Economic Trends

August 2013 (July 12, 2013-August 15, 2013)

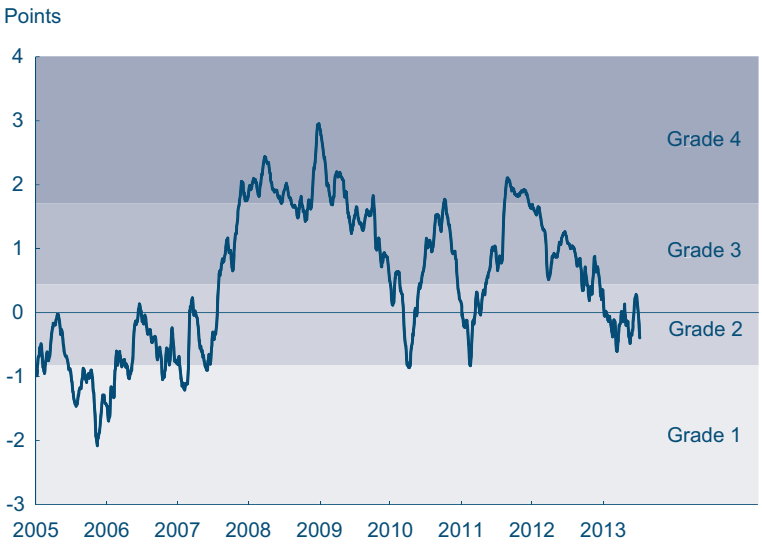
In This Issue:

FEDERAL RESERVE BANK *of* CLEVELAND

Tracking Recent Levels of Financial Stress

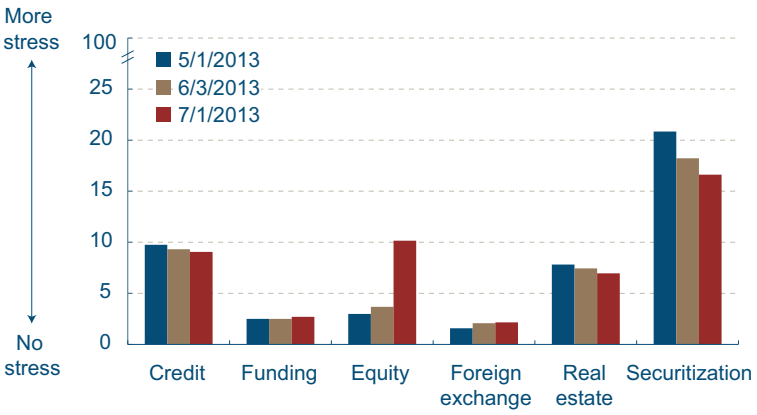
07.11.13
by Timothy Bianco and Amanda Janosko

Cleveland Financial Stress Index



Source: Oet, Bianco, Gramlich, and Ong (2012).

Relative 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 1.00 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).

The Cleveland Financial Stress Index (CFSI) has remained in Grade 2, or within a "normal stress" level, since the index was revised in April 2013, when new submarkets were added and updates began to be posted on a daily basis. The trend in financial stress over the previous three months is most likely due to continuing improvements in financial markets.

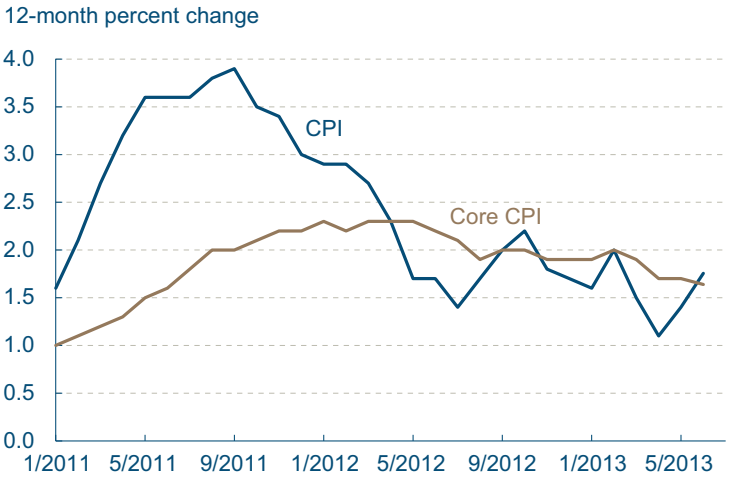
As of July 9, the index stands at –0.39, which is up 0.09 points from a recent low on May 20, 2013. The index is down 1.47 points over the past year and is 3.35 points lower than its historical peak in December 2008.

The CFSI incorporates measures of stress for each of the major financial submarkets: credit, funding, equity, foreign exchange, real estate, and securitization. As a result, the total level of system stress can be decomposed to gauge the level of stress in each of these submarkets and the contribution each makes to system stress (see the working paper). Although the overall CFSI has remained low, recently there have been increases to the amount of financial stress generated by the equity market. Conversely, the contribution from the securitization market has trended downward.

What's Weighing on Inflation?

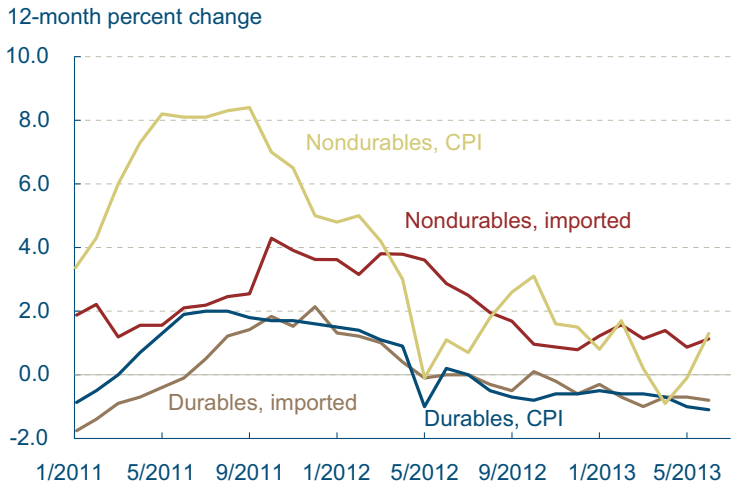
07.22.13
by Todd Clark and Margaret Jacobson

CPI Inflation



Source: Bureau of Labor Statistics.

Prices of Consumer Goods



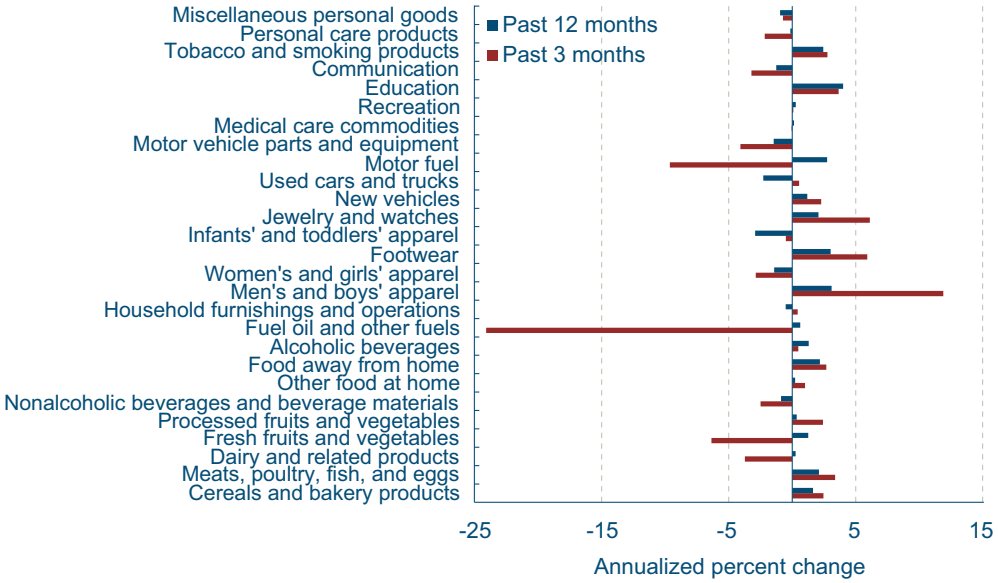
Source: Bureau of Labor Statistics.

