

# Economic Trends

**November 2014** (October 10, 2014-November 25, 2014)

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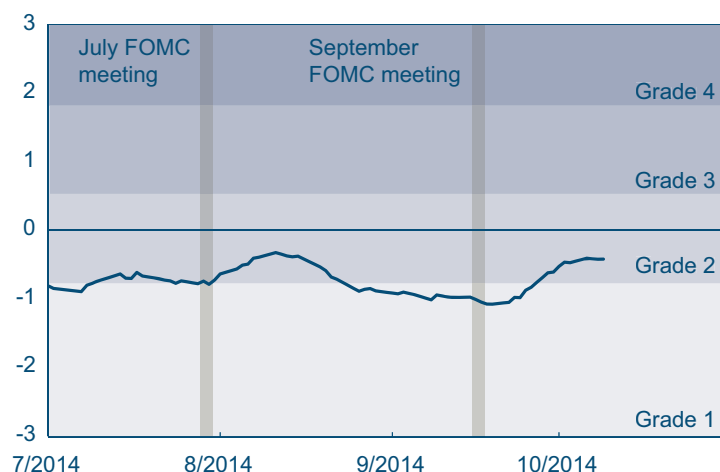
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FEDERAL RESERVE BANK  
*of* CLEVELAND

## Tracking Recent Levels of Financial Stress

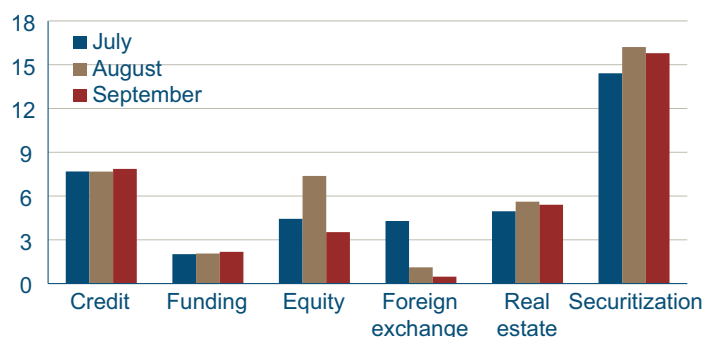
### Cleveland Financial Stress Index

Standard deviation



Source: Oet, Bianco, Gramlich, and Ong, 2012. "A Lens for Supervising the Financial System," Federal Reserve Bank of Cleveland working paper no. 1237.

### Average Stress-Level Contributions of Component Markets to CFSI



Note: These contributions refer to levels of stress, where a value of 0 indicates the least possible stress and a value of 100 indicates the most possible stress. The sum of these contributions is the level of the CFSI, but this differs from the actual CFSI, which is computed as the standardized distance from the mean, or the z-score.

Source: Oet, Bianco, Gramlich, and Ong, 2012. "A Lens for Supervising the Financial System," Federal Reserve Bank of Cleveland working paper no. 1237.

10.16.14

by Amanda Janosko

The Cleveland Financial Stress Index (CFSI) fluctuated between grades 1 and 2 throughout the third quarter of 2014. As of October 9, the index stood at  $-0.426$ , which is 3.599 standard deviations below the historical high in December 2008 and 1.707 standard deviations above the historical low in January 2014. The index is down 0.072 standard deviations from this time last year.

As the quarter progressed, increasing contributions of the real estate and securitization markets were offset by decreasing contributions of the foreign exchange market. As stock price indexes approached historic highs in late August and early September, the equity market's contribution to stress declined. The CFSI's credit and funding markets remained relatively stable over the quarter.

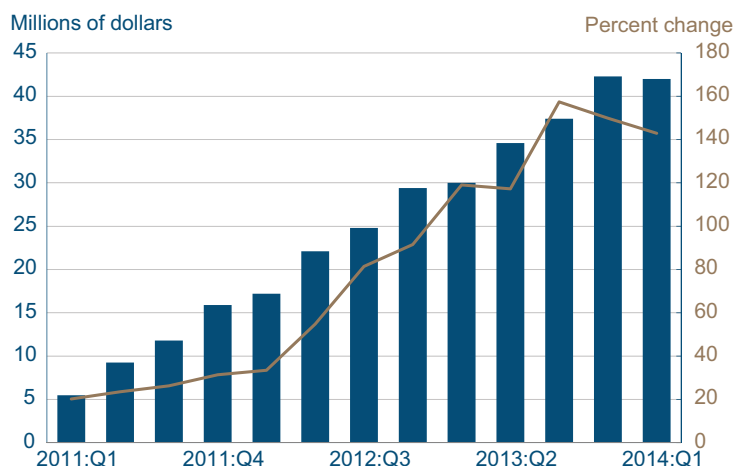
The Cleveland Financial Stress Index and all of its accompanying data are posted to the Federal Reserve Bank of Cleveland's website at 3 pm daily. For a brief overview of how the index is constructed see this page. The CFSI and its components are also available on FRED (Federal Reserve Economic Data), a service of the Federal Reserve Bank of St. Louis. FRED allows users to download, graph, and track more than 200,000 data series.

# Gauging the Impact of the Small Business Lending Fund

11.25.14

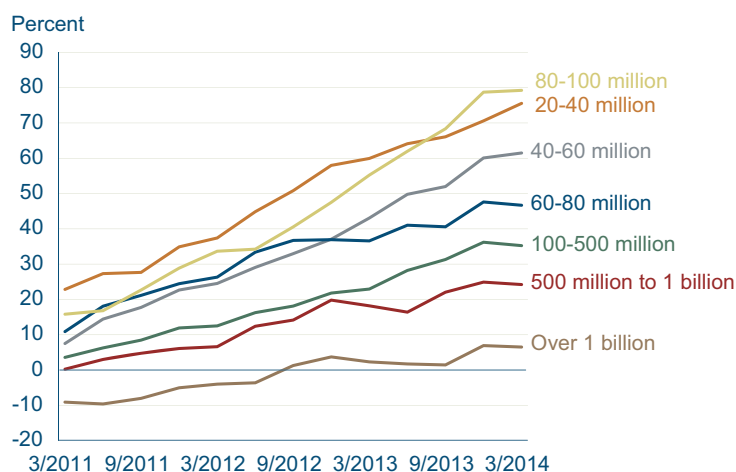
by Kristle Cortés and Sara Millington

## Change Relative to Baseline Lending



Source: Small Business Lending Fund Program Reports, US Department of the Treasury.

## Change in Lending Compared to Baseline Lending, US Dollars



Source: Small Business Lending Fund Program Reports, US Department of the Treasury.

The Small Business Lending Fund (SBLF) was created in 2010 to encourage small business lending by providing capital to qualified community banks. The Treasury provides banks with capital by purchasing Tier 1-qualifying preferred stock or the equivalent in each bank, with the intention that banks use this capital to make loans to small businesses. Community banks were targeted because they have traditionally supplied a significant share of the total amount of loans made to small businesses. For example, as of 2014:Q1, community banks held 45 percent of small business loans, according to the March FDIC Quarterly Banking Profile. We examine the first quarter of 2014 data to determine the extent to which banks that received funding have increased their small business lending.

Institution-specific data on the change in small business lending to SBLF recipients is available on a quarterly basis from the US Treasury. To make it easy to compare before and after levels of lending, the Treasury calculated a baseline for comparison, which is defined as the average level of each bank's lending prior to receiving funds. A bank's baseline is the average of its qualified small business lending for each of the four quarters leading up to and ending on June 30, 2010. This applies for all banks that receive funding regardless of their entry date into the program. We compare banks' baseline lending to their lending in subsequent quarters up through 2014:Q1.

In the aggregate, small business lending has increased in every quarter since the banks received SBLF funds. As of 2014:Q1, mean lending was 142 percent higher than mean baseline lending for the whole sample.

