## Recession Probability from Yield Curve

Percent probability, as predicted by a probit model



Note: Shaded bars indicate recessions.

Sources: Bureau of Economic Analysis, Federal Reserve Board, authors' calculations.

ally different from the determinants that generated yield spreads during prior decades. Differences could arise from changes in international capital flows and inflation expectations, for example. The bottom line is that yield curves contain important information for business cycle analysis, but, like other indicators, should be interpreted with caution. For more detail on these and other issues related to using the yield curve to predict recessions, see the Commentary “Does the Yield Curve Signal Recession?” Our friends at the Federal Reserve Bank of New York also maintain a website with much useful information on the topic, including their own estimate of recession probabilities.

## Wide Variation in House Price Decline across the Country

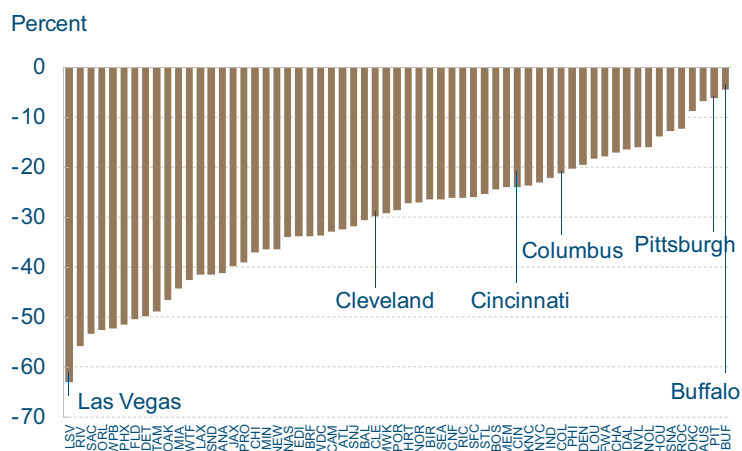
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by Kyle Fee and Daniel Hartley

Since the peak of the housing market, which occurred in mid-2006 according to the Case-Shiller 10-city and 20-city composite indices, housing markets across the United States have seen large declines in home prices. However, some areas have fared much worse than others.

We look at variation in the size of the price declines, both across different Metropolitan Statistical Areas (MSAs) and within each MSA. We measure the growth rates of housing prices over the past six years using repeat sales indices. The data cover March 2006 to March 2012, and we report all growth rates in real terms. The indices are computed using nondistressed transactions of attached (condo, townhome) and detached single-family homes.

### Real House Price Growth by MSA, March 2006–March 2012



Source: Core Logic.

Housing price growth rates for the 61 MSAs that had a population of one million or more in 2000 show a large amount of variation. While prices dropped by more than 50 percent in Las Vegas, Riverside, Sacramento, and Orlando, prices fell by less than 10 percent in Buffalo, Pittsburgh, Austin, and Oklahoma City. Some of the biggest declines have occurred in warm-weather MSAs that saw large increases in prices prior to the peak. Some of the smallest have been in places where the economy has been less adversely affected by the downturn, such as Texas and Oklahoma. Interestingly, there is quite a bit of variation in older northern MSAs. While prices have fallen by about 50 percent in Detroit and about 30 percent in Cleveland, they are down by much less in Rochester, Pittsburgh, and Buffalo.

While housing price growth rates have varied substantially across MSAs over the past six years (the standard deviation is about 14 percentage points), they varied much more during the boom period from 2000 to 2006. Depending on the price measure used, standard deviations of growth rates in those years were 33 to 42 percentage points.

### Variation in House Price Growth Rates across Metro Area

	Standard deviation (percentage points)	
	FHFA	Case-Shiller
2000-2006	33	42
1990-2000	17	21

Notes: For the FHFA data, we use all 384 MSAs that are available in the data. For Case-Shiller data, we use the 20 MSAs for which Case-Shiller reports an index.

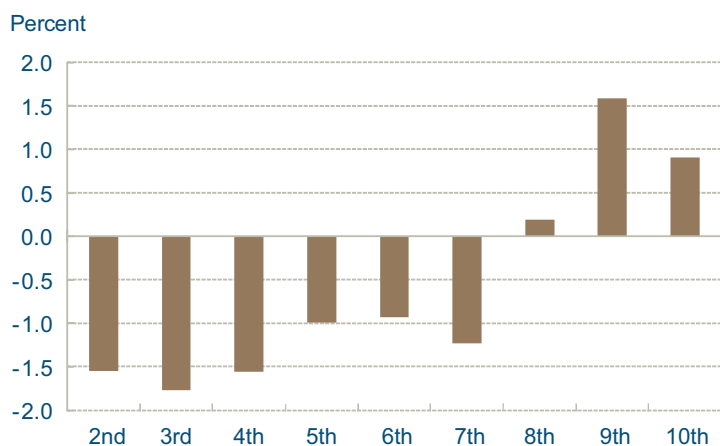
Sources: Federal Housing Finance Agency; S&P, Fiserv, and Macromarkets, LLC.

In addition to variation in price declines at the MSA-level, there is also variation from neighborhood to neighborhood within each MSA. On average, housing price growth rates had a standard deviation of about 7.5 percentage points at the zip-code level within MSAs from 2006 to 2012. This is lower than the 14 percentage point standard deviation across MSAs from 2006-2012, and is also lower than the standard deviation at the zip-code level within MSAs from 2000–2006 (18 percentage points). So, while prices have fallen at different rates in different neighborhoods over the past six years, these differences have been less pronounced than those across MSAs. They are also less pronounced than differences across and within MSAs during the boom period (2000-2006).

One way to look at the variation in growth rates within MSAs is to compare zip codes with different income levels in 2006. Sorting incomes into ten groups (deciles) within each MSA and comparing the mean growth rate of the second through the tenth decile to the first decile reveals that on average the second through the seventh decile experienced bigger percent drops in home prices relative to the lowest income decile, while the ninth and tenth deciles (the highest-income zip codes) experienced smaller price declines than the lowest income decile. In other words, high-income zip codes experienced smaller drops in housing prices on average than middle-income zip codes. The drops were several percentage points smaller.

Over the past six years, housing prices have dropped a lot more in some MSAs than in others. While price declines have varied less within MSAs and less than during the housing boom, the within-MSA variation is associated with differences in average neighborhood incomes. On average, neighborhoods that were at the upper end of an MSA's income distribution have not seen as big of a percent decline in home prices as those in the middle and near the bottom of the distribution.

## Relative Mean House Price Growth by Income Decile, March 2006–March 2012



Sources: CoreLogic, Internal Revenue Service.

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