Various indicators show that CPI inflation has declined over the past year or so. Although the Bureau of Labor Statistics' (BLS) most recent release of the Consumer Price Index (CPI) shows an annualized increase of 5.9 percent for the month of June, CPI inflation has been very low for many months of the year. As a result, measured on a 12-month basis, CPI inflation continued to remain below 2 percent, at 1.8 percent. The "core" CPI, which covers goods and services excluding food and energy, rose at an annual rate of 2.0 percent in June, putting the 12-month rate at 1.6 percent. Measured on a 12-month basis, core CPI inflation has slowed from 2.2 percent in June 2012 to 1.9 percent in December 2012 to its current rate of 1.6 percent.

The current low rates of inflation in the CPI and core CPI are partly due to low rates of inflation in the prices of goods (see "Recent Trends in Various CPI-Based Inflation Measures" and "Behind Recent Disinflation: 2010 Redux?"). Over the past year or so, inflation rates for both nondurable and durable goods captured in the CPI have slowed, reaching levels that, today, are very low. In June, the 12-month CPI inflation rate for durable goods was –0.6 percent (meaning that the level of durables prices fell 0.6 percent), and the CPI inflation rate for nondurable goods was 1.3 percent.

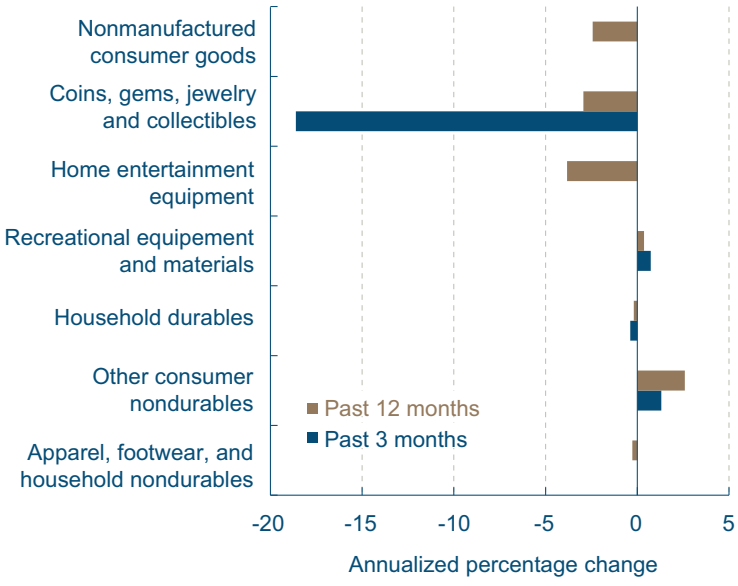
Goods represent about 40 percent of the total CPI consumer basket, with food and beverages comprising 15 percent of the entire basket and nondurables and durables making up the other 25 percent (as measured by relative importances in December 2012). For the 27 goods components of the CPI, inflation rates over the past 12 months vary quite a bit across components, as is normally the case. However, inflation rates are moderate or low for most categories and negative (indicating declining prices) for a number of categories.

CPI Goods Prices



Note: The communication, education, and household furnishings and operations components contain both goods and services.
Source: Bureau of Labor Statistics.

Prices of Imported Consumer Goods



Source: Bureau of Labor Statics, Import Prices Table 1

While the CPI doesn't distinguish goods produced in the U.S. from those produced abroad, the low inflation rate of CPI goods prices seems to be partly due to low inflation rates for the prices of imported goods: the inflation rates of separate BLS indexes of import prices are very low. The prices of imported durable goods prices fell 0.5 percent on average over the same period. Inflation in imported nondurable goods was 1.1 percent on a year-over-year basis in June. Taking a more disaggregated look at inflation in imported good yields a picture similar to that for the components of CPI goods. While inflation rates measured over the past 12 months differ quite a bit across categories of imported consumer goods, rates are low for most and negative for a fair number.

So, to briefly answer the question posed in the title, continued low rates of inflation in goods prices—as measured in import prices and CPI goods prices—appear to be an important factor behind overall and core CPI inflation rates that, on a 12-month basis, remained below 2 percent in June.

Differences in Employment Growth across Metropolitan Areas

08.14.13
by Dionissi Aliprantis and Nelson Oliver

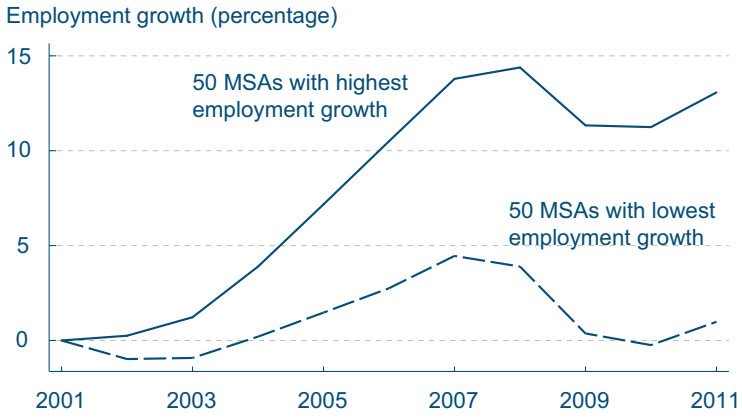
In the last decade, different metropolitan areas of the United States have experienced dramatically different levels of employment growth. Stark contrasts can be seen, for example, when we compare the 50 metro areas with the highest employment growth between 2001 and 2011 to the 50 with the lowest (using the 100 largest metro areas in the U.S. based on their 2001 populations).

Employment expanded by 13 percent in the high-growth metros but only 1 percent in the low-growth group. Though both groups lost significant employment during the Great Recession, the low-growth group lost almost 5 percentage points while the high-growth group lost roughly 3 percentage points. Even if we focused on employment growth only up to 2007, the same patterns would hold and the specific metropolitan areas within each group would change little (12 metro areas would switch categories).

Given these substantial differences between high-growth and low-growth metro areas, it might be surprising that unemployment rates do not diverge across metro areas more than they do. In January 2013, for example, average unemployment rates were 7.7 percent in the high-growth group and 7.8 percent in the low-growth group.