Banks pay for SBLF funds by means of the dividends they pay on the stock purchased by the Treasury. The dividend rate is reduced as their level of small business lending increases. The program

incentivizes institutions to increase their lending immediately by creating a situation in which banks must use SBLF funds right away to ensure they are paying the lowest rate for them.

Interesting trends are visible if we separate the banks by their initial baseline lending. Banks that were lending over \$1 billion before the program did not experience increases until 6 quarters into the program, while banks with baseline lending less than \$1 billion experience gains immediately. Bank size also determines differences in subsequent lending.

Banks with more than \$20 million in baseline lending are comparable when looking at the change in their current lending over the starting baseline; banks below \$20 million in baseline lending look rather different. This difference is due to many institutions receiving SBLF funds that were greater than their current levels of baseline lending. With the SBLF funds larger than their baseline, it was much easier to increase their lending over 100 percent or, in some cases, 400 percent.

To observe small business lending growth for different regions of the United States, we focus on the first quarter of 2014 and break the data down by region. The Southwest experienced the largest increase over baseline lending—up 50 percent. The Midwest experienced the lowest increase in small business lending over mean baseline lending; yet its increase still reached 32 percent for the first quarter of 2014. All other regions experienced increases in lending as well.

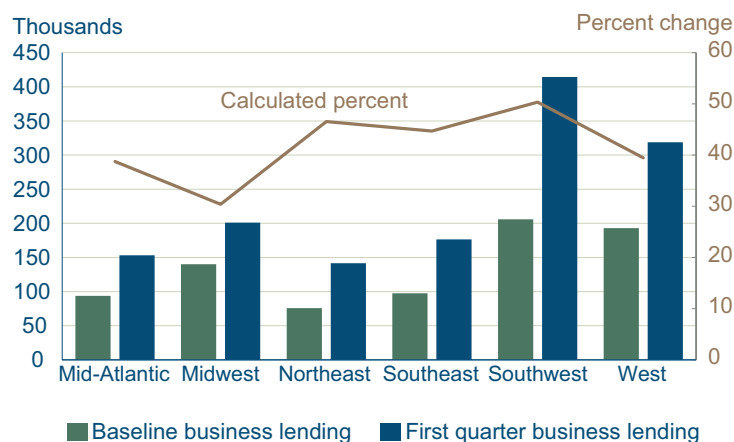
The SBLF categorizes small business loans made in terms of the following types: commercial and industrial, owner occupied commercial real estate, loans to finance agricultural production, and loans secured by farmland. The majority of regional loans consist of commercial and industrial and owner occupied commercial real estate. Agricultural production and farmland loans are seen in the regional areas where we would expect farming to be a portion of small businesses.

While it is too early to evaluate the long-term effects of the SBLF program on small business lending, the data so far show that banks have used

## Price Banks Pay (Dividend Rate) for SBLF Funds

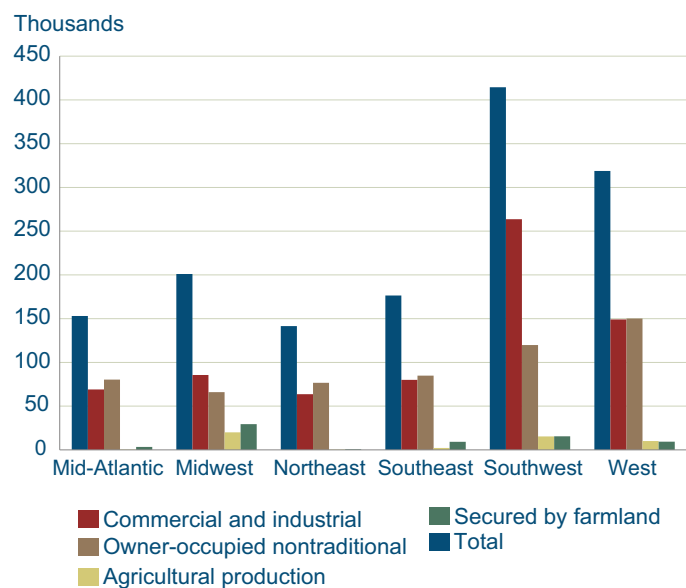
Time period	Lending increase above baseline (percent)	Dividend rate (percent)
	Less than 2.5	5
Upon funding and for the next nine calendar quarters	2.5-5.0	4
	5.0-7.5	3
	7.5-10	2
	10 or more	1
Tenth quarter after funding through the end of the first 4.5 years	If lending has increased after the end of the eighth quarter after funding	Rate set as above for the tenth quarter
	If lending has not increased at the end of the eighth quarter after funding	
After 4.5 years (if funding has not been repaid)		0

## Regional Lending



Source: Small Business Lending Fund Program Reports, US Department of the Treasury.

## Regional Loan Breakdown



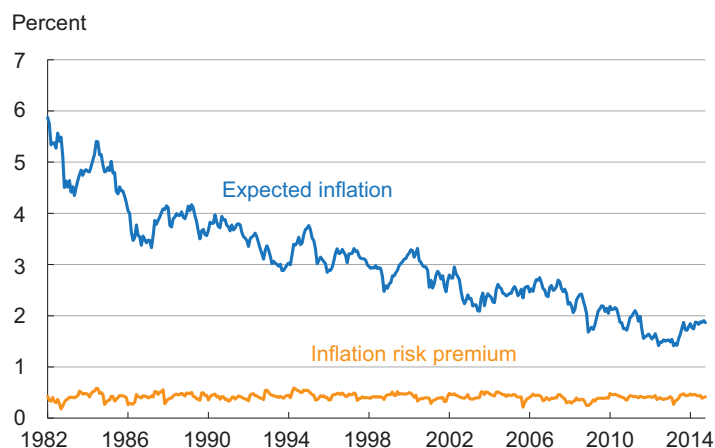
Source: Small Business Lending Fund Program Reports, US Department of the Treasury.

SBLF funds to increase their small business lending. Whether SBLF funding will play a long-term role in insuring small business lending continues to be available to qualified borrowers remains to be explored in further studies.

# Cleveland Fed Estimates of Inflation Expectations, October 2014

News Release: October 22, 2014

## Ten-Year Expected Inflation and Real and Nominal Risk Premia

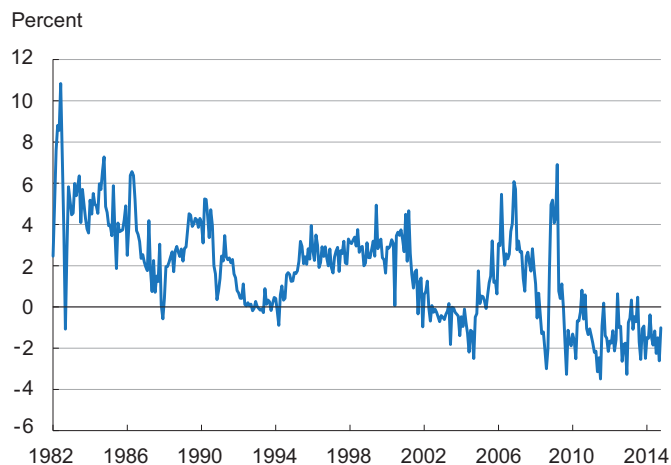


Source: Haubrich, Pennacchi, Ritchken (2012).

The latest estimate of 10-year expected inflation is 1.87 percent, according to the Federal Reserve Bank of Cleveland. In other words, the public currently expects the inflation rate to be less than 2 percent on average over the next decade.