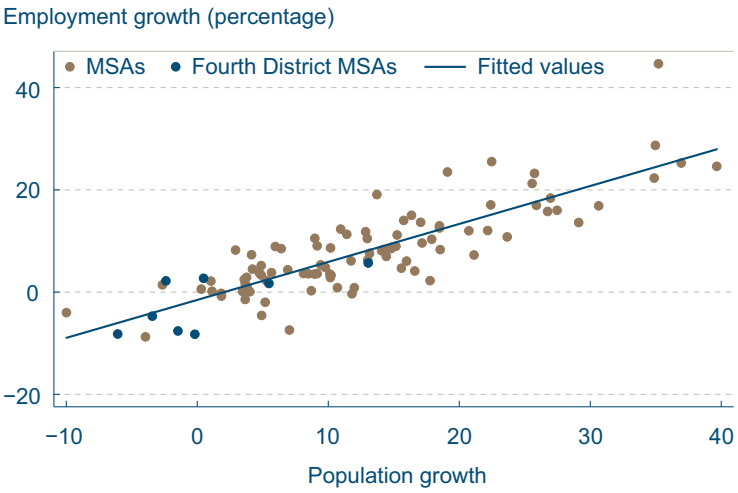
The long-term patterns of employment reflect, to a greater extent, changes in the size of the local economy—not utilization rates of labor. One can see this by looking at the relationship between population and employment. Employment growth and population growth are highly correlated (correlation coefficient=0.72). Metro areas that experience high employment growth also experience high population growth, and vice versa, during the period in question. This does not necessarily mean that population growth causes employment growth. Rather, employment and population growth are jointly determined. Better job prospects in a region will attract people to the area, and higher popula-

Employment Growth in the 100 Largest US MSAs, 2001–2011



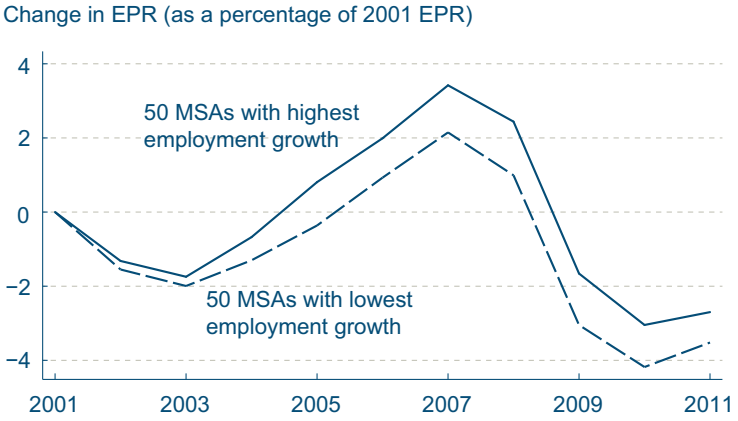
Source: Authors' calculations based on Bureau Economic Analysis data.

Employment and Population Growth in the 100 Largest MSAs, 2001–2011



Source: Authors' calculations based on Bureau Economic Analysis data.

Change in Employment-to-Population Ratio in the 100 Largest US MSAs, 2001–2011



Source: Authors' calculations based on Bureau Economic Analysis data.

tion growth in an area will cause economic activity to rise and increase the demand for labor.

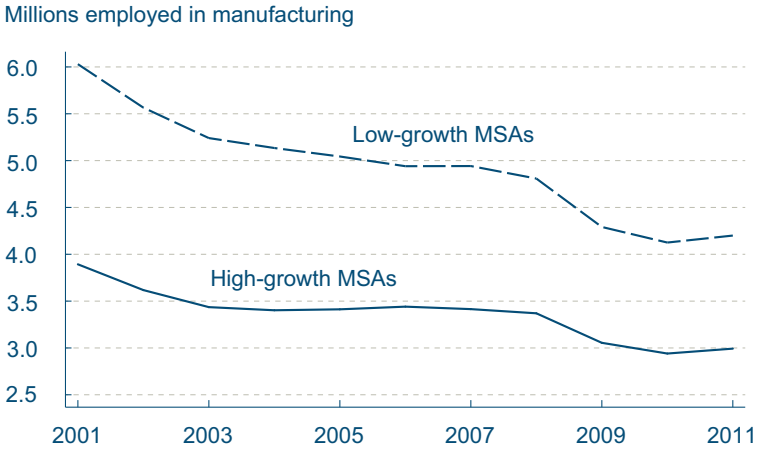
Employment-to-population ratios diverge much less across the two groups of metropolitan areas than employment-growth rates. Still, low-growth metro areas have underperformed and their employment-to-population ratios have declined by about 1 percentage point more than those of high-growth metros.

One factor behind the trend in the employment-to-population ratio is that population share is moving from low-growth metros to high-growth metros, and this is reflected in employment. However, simple differences in population growth are not the entire story. Industrial structure has worked against the low-growth metros: They are much more focused on manufacturing than the high-growth metros. In 2011, for example, low-growth metros had 40 percent more manufacturing workers than the high-growth metros, and manufacturing represented a greater share of their overall employment (7.4 percent versus 4.9 percent)—although this gap had narrowed since 2001 (when it was 10.8 percent versus 7.2 percent). Even though the negative shocks to manufacturing during the decade were widespread, low-growth metros also lost a greater proportion of their manufacturing workers than higher-growth metropolitan areas.

Between 2001 and 2003, manufacturing employment in low-growth metro areas declined by 790,000, whereas high-growth metro areas experienced a more moderate decline of 457,000. A large gap was apparent between 2003 and 2008, when low-growth metro areas lost 432,000 manufacturing jobs and high-growth metros lost only 66,000. And the contrast in manufacturing employment trends was again apparent between 2008 and 2011, when low-growth metros lost 609,000 manufacturing jobs and high-growth metros lost 377,000.

That said, industrial structure explains only a small fraction of the difference in employment growth between high- and low-growth metros. If one replaced the industrial structure of the low-growth regions with the industrial structure of the high-growth regions, but kept each group's origi-

Manufacturing Employment in the 100 Largest US MSAs



Source: Authors' calculations based on Bureau Economic Analysis data.

nal sectoral employment growth rates, the overall difference in employment growth between the two groups of metros would shrink by only 18 percent. So even if the metro groups had similar industry structure in 2001, it is likely there would still be a large gap in growth rates between our high- and low-employment growth rate metros.

Shifting Expectations and Interest Rates

08.15.13

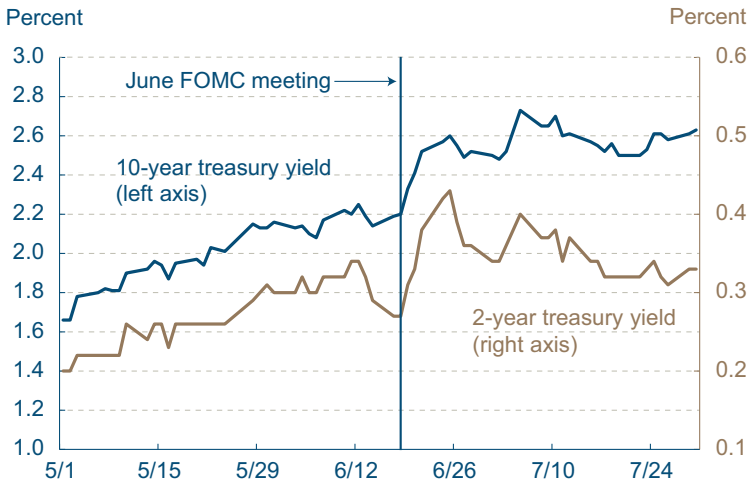
By John Carlson, Sara Millington, and Bill Bednar

By simply changing their views about future economic conditions and the likely policy response, monetary policymakers can alter financial conditions in the present. As a result, how policymakers choose to communicate their expectations influences the effectiveness of their policies. The recent rise of interest rates is a case in point.