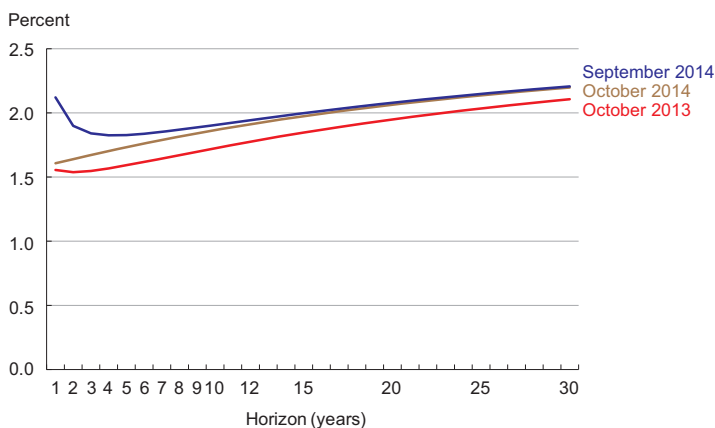
The Cleveland Fed's estimate of inflation expectations is based on a model that combines information from a number of sources to address the shortcomings of other, commonly used measures, such as the "break-even" rate derived from Treasury inflation protected securities (TIPS) or survey-based estimates. The Cleveland Fed model can produce estimates for many time horizons, and it isolates not only inflation expectations, but several other interesting variables, such as the real interest rate and the inflation risk premium.

## Real Interest Rate



Source: Haubrich, Pennacchi, Ritchken (2012).

## Expected Inflation Yield Curve



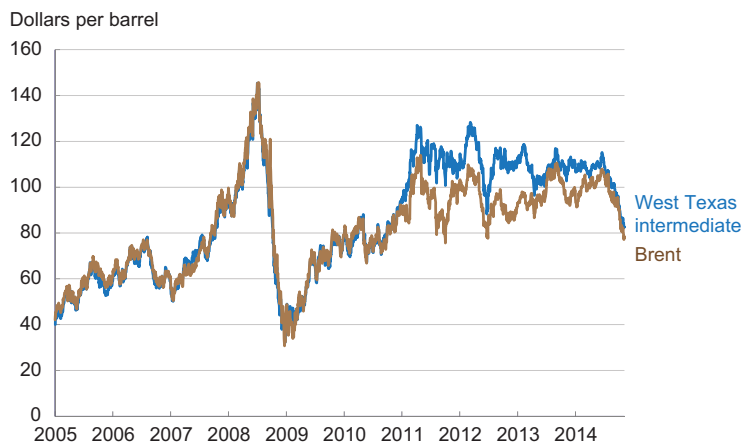
Source: Haubrich, Pennacchi, Ritchken (2012).

## The Effect of Oil Price Declines on Consumer Prices

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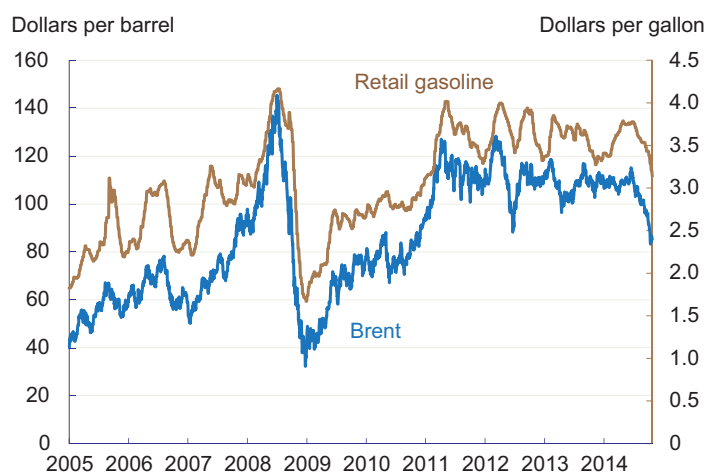
by Ben Craig and Sara Millington

### Brent and West Texas Intermediate Barrel Prices



Sources: Energy Information Administration, Haver Analytics.

### Brent Barrel and Retail Gasoline Prices



Sources: Energy Information Administration, Haver Analytics.

Oil prices have declined significantly in recent weeks, reaching levels not seen in several years. At the same time, the year-over-year percent change in the most widely known measure of inflation, the Consumer Price Index (CPI), came in at 1.7 percent for September, which is below policymakers' targeted levels. Given these circumstances, there is some concern that low oil prices, which have continued to remain below \$90 a barrel through October, will keep inflation persistently below or even push it further from targeted levels. A look at historical relationships between oil prices and various price measures can help gauge the potential pass-through of the recent oil-price declines to other domestic prices.

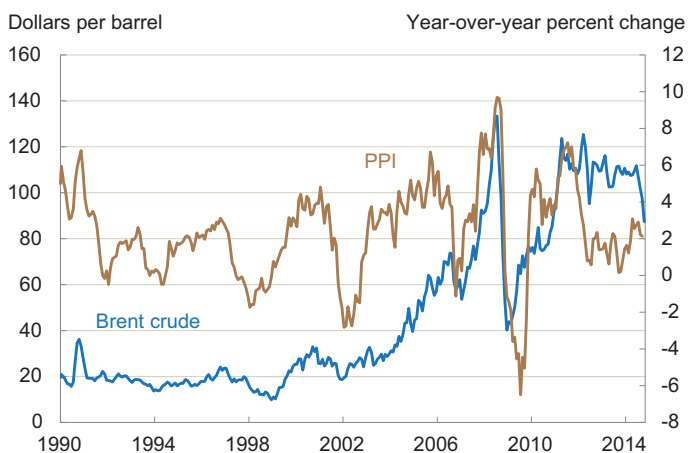
Historically, international and domestic oil prices have moved closely together—until recently there had been 25 years of nearly identical price movement. (Brent crude is the measure of international oil prices, while West Texas intermediate is the measure of domestic oil prices.) However, at the start of 2011 they began to deviate slightly from one another. In October, oil prices fell significantly, resulting in some of the lowest international barrel prices since 2010, and the two crude benchmarks began to converge to the same price path.

The most direct impact that low oil prices, both domestic and international, have on other domestic prices is through a decline in retail gasoline prices. While oil prices and gasoline prices follow the same trend, gasoline prices react with a delay to changes in oil prices. Gasoline prices have been trending around \$3.50 a gallon for a few years, a level much higher than before the recession, but by the end of October, they had declined to \$3.14 a gallon.

In broader terms, one way in which we might expect oil prices to influence aggregate domestic prices is by lowering firms' costs of production. An indicator in which this effect would show up is the Producer Price Index (PPI), which measures the

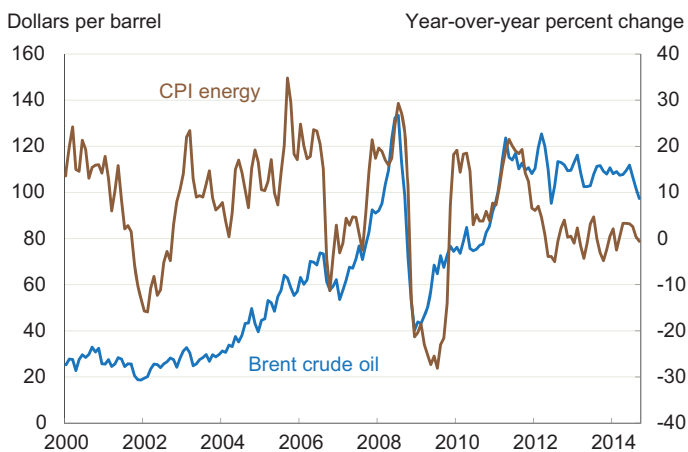


## Oil Prices and Producer Price Index



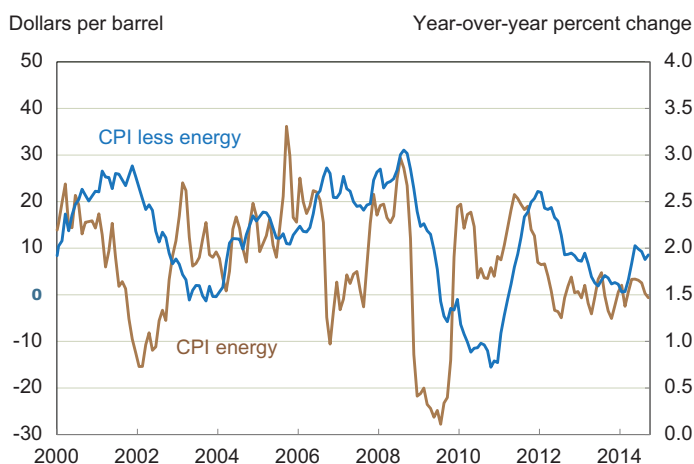
Sources: Bureau of Labor Statistics, Energy Information Administration, Haver Analytics.

## CPI Energy and Oil Prices



Sources: Bureau of Labor Statistics, Energy Information Administration, Haver Analytics.

## CPI Less Energy and CPI Energy Index



Sources: Bureau of Labor Statistics, Haver Analytics.

change in the selling prices received by domestic producers for their output. As production costs go down, firms can lower the prices they charge for their produced goods. The year-over-year percent change in the PPI for finished goods has been loosely related to international oil prices for the past 20 years. But when oil reached \$60 a barrel in 2007, the two price series began to move more in sync. The year-over-year percent change in the PPI was lower in the most recent data release, but it is still too early to tell whether low oil prices are going to feed through to the PPI going forward.

Given that oil prices and gasoline prices move closely together, low oil prices will directly affect the CPI through its energy component. The close comovement of the CPI energy index and oil prices can be seen below. However, much like the PPI, the energy CPI began to trend much closer to oil prices following the \$60 threshold of 2007.

Since the CPI is most directly influenced by oil price changes through its energy component, one question that remains is whether or not other components in the CPI are influenced by low oil prices. Generally, energy prices are rather volatile, and so energy components are often excluded when predicting inflation because of that volatility. Forecasters focus on “core” measures instead. The recent decline in oil prices is of less concern to many CPI forecasters, because it may not affect the “core” price level. It would be a bit more concerning, however, if low oil prices also affected other domestic prices as well. A quick look at the year-over-year percent changes in the energy CPI and the CPI excluding energy suggests changes in energy prices are often followed by similar changes in the rest of the CPI’s components.

We can take a more detailed look at how changes in energy prices might affect the nonenergy parts of the CPI by looking at the correlation between the CPI energy index and the indexes for other CPI components. The resulting correlations point to two components that are significantly correlated to energy price swings—food and beverages and housing—though the strength of these relationships has fluctuated over time. However, the relationship between energy and other components of the CPI



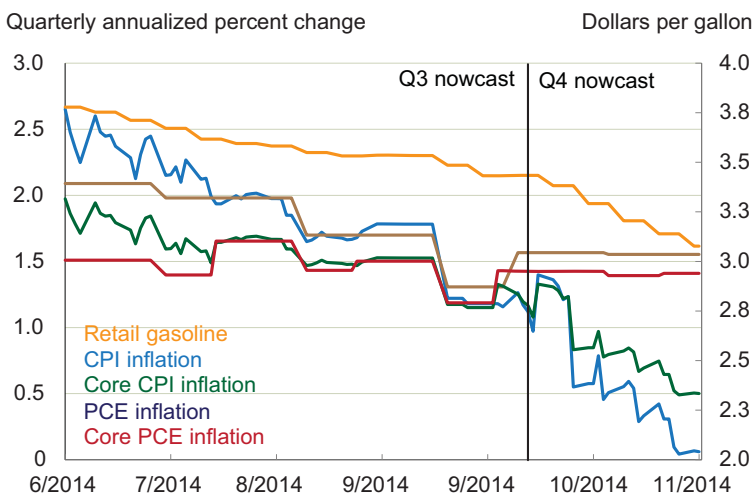
is weak and, in some cases, even negative. Looking at the “all-items” or “headline” CPI suggests that the relationship between it and the energy index is strong, but this, again, is primarily because the energy component exerts such a strong influence in the overall CPI. It does explain why changes in energy prices can substantially change the headline CPI numbers.

## Correlations between the CPI Energy Index and Other CPI Component Indexes

Component Index	1970-1980	1980-1990	1990-2000	2000-2010	2010-present	Total
All items	0.833	0.895	0.895	0.931	0.771	0.681
All items less energy	0.726	0.781	0.400	0.157	-0.117	0.442
Food and beverages	0.555	0.653	0.499	0.087	0.259	0.425
Housing	0.739	0.806	0.478	0.607	-0.474	0.555
Apparel	0.629	0.777	0.183	-0.047	0.039	0.293
Medical care	0.409	0.464	0.290	0.298	0.216	0.259
Recreation				-0.017	-0.465	-0.155
Education and communication				-0.360	-0.129	-0.222
Other goods and services	0.438	0.341	0.114	-0.413	0.265	0.034

Note: Correlations are between the year-over-year percent changes in each index.  
Sources: Bureau of Labor Statistics; Haver Analytics.

## Cleveland Fed Nowcasting Model and Retail Gas



Source: Federal Reserve Bank of Cleveland.

The volatile nature of oil and energy prices more generally makes it difficult to say how recent oil price movements impact the longer-term outlook for inflation. However, we can gauge the impact that these oil price changes have on the near-term inflation outlook. The Federal Reserve Bank of Cleveland’s inflation nowcasting model provides a daily nowcast of inflation for both the PCE and CPI. The nowcast provides a forecast of the current period’s rate of inflation before the official data are released. If we plot recent gas prices along with the daily nowcasts for the CPI, PCE, core CPI, and core PCE, we see that declining oil prices decrease nowcasts for headline CPI and headline PCE, while the core indicators remain steady. Headline CPI and PCE both continue trending downward as gasoline prices continue falling. Core measures, being isolated from direct energy swings, remain around 1.5 percent.

Oil price changes can potentially play a large role in the US economy. With respect to inflation, the two most likely channels through which they could

do so are retail gasoline prices and producer prices. However, as consumers use savings from lower energy prices for other goods and services, these prices are likely to rise in response, offsetting the initial disinflationary impact of lower oil prices. Accordingly, as the FOMC observed in its Statement on Longer-Run Goals and Monetary Policy Strategy, “the inflation rate over the longer run is primarily determined by monetary policy,” rather than by movements in individual price components.

## Yield Curve and Predicted GDP Growth, October 2014

Covering September 19, 2014–October 24, 2014  
by Joseph G. Haubrich and Sara Millington

### Overview of the Latest Yield Curve Figures

Since last month, the yield curve flattened sharply, more than reversing the sharp gain in September. Long rates rose while the short end stayed (nearly) constant, with the three-month (constant maturity) Treasury bill rate staying at the very low 0.02 percent (for the week ending October 24), just down from August's 0.03 percent. The ten-year rate (also constant maturity) dropped all the way to 2.25 percent, a big drop from September's 2.61 percent and well below August's 2.41 percent. The slope decreased to 223 basis points, down from September's 259 basis points and August's 241 basis points.

The change in slope, large as it was, was counteracted by the strong real GDP report for the third quarter of 2014 (with a previous strong report in the second quarter) and as a result, using past values of the spread and GDP growth suggest that real GDP will grow at about a 1.8 percentage rate over the next year, up from both August's and September's projections of 1.5 percentage rate. The influence of the past recession continues to push towards relatively low growth rates, but recent stronger growth is counteracting that push. Although the time horizons do not match exactly, the forecast comes in on the slightly more pessimistic side than some other predictions, but like them, it does show moderate growth for the year.