Since the beginning of the year, there have been no explicit changes to monetary policy actions. The Federal Reserve has been purchasing the same amount of federal-agency mortgage-backed securities and Treasury securities since January, and the target for the federal funds rate has not changed. Still, interest rates have steadily risen over the past few months (although they have moderated somewhat recently). Rising rates effectively translate into tightening financial conditions, which could feed into broader economic conditions as well. A key factor influencing these rates is market participants' evolving expectations about the timing of future changes in monetary policy, especially in the context of the Committee's economic projections.

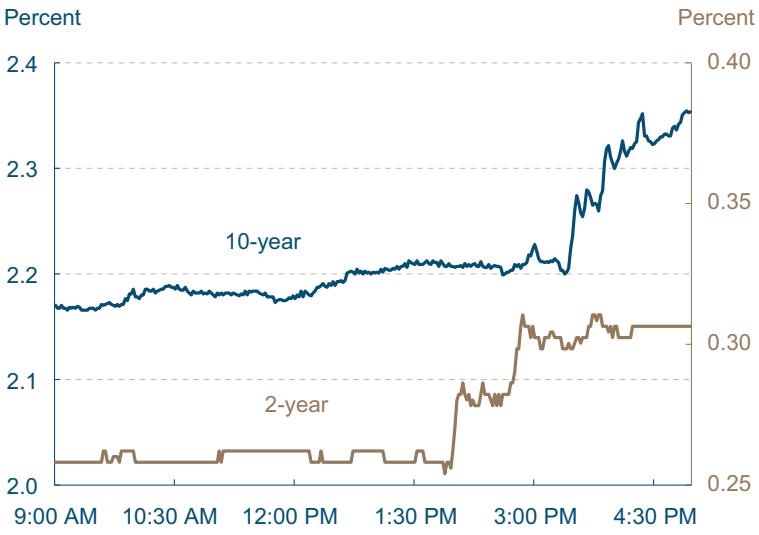
The yield on a 10-year treasury bond, which is highly correlated with many other longer-term interest rates, including rates on mortgages and corporate bond yields, has increased from around 1.7 percent to nearly 2.6 percent since May 1. Similarly, on the shorter end of the maturity distribution, interest rates on 2-year treasury bonds have increased from around 0.2 percent to over 0.3 percent. The largest movements in these rates came in the days following the June Federal Open Market Committee (FOMC) meeting, when the Committee released its updated economic projections and Chairman Bernanke gave additional details on the predicted future of asset purchases. In contrast, the reaction after the July FOMC meeting, when less new information about the Committee's outlook was provided, was rather muted. This suggests that,

Daily Treasury Yields



Sources: Board of Governors of the Federal Reserve System, Haver Analytics.

Intra-day Treasury Yields for June Meeting



Source: Bloomberg.

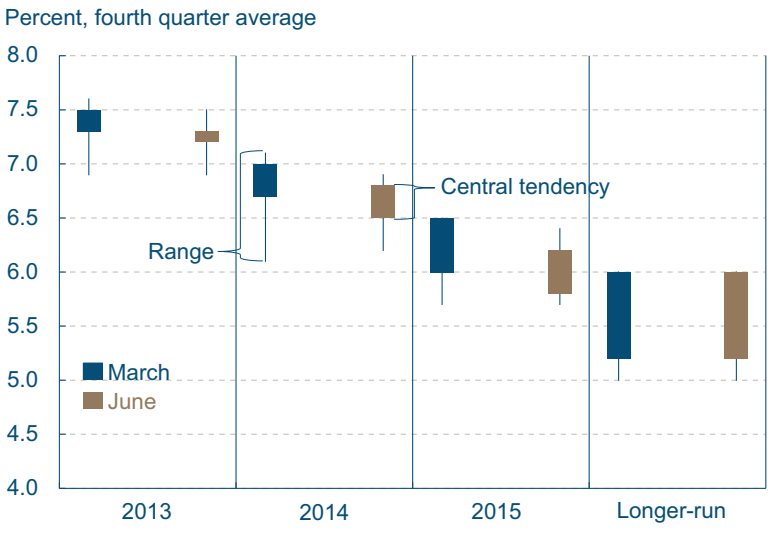
while there are many influences on interest rates, the outlook and expectations of FOMC participants are playing some role in driving these tighter financial conditions.

Looking at these yields on the date of the June meeting provides further evidence of the impact that the FOMC's outlook is having on financial conditions. Sharp increases are observed in the intraday yields for the 2-year treasury rate, which coincide with the release of new economic projections and the Chairman's press conference on future plans for monetary policy. Additionally, the 10-year Treasury rate experiences a significant jump following the press conference and finishes on June 19 nearly 20 basis points higher than the level at which it started the day. Therefore, while no explicit changes to policy actions were made at the June meeting, the yields on both the short- and longer-term Treasury bonds increased considerably throughout the day, and the new rates reached on these bonds after this meeting persisted through July.

One of the likely causes of the strong reaction of financial markets to the June meeting was the release of the Committee's economic projections. Those projections reflected some improvement in the FOMC's forecast, notably for the unemployment rate, over the Committee's previously released projections in March. Specifically, the central tendency of the unemployment rate forecasts for 2014 encompassed 6½ percent, the Committee's threshold for raising the federal funds rate target; while in the March projections, a majority of FOMC participants saw the unemployment rate reaching this threshold some time in 2015. Given this shift in the unemployment rate forecast and the FOMC's threshold, the improved outlook is expected to impact the projected path of the federal funds rate, which will additionally feed into other longer-term rates in the present.

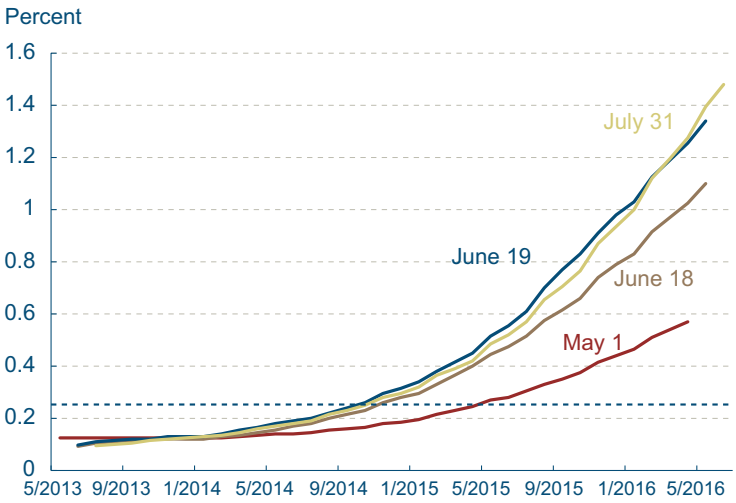
In order to gauge market expectations for the path of the federal funds rate, we can look at data from federal funds futures contracts. The expected path of the federal funds rate shifted higher following the June meeting and has remained at this level for most of June and July. The upper bound on the

Unemployment Rate SEP Projections



Source: Board of Governors of the Federal Reserve System.

Implied Federal Funds Rate Path



Source: Bloomberg.