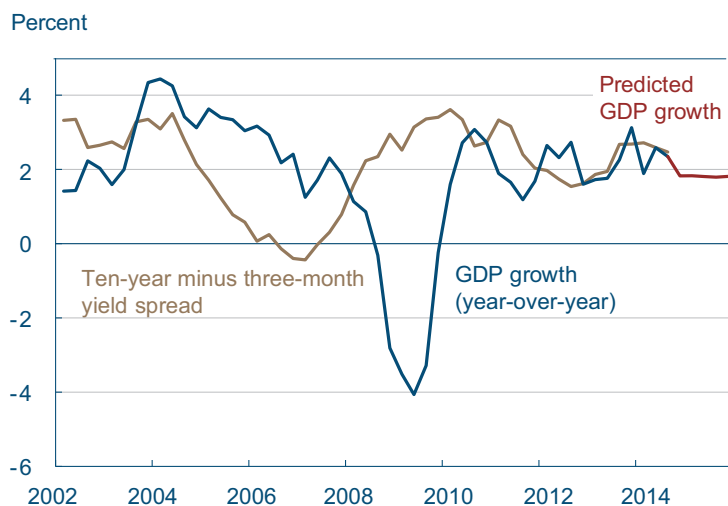
The flatter slope, however, still had the usual effect on the probability of a recession, moving to above 3 percent, previously below 2 percent. Using the yield curve to predict whether or not the economy will be in recession in the future, we estimate that the expected chance of the economy being in a recession next October at 3.42 percent, up from September's number of 1.99 percent and above August's number of 2.76 percent. So although our approach is somewhat pessimistic with regard to the level of growth over the next year, it is quite optimistic about the recovery continuing.

### Highlights

	October	September	August
Three-month Treasury bill rate (percent)	0.02	0.02	0.02
Ten-year Treasury bond rate (percent)	2.25	2.61	2.41
Yield curve slope (basis points)	223	259	238
Prediction for GDP growth (percent)	1.8	1.5	1.5
Probability of recession in one year (percent)	3.42	1.99	2.76

Sources: Board of Governors of the Federal Reserve System; authors' calculations.

### Yield Curve Predicted GDP Growth



Sources: Bureau of Economic Analysis, Board of Governors of the Federal Reserve System; authors' calculations.

## 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. 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.

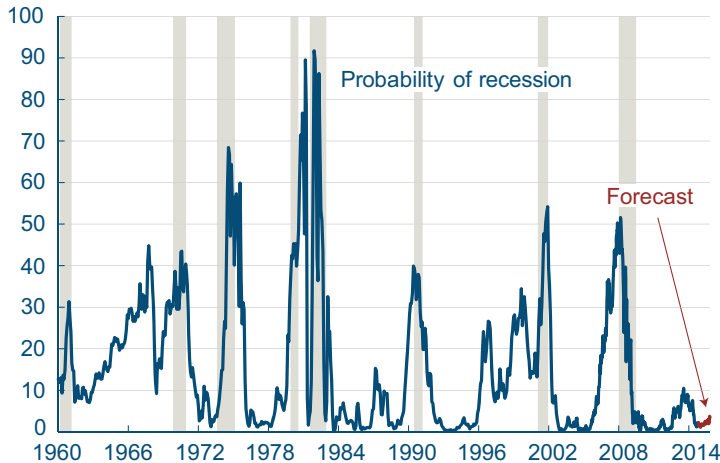
### Predicting the Probability of Recession

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-

## Recession Probability from Yield Curve

Percent probability, as predicted by a probit model

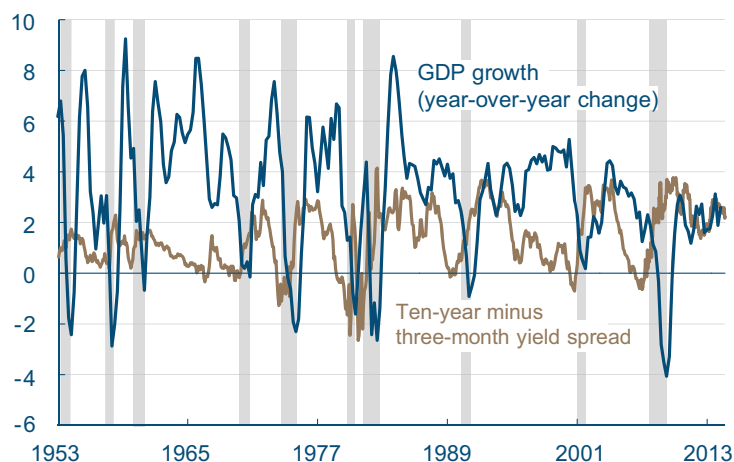


Note: Shaded bars indicate recessions.

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

## Yield Curve Spread and Real GDP Growth

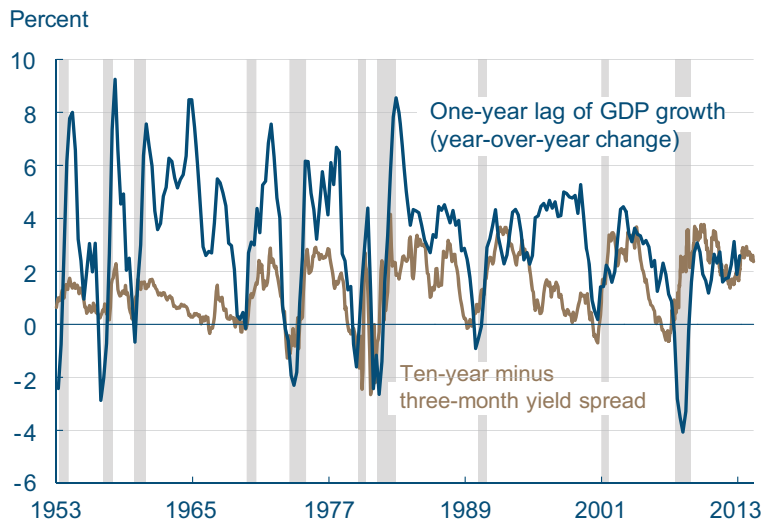
Percent



Note: Shaded bars indicate recessions.

Sources: Bureau of Economic Analysis, Board of Governors of the Federal Reserve System.

## Yield Spread and Lagged Real GDP Growth



Note: Shaded bars indicate recessions.

Sources: Bureau of Economic Analysis, Board of Governors of the Federal Reserve System.

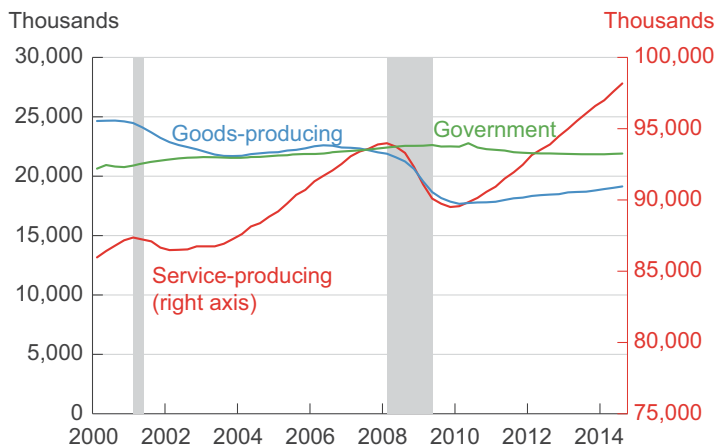
ally different from the determinants that generated yield spreads during prior decades. Differences could arise from changes in international capital flows and inflation expectations for example. The bottom line is that yield curves contain important information for business cycle analysis, but like 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.