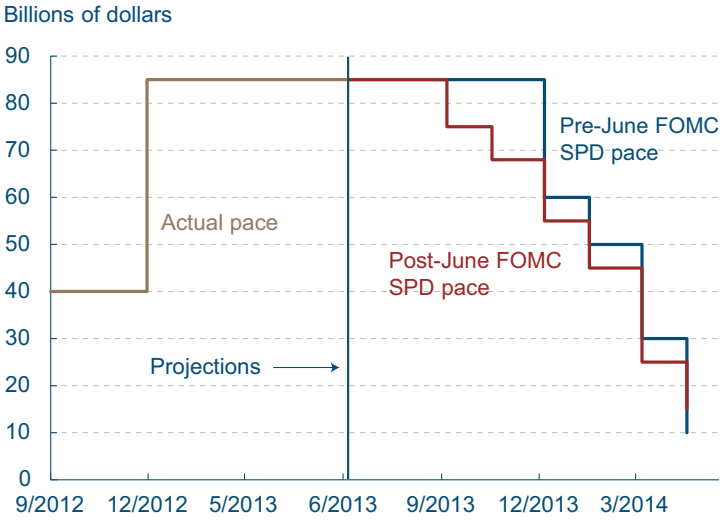
current target range for the federal funds rate set by the FOMC is currently 0.25 percent. Since this expected path has steepened since May 1 and has continued to follow the higher path first seen on June 19, the expectation about when the federal funds rate will exceed the current target range and come off of the "lower bound" is now not as far away as previously thought, and it is no coincidence that this shift corresponds with the improvement in the outlook for the unemployment rate.

Additionally, expectations about the projected path of short-term interest rates play a major role in determining the current level of long-term interest rates, so this shift in expectations is likely to feed through to current interest rates on securities with longer maturities, like 2- or 10-year Treasury bonds, as well as mortgages or auto loans.

Another potential cause of the recent shift in interest rates, especially on longer-term securities, is changes to expectations about the Federal Reserve's asset purchase program. The Federal Reserve started purchasing long-term securities when the primary monetary policy tool, the target federal funds rate, reached its zero lower bound following the financial crisis, and further easing in financial conditions was needed. Since this program is a tool meant to influence interest rates, changes in how these purchases are expected to evolve are likely to impact the behavior of interest rates as well. At the June meeting, Chairman Bernanke laid out a potential path of asset purchases if the economic recovery were to proceed as forecasted. The Chairman's statement may have caused the market's expectations about the path of asset purchases to shift from previous projections closer to the path he presented, which would impact the current level of interest rates.

One view of potential shifts in expectations for asset purchases is drawn from the Survey of Primary Dealers. Primary dealers—financial institutions that trade securities directly with the Federal Reserve—are regularly surveyed on their expectations for the economy, monetary policy, and financial market developments prior to FOMC meetings. Data from this survey show that there was a downward shift to the expected pace of asset purchases following the June meeting. This shift is likely playing some role

LSAP Projections



Sources: Board of Governors of the Federal Reserve System, Survey of Primary Dealers.

in the recent increases in interest rates, although it is tough to determine what the impact is or to differentiate it from the impact of shifts in the expectations of other policy tools.

Even as monetary policy actions remain consistent, expectations about future monetary policy actions are likely to change as the economy evolves. As these expectations change, they are likely to have a fresh impact on current financial and economic conditions.

Yield Curve and Predicted GDP Growth, July 2013

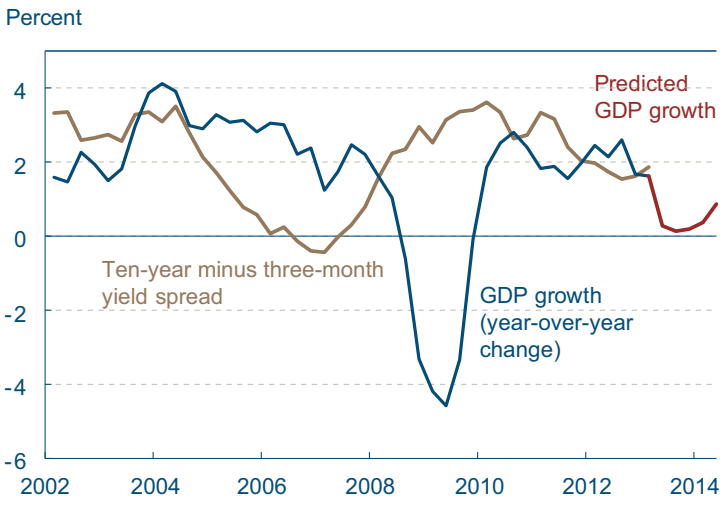
Covering June 15, 2013–July 19, 2013
by Joseph G. Haubrich and Margaret Jacobson

Highlights

	July	June	May
Three-month Treasury bill rate (percent)	0.03	0.05	0.04
Ten-year Treasury bond rate (percent)	2.54	2.20	1,93
Yield curve slope (basis points)	251	215	189
Prediction for GDP growth (percent)	0.9	0.4	0.3
Probability of recession in one year (percent)	2.6	4.4	6.1

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.

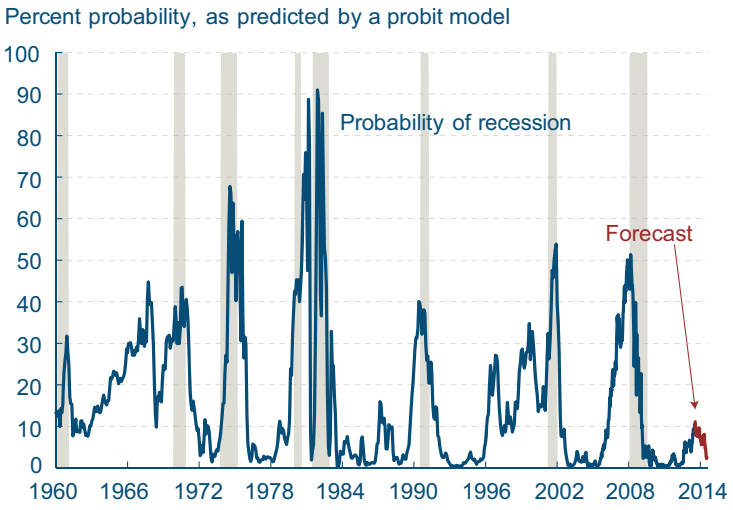
Overview of the Latest Yield Curve Figures

Over the past month, the yield curve steepened sharply as long rates surged and short rates ticked down, increasing the slope even more than last month. The three-month Treasury bill dropped to 0.03 percent (for the week ending July 19), down from June's 0.05 percent and from May's 0.04 percent. The ten-year rate moved to 2.54 percent, a third of a percent above June's 2.20 percent, and more than half a percent above May's 1.93 percent. The slope increased to 251 basis point, up from June's 215 basis points, and well above the May level of 189 basis points.

The steeper slope had a small but noticeable impact on projected future growth. Projecting forward using past values of the spread and GDP growth suggests that real GDP will grow at about a 0.9 percent rate over the next year, up a bit from June's 0.4 percent and triple May's 0.3 percent. The strong influence of the recent recession is still leading towards 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.

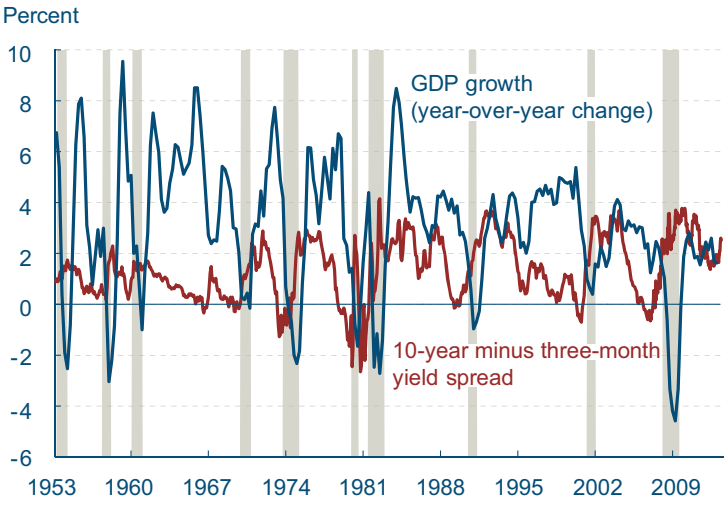
The slope change had a bit more impact on the probability of a recession. Using the yield curve to predict whether or not the economy will be in recession in the future, we estimate that the expected chance of the economy being in a recession next July is 2.58 percent, down from June's already low 4.35 percent and May's 6.1 percent. So although our approach is somewhat pessimistic regarding the level of growth over the next year, it is quite optimistic about the recovery continuing.

Recession Probability from Yield Curve



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



Note: Shaded bars indicate recessions.
Source: Bureau of Economic Analysis, Board of Governors of the Federal Reserve System.

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

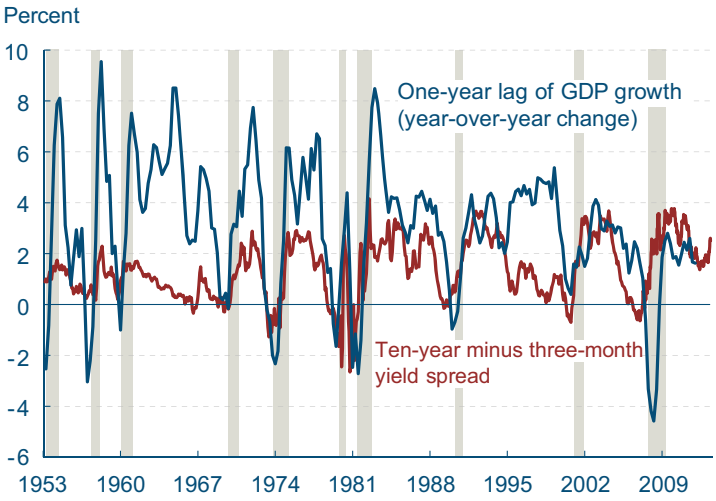
We use past values of the yield spread and GDP growth to project what real GDP will be in the future. We typically calculate and post the prediction for real GDP growth one year forward.

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, 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.

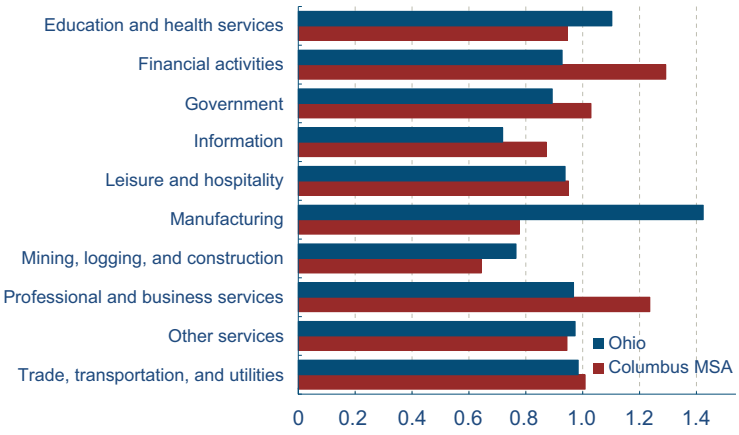
For more on the yield curve, read the *Economic Commentary* "Does the Yield Curve Signal Recession?" at http://www.clevelandfed.org/Research/Commentary/2006/0415.pdf.

For more on the Federal Reserve Bank of New York's estimate fo recession, visit http://www.newyorkfed.org/research/capital_markets/ycfaq.html.

The Columbus Metropolitan Statistical Area

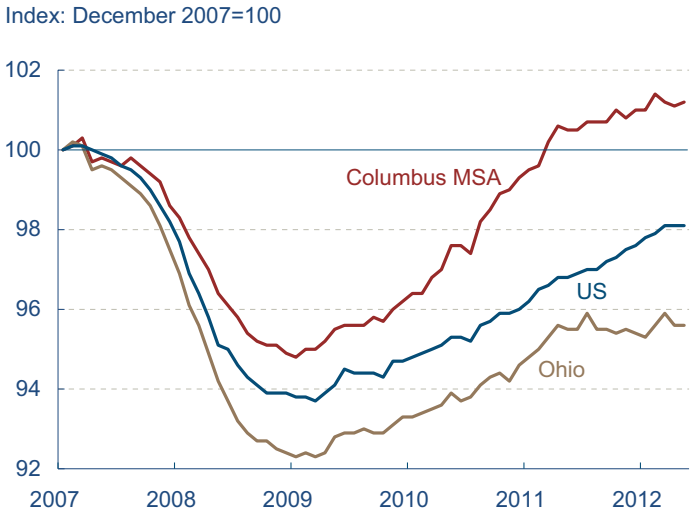
08.02.13
by Kathryn Holston and Kyle Fee

2012 Location Quotients



Note: The location quotient is the ratio between a given industry's employment share in two locations. For both Ohio and the Columbus MSA, the base area is the United States.
Sources: Bureau of Labor Statistics, Haver Analytics.

Payroll Employment since December 2007



Sources: Bureau of Labor Statistics, Haver Analytics.

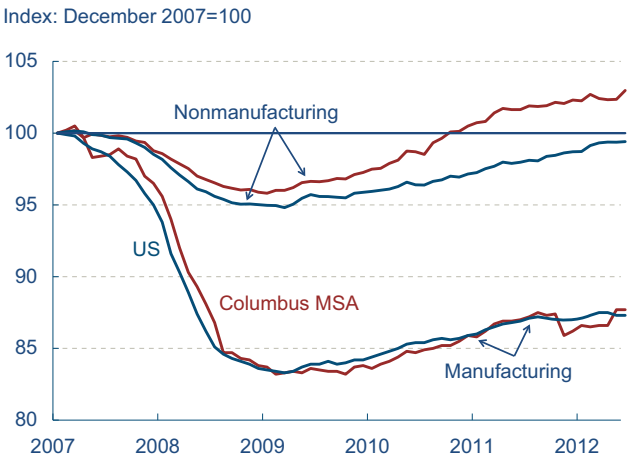
Located in the geographic center of Ohio, the Columbus Metropolitan Statistical Area (MSA) is home to nearly 2 million people, dispersed across ten counties (Delaware, Fairfield, Franklin, Hocking, Licking, Madison, Morrow, Perry, Pickaway, and Union). The MSA has a significantly higher concentration of employment than the nation in two high-skilled, high-wage service industries: financial activities and professional and business services. This was true in 2007 and remained the case throughout the recession. In 2012, the share of workers in each of these industries surpassed the nation's share by 25 to 30 percent.

Columbus's employment is largely concentrated in different industries than the state as a whole. Looking at location quotients for Ohio and Columbus (which show how employment is concentrated in various industries relative to the nation), we can see that the proportion of the state's workforce that is employed in manufacturing is higher than the national average, unlike the Columbus MSA. In contrast, the state has a smaller share of workers than the nation in financial activities and professional and business services, the two sectors in which Columbus's employment is particularly concentrated.

Perhaps this difference in labor allocation accounts for the dissimilarity between the MSA's and the state's employment levels throughout the recession: Columbus suffered less job loss than the nation and significantly less than the state. Since the last business cycle peak in December 2007, employment within the MSA has grown by almost 1 percent. In comparison, Ohio's employment fell by 3.8 percent and the nation's declined by 1.7 percent over the same period.