# Slow Recovery in Wages and Salaries Continues despite Strong Jobs Growth

11.05.14

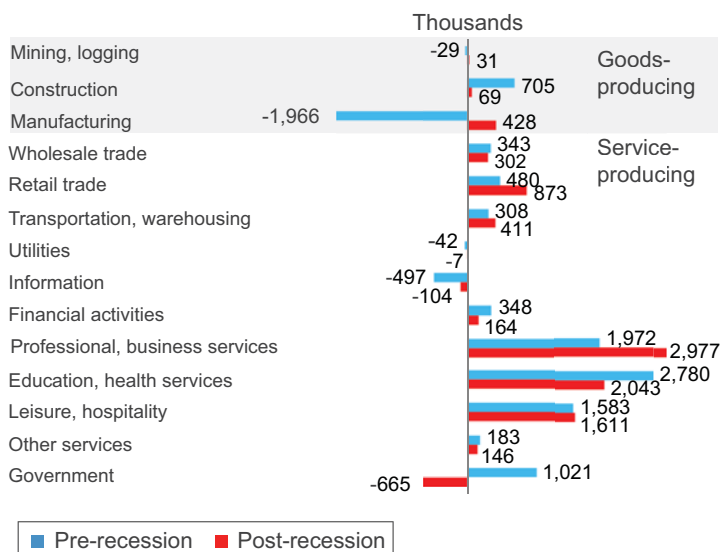
by LaVaughn M. Henry

## Total Nonfarm Employment by Industry Sector



Note: Shaded bar indicates recession.  
Source: US Bureau of Labor Statistics.

## Payroll Employment Growth by Industry Sector



Note: Pre-recession period is 2002:Q1-2007:Q4. The post-recession period includes 2009:Q3-2014:Q3.  
Source: US Bureau of Labor Statistics.

After enduring the worst recession since the Great Depression and seeing higher levels of unemployment than at any other point in their lifetime, Americans have been finding jobs at an increasing rate. However, the workplaces to which they are returning look very different from the ones that they participated in prior to the Great Recession. Most strikingly, many of the sectors that lost jobs before or during the recession are not those that are gaining jobs now. And wages and salaries tend to be growing slowest in the sectors gaining the most jobs and fastest in those gaining the fewest.

During the pre-recession period of 2002–2007, total nonfarm employment grew by 7.4 million workers. This growth was strongly concentrated in the private services-producing sector, and to a lesser extent in the government sector. During this period, these sectors grew by 7.5 million and 1 million workers, respectively. Conversely, the goods-producing sector, primarily composed of workers in mining and logging, construction, and manufacturing, saw their employment numbers decline by 1.1 million. Manufacturing alone lost 2.0 million jobs. (By way of historical comparison, the manufacturing sector as a percent of total private sector employment has declined from a high of approximately 37 percent immediately following World War II to approximately 10 percent today.)

Both before and after the Great Recession (2008:Q1 to 2009:Q2), service sectors have fared best. Specifically, jobs growth in professional and business services has almost reached 3 million in the recovery, eclipsing the sector's pre-recession growth of 2 million jobs over a comparable period (five years). Similarly, growth remains strong in the education and health services sector and the leisure and hospitality sector. Collectively, these three sectors have seen total job growth of 6.6 million in the recovery period, slightly surpassing the 6.3 million

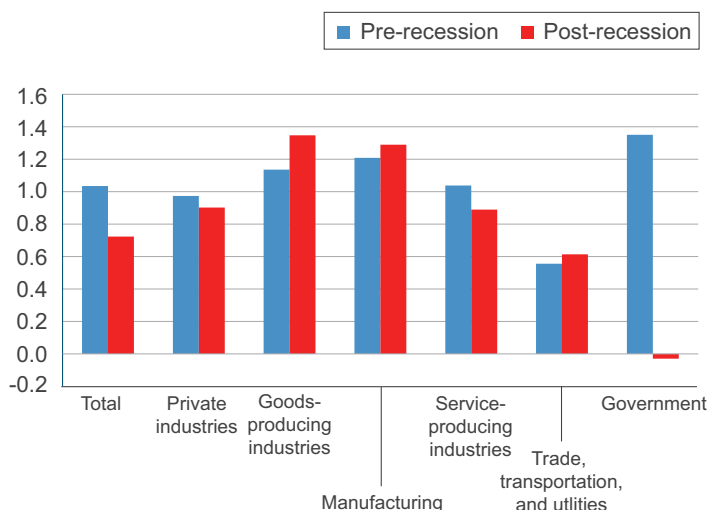
jobs gained in the pre-recession period. Conversely, due to the onset of fiscal restraint at all levels of government, the government sector has actually lost 665,000 jobs in the recovery, while it gained 1 million in the pre-recession period.

Meanwhile, wage and salary growth evolved quite differently. During the pre-recession period, real wages and salaries, as measured in 2001 dollars, were growing at an average annual rate of approximately 0.9 percent across all sectors. The variation between sectors was fairly tight with wages in the goods-producing sector growing at a 1 percent rate while the service sector was growing at approximately a 0.9 percent rate. The government sector actually led in wage and salary growth during this period, with an average annual growth rate of approximately 1.2 percent.

However, in the recovery, this relative symmetry in performance has eroded. The goods-producing sector, despite having the slowest rate of growth in employment levels, has seen an average of 1 percent growth in real wages and salaries. The fast-growing service sector has seen wage and salary growth fall to approximately half that rate. The trade, transportation, and utilities sector has fallen even further, to approximately 0.2 percent average annualized growth, and the government sector has also seen a decline in average annual wage and salary growth of approximately 0.3 percent.

It may seem counterintuitive that wages and salaries are growing the slowest in industries where jobs are growing the fastest, but it actually is not. It is primarily due to the wide variance in jobs in the service sector. Some service jobs, such as high-tech professionals, health service professionals, and engineers, have higher barriers to entry, including the need to acquire more training and credentials. Many others, such as some jobs in leisure and hospitality and wholesale and retail trade, have much lower barriers to entry than the high-skilled, high-tech positions that are being created in the skilled manufacturing and construction sectors. And because these high-skilled jobs continue to increase in demand, average wage and salary rates have risen faster than they have in the lower-skilled sectors.

## Average Annual Growth Rate in Real Wages and Salaries by Industry Sector



Note: Pre-recession period is 2002:Q1-2007:Q4. The post-recession period includes 2009:Q3-2014:Q3.

Source: US Bureau of Economic Analysis.



## Recent Trends in Local Multipliers

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11.05.14

by Daniel Hartley

Attracting good businesses to a region is important to local economic development officials, but they pay particular attention to the attraction and retention of businesses that produce tradable goods and services. A tradable good or service is one that can be sold outside of the metropolitan area in which it is produced. Tradable industries are important because they bring money into the local economy and thus can be associated with a “local multiplier” effect, that is, the possibility that adding a job in a tradable business leads to the creation of new jobs in nontradable ones (or conversely, jobs in nontradable businesses can be lost when a job in the tradable business is destroyed).

Do these “local multiplier” effects exist, and if so, how big are they? In practice, it can be hard to determine which services are tradable, so economists have developed an alternate approach to estimating local multipliers. They focus on the manufacturing industry, which produces many tradable goods, and they look at how many nonmanufacturing jobs are gained or lost in the metropolitan area in response to an increase or decrease in the number of manufacturing jobs. However, they consider only particular kinds of increases and decreases in manufacturing jobs—those that are “externally driven,” since these are less likely to also influence nonmanufacturing jobs in the metro area directly.