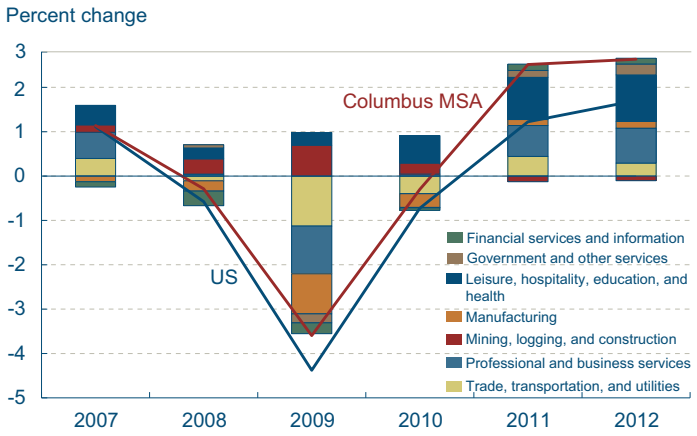
Since the last business cycle peak, nonmanufacturing employment within the MSA has increased by roughly 3 percent, compared to the nation's decline of 0.4 percent. In contrast, manufacturing job losses have been almost equivalent in Columbus and the nation.

Payroll Employment since December 2007



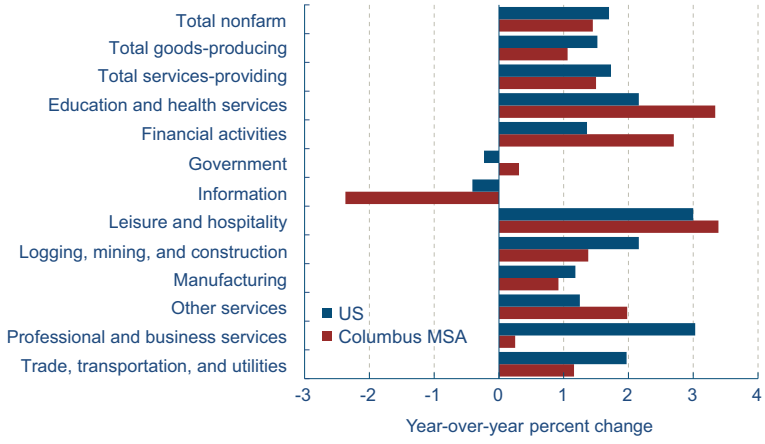
Sources: Bureau of Labor Statistics, Haver Analytics.

Components of Employment Growth, Columbus MSA



Note: The US and Columbus MSA lines represent total nonfarm employment growth.
Sources: Bureau of Labor Statistics, Haver Analytics.

Payroll Employment Growth December 2012



Note: In the surrounding months, Columbus' professional and business services sector had year-over-year growth rates of one to four percent.
Sources: Bureau of Labor Statistics, Haver Analytics.

Recent job growth within the MSA has been largely driven by service industries. The leisure, hospitality, education, and health services sectors have consistently contributed to positive employment gains throughout the past six years. Although the professional and business services sector suffered a significant decline in employment in 2009, it has resurfaced as one of Columbus's leading sectors in terms of job growth in both 2011 and 2012.

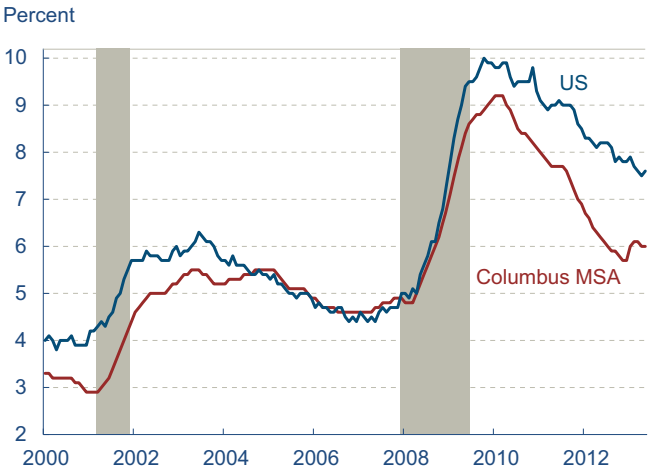
During 2012, jobs in Columbus grew by about 1.5 percent, compared to the nation's gain of 1.7 percent. Predictably, the MSA performed more strongly than the nation in a number of higher-skilled service industries over this period, including financial activities, education and health services, and leisure and hospitality. Columbus experienced negative employment growth in only one sector and posted growth of more than 1 percent in many others.

From 2005 to 2009, Columbus's unemployment rate remained very close to the nation's. While unemployment did increase sharply in the MSA during the recession, it has consistently been lower than the nation since early 2009. In December, the MSA's seasonally adjusted unemployment rate was 5.7, compared to 7.8 percent in the nation.

Columbus is the only large Fourth District MSA whose population has grown at a faster rate than the nation's in the past three decades. Since 1980, Columbus's population has increased by 53 percent, compared to the nation's gain of 39 percent. In that same period, Cincinnati's population grew at slightly more than half of the national rate, while Cleveland's declined by 5 percent and Pittsburgh's fell by 10 percent.

Although the Columbus MSA is home to a smaller percentage of minorities than the US, it has a higher percentage than the state. The MSA's population is relatively better educated: Almost a third of Columbus's residents aged 25 and older have earned a bachelor's degree, higher than in either Ohio or the nation. The MSA's population is also younger, on average, than either the state's or the nation's, with a median age of only 35.4.

Unemployment Rate



Note: Shaded bars indicate recessions.
Sources: Bureau of Labor Statistics, Haver Analytics.

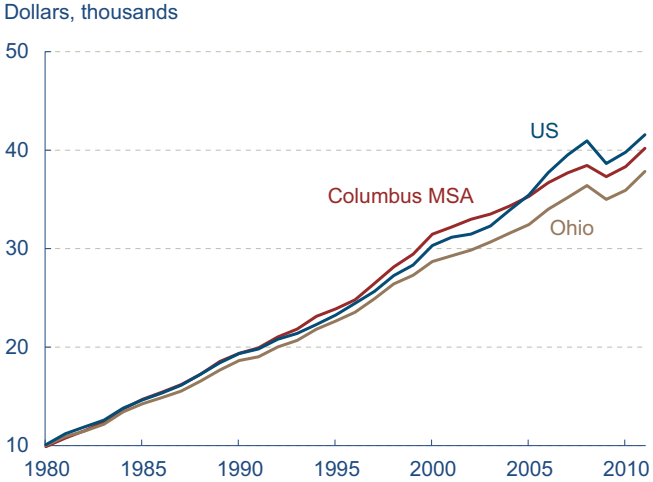
In 2011, the MSA's per capita income was $40,188, exceeding the state's ($37,836) but falling below the nation's ($41,560). While Columbus's per capita income has been below the national level in recent years, it has historically been higher. It has also surpassed Ohio's in every year since 1980.

Selected Demographics

	Columbus	Ohio	US
Total population (millions)	1.9	11.5	311.6
Percent by race			
White	77.7	82.9	74.1
Black	14.6	12.1	12.6
Other	7.7	5.0	13.3
Percent by age			
0-19	27.4	26.2	26.6
20-34	22.2	19.0	20.4
35-64	39.7	40.5	39.6
65 and older	10.8	14.2	13.2
Percent with bachelor's degree or higher	32.9	24.7	28.5
Median age	35.4	39.1	37.3

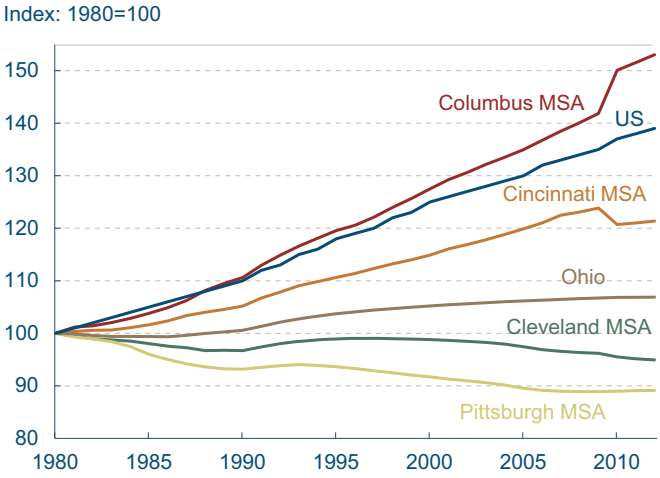
Source: US Census Bureau, 2011 American Community Survey.

Per Capita Personal Income



Sources: Bureau of Economic Analysis, Haver Analytics.

Population Growth in the Fourth District



Sources: Bureau of the Census, Haver Analytics.

Brain Hubs and Manufacturing Centers in the Fourth District

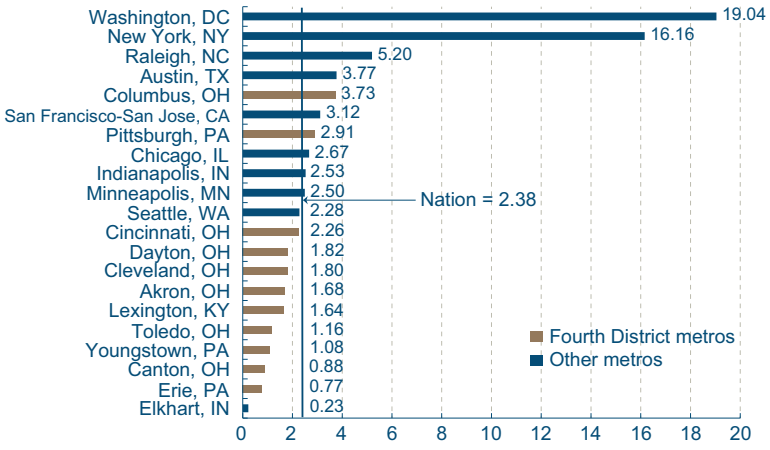
08.07.13
by Joel Elvery

Urban economists like to divide a regional economy into two sectors: tradable and nontradable. The tradable sector produces goods and services that are sold outside of the region; the nontradable sector produces goods and services for use in the region. The long-term growth trends of regions are closely tied to the fate of their tradable sectors. If the industries that make up the tradable sector are growing nationally, then the region will most likely grow. If the tradable sector is struggling, eventually the region will also struggle.

In his 2012 book The New Geography of Jobs, Enrico Moretti uses this framework to study the growth of metropolitan areas (metros) over the last 50 years. The key insight is that metros whose tradable sectors are focused on knowledge work—which he calls brain hubs—have seen strong growth in employment, property values, and wages (think San Francisco, New York, and DC). Those metros with tradable sectors focused on manufacturing—manufacturing centers—have seen weak wage growth and a loss of employment and population (think Detroit, Toledo, and Cleveland). Regions with small tradable sectors—the rest—have either thrived or declined based on whether they have been able to attract more population, primarily due to natural amenities and the cost of new housing.

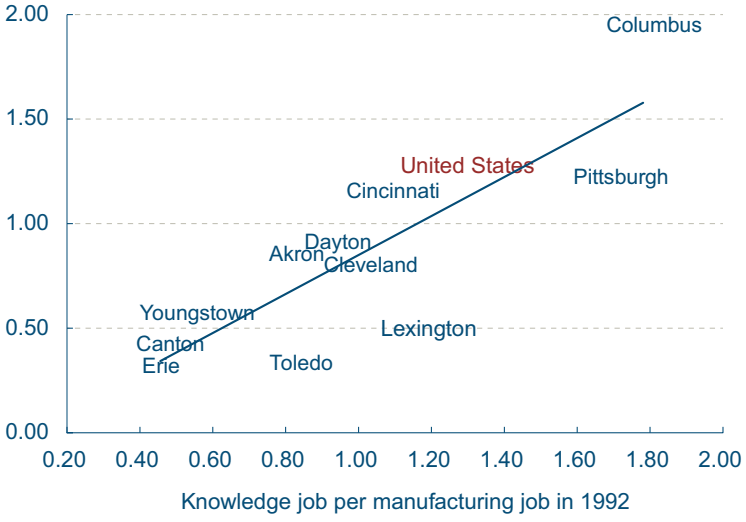
A few Fourth District metros could be considered brain hubs. A good measure of a brain hub is the number of knowledge jobs per manufacturing job (K/M). The higher K/M is, the more likely that a metro is a brain hub. The chart below shows K/M for 11 of the largest metros in the Fourth District and ten other metros, including those where K/M is the highest (Washington, DC) and lowest (Elkhart, IN). (Knowledge jobs were defined as jobs in the following industrial sectors: information; finance, insurance, and real estate; and professional and business services.)

Knowledge Jobs per Manufacturing Job in 2012



Source: Author's calculations from Bureau of Labor Statistics data.

Change from 1992 to 2012 in Knowledge Jobs per Manufacturing Job



Source: Author's calculations from Bureau of Labor Statistics data.

While no metros in the district have tradable sectors as specialized in knowledge work as Washington or New York, Columbus and Pittsburgh are close to some of the metros Moretti cites as brain hubs, such as Austin, TX, and San Francisco/San Jose, CA. Columbus and Pittsburgh also rank above three Midwestern metros that have fared well in the last 30 years (Chicago, Indianapolis, and Minneapolis). However, the remaining metros in the district fall below the number of knowledge jobs per manufacturing job found in the nation as a whole and are better classified as manufacturing centers. Canton and Erie are unusual because they have more manufacturing jobs than knowledge jobs.

Few metros in the Fourth District seem to be transitioning from manufacturing centers to brain hubs. The chart below shows the number of knowledge jobs per manufacturing job in 1992 (horizontal axis) and the change in this measure from 1992 to 2012 for Fourth District metros (vertical axis). K/M increased in all of the metros, with the increase ranging from one-third of a job in Erie to almost 2 jobs in Columbus. Columbus and Pittsburgh were more concentrated in knowledge work than the United States in 1992, and this lead grew from 1992 to 2012. The other metros in the Fourth District were behind the United States in 1992, and the gap grew over the last 20 years. Lexington and Toledo stand out as regions where growth in knowledge work has been weaker than would be expected based on their 1992 K/M levels.

The increased polarization of Fourth District metros is similar to what Moretti found for the nation as a whole: regions that had more knowledge work in 1980 had larger increases in knowledge work over the next 30 years. Based on trends in technology and increased foreign trade, Moretti argues that the future of metros will look a lot like the recent past: brain hubs will thrive, manufacturing centers will struggle, and the rest will be somewhere in between. Finding ways to draw knowledge work to manufacturing centers remains critically important to many Fourth District metros.

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

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**. No commands in either the subject header or message body are required.

ISSN 0748-2922