First the researchers identify externally driven demand and supply shocks which might manifest themselves as particularly strong employment gains or losses in a particular type of manufacturing at the national level (possibly excluding the metropolitan area under consideration). Then they estimate how much manufacturing employment would have grown in the metro area if each particular type of manufacturing present in the metro area had grown at the same rate as it did nationally. Finally, they estimate how much of the nonmanufacturing employment growth that occurred in the metro area is associated with this estimated portion of manufac-

turing growth. From these estimates, they calculate an elasticity, a measure of the percent change of one variable in response to a one percent change in another, and those elasticities are used to figure out the multipliers. This approach, credited to Bartik (1991), is used to calculate all of the elasticities mentioned in this article.

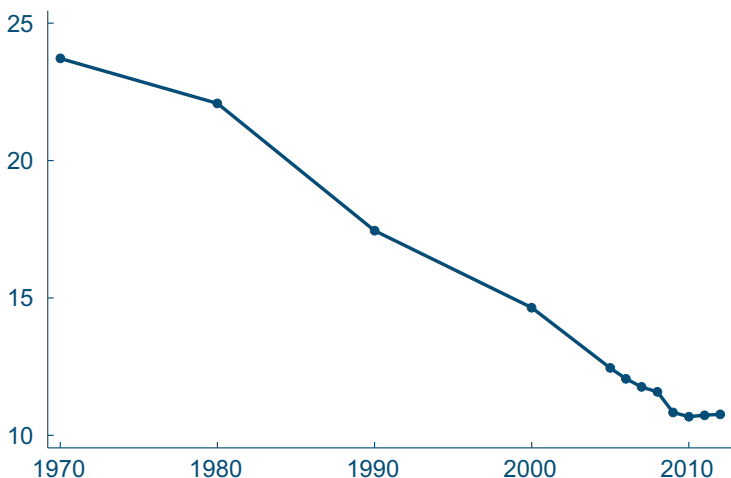
Using data from the 1980, 1990, and 2000 censuses, Moretti (2010) estimates an elasticity of 0.3 of nonmanufacturing jobs to manufacturing jobs. This means that a 10 percent decrease in manufacturing jobs would spur a 3 percent decrease in other jobs. However, since the base number of nonmanufacturing jobs is much larger than the base number of manufacturing jobs, a 3 percent drop in nonmanufacturing jobs compared to a 10 percent drop in manufacturing jobs translates into about 1.6 fewer nonmanufacturing jobs for each lost manufacturing job.

I re-estimate these relationships using more recent data. I find that the elasticity of nonmanufacturing jobs with respect to manufacturing jobs was near zero (0.1) for the 2000s (from 2000 to 2010). However, this figure is actually the composite of a negative elasticity (−0.4) during the housing boom period from 2000–2006 and a slightly more positive elasticity (0.2) during the housing bust and subsequent period from 2006–2011 (the most recently available data using comparable geographic definitions is from 2011).

While neither of the aforementioned elasticities is statistically distinguishable from zero, their signs are consistent with other research (Charles, Hurst, and Notowidigdo, 2013) that finds that the housing boom masked the extent of employment losses due to the decline of manufacturing employment. The negative elasticity implies a negative multiplier, which means that the declines in manufacturing jobs during the boom were associated with increases in nonmanufacturing jobs. However, the increases in nonmanufacturing jobs may have been driven by temporarily elevated demand for housing and consumption goods during the boom, which would not have been present, had the boom not occurred. Once the boom ended, the construction and retail jobs driven by the elevated demand disappeared.

## Share of US Employment in Manufacturing Sector

Share of employment (percent)



Source: 1970, 1980, 1990, and 2000 Census of Population; 2005, 2006, 2007, 2008, 2009, 2010, 2011, and 2012 American Community Survey.

So what does this portend for metropolitan areas that lost employment in the manufacturing sector during the 2000s? One possibility is that nonmanufacturing employment will adjust in a manner so that the relationship between nonmanufacturing and manufacturing employment changes observed during the 1980s and 1990s will be re-established. This would mean sharp drops in nonmanufacturing employment in many metropolitan areas. However, it is more likely that manufacturing employment has become a less useful proxy for the tradable sector as manufacturing has fallen as a share of employment in the United States. In this case, it could be that the relationship between tradable and nontradable employment from the 1980s and 1990s still holds and would be apparent in the 2000s if one were to use a better measure of the tradable sector. Research relating to such a measure is currently underway by some of my colleagues here at the Cleveland Fed (Elvery and Venkatu, 2014).

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# Employment Trends in Pennsylvania

11.14.14

by Guhan Venkatu

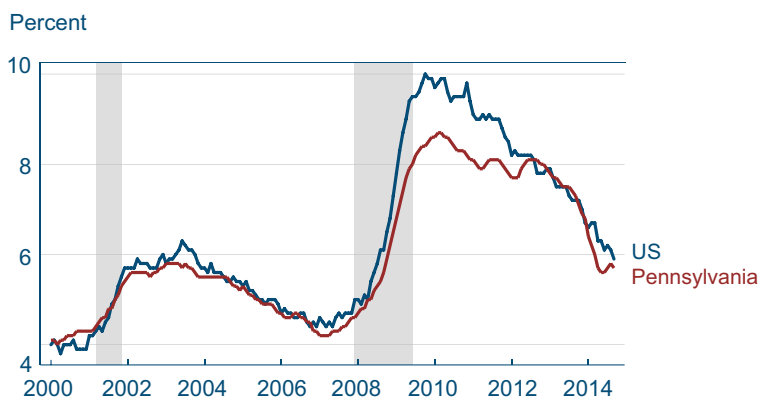
Pennsylvania's unemployment rate was 5.7 percent in September. This put the state close to the middle of the distribution of state unemployment rates, ranking 20th, as well as below the US average of 5.9 percent. Additionally, the state has seen its unemployment rate fall fairly sharply in 2014. Among the 50 states, it's experienced the 8th largest decline (1.1 percentage points, tied with 5 other states) during the year.

These data seem like a good indication of conditions in the commonwealth's labor market, though recent unemployment rate changes have been associated with declines in the labor force. From December 2013 to September 2014, Pennsylvania's labor force fell by 76,791 workers, or 1.2 percent. This compares with an increase nationally of about 0.6 percent over the same time span.

One way to understand the significance of these developments is to hold the labor force constant after December 2013, and assume that the roughly 77,000 workers who were in the labor force in December 2013 had not left by September 2014 and had remained unemployed. Doing so would produce an unemployment rate in Pennsylvania of 6.8 percent, entirely eliminating the 1.1 percentage point decline in the official measure since the end of last year.

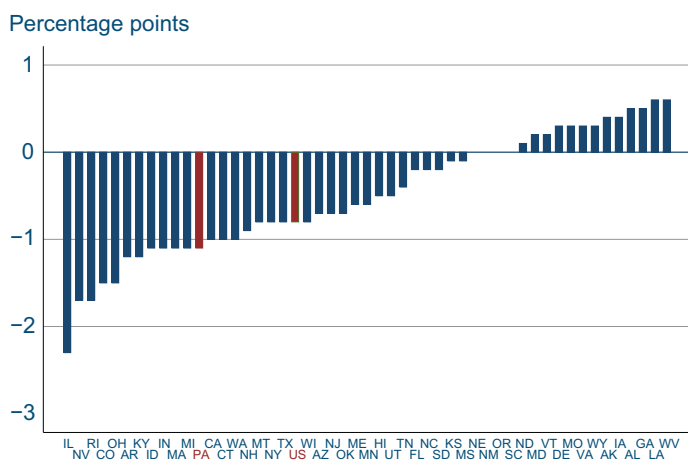
A survey of establishments by the Labor Department provides another perspective on the state's labor market. According to this survey, the state's employment growth in 2014 is on pace to slightly exceed its employment growth in 2012 and 2013. However, this pace (0.6 percent) is considerably weaker than that for the US (2.0 percent). Indeed, outside of 2010, Pennsylvania's employment growth (in percentage terms) has consistently lagged behind that of the US throughout the recovery. As a result, Pennsylvania has yet to fully recover the jobs it lost in the Great Recession. The US, by contrast, achieved this milestone in May of this year.

## Unemployment Rate: US and Pennsylvania



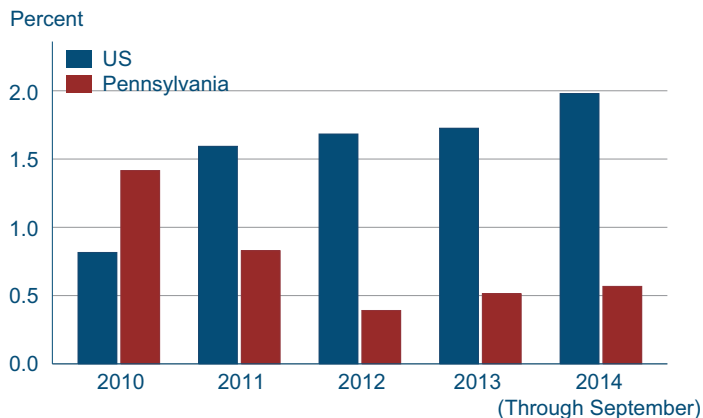
Note: Shaded bars indicate recessions.  
Source: Bureau of Labor Statistics.

## Unemployment Rate Change: December 2013 to September 2014



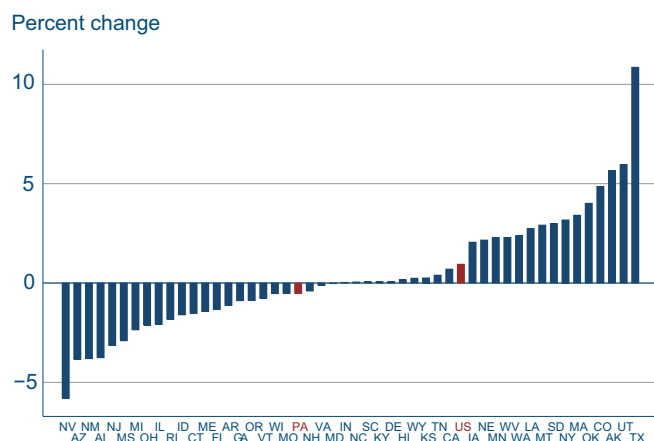
Source: Bureau of Labor Statistics.

## Annual Payroll Employment Change: US and Pennsylvania



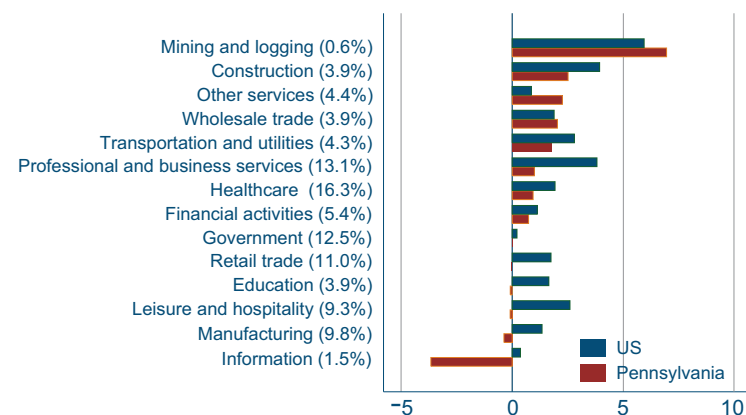
Note: 2014 annualized. Figures in parentheses identify the industry employment share in Pennsylvania as of September 2013.  
Source: Bureau of Labor Statistics.

## Payroll Employment, Change Relative to December 2007



Note: Annual changes for every year other than 2014 are calculated from December to December. The change for 2014 is calculated from December 2013 to September 2014 and annualized.  
Source: Bureau of Labor Statistics.

## Pennsylvania Industry Employment Growth, September 2013–September 2014



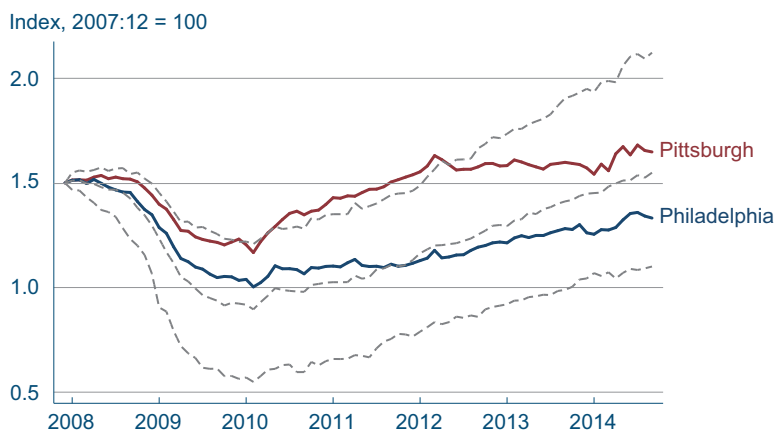
Source: Bureau of Labor Statistics.

Year-over-year employment growth rates (September 2013 to September 2014) were similar to those noted above—0.6 percent for the commonwealth versus 1.9 percent for the US. Several relatively large sectors, like retail trade, manufacturing, and leisure and hospitality, experienced no employment growth or outright declines over this period in Pennsylvania, even as these sectors saw gains nationally. Other large sectors—like health care and professional and business services—saw employment expand much less in Pennsylvania than in the US. On the other side of the ledger, mining and logging experienced stronger employment growth in the state than in the US.

Examining Pennsylvania's two major metro areas (MSAs)—Philadelphia and Pittsburgh—since the onset of the Great Recession can give us a sense of the relative contributions of each to the state's employment recovery, given that they collectively account for about half of the commonwealth's population. Using 2010 Census figures, the Pennsylvania counties of the Philadelphia metro area accounted for about 32 percent of the state's population (4,008,994 residents), while the Pittsburgh metro area accounted for about 19 percent of the state's population (2,356,285 residents). With respect to employment, the Pittsburgh MSA had largely returned to its late 2007 employment levels by 2012 and has since added to these gains. As of September, it has about 17,000 more jobs than it did in December 2007. The Philadelphia MSA (which includes some areas outside of Pennsylvania), on the other hand, has about 47,300 fewer jobs that it did in December 2007—one of the key reasons why the state remains below its pre-recession employment peak.

When compared with the 100 largest American metro areas, Pittsburgh's cumulative employment gains since the onset of the Great Recession rank it 41st best. It has about 1.5 percent more employment than it did in December 2007. Philadelphia, by contrast, ranks 76th, and as described above, has yet to recover its Great Recession-related employment losses. This is something of a reversal from the previous business cycle. By the end of that episode, Philadelphia had expanded its employment more than 2 percent over its March 2001 levels (when

## Payroll Employment: Pittsburgh and Philadelphia Metropolitan Statistical Areas



Notes: Outcomes for the 100 largest American metro areas, by employment, are shown by the dashed lines. The median outcome is in the middle of the chart; the top-most and bottom-most dashed lines depict the 10th best and worst outcomes, respectively, at any given point. Recovery growth rank among 100 largest American metro areas, by employment, show in parenthesis.  
Source: Bureau of Labor Statistics.

that recession began), while the Pittsburgh area failed to recover to its pre-recession employment levels. Taking these two episodes together, employment levels in Pennsylvania's two largest MSAs are now almost the same in September 2014 as they were in March 2001—less than half a percentage point higher in both cases.

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