

Economic Trends

March 2014 (February 12, 2014-March 13, 2014)

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FEDERAL RESERVE BANK
of CLEVELAND

How Fast Will Labor Productivity Grow in the Long Run?

03.10.14

by Filippo Occhino and Jessica Ice

Labor productivity in the nonfarm business sector grew rapidly in the second half of 2013, reaching an average 2.63 percent annual rate. This was the fastest two-quarter pace since the boost of productivity growth associated with the end of the Great Recession and the beginning of the recovery. Meanwhile, labor compensation per hour grew much more slowly over the same period, at an average 1.5 percent annual rate. The combination of fast productivity growth and moderate labor compensation growth reduced unit labor costs—the average labor compensation for the production of one unit of output.

Such a fast pace of productivity will not last long though. Productivity growth is very variable in the short run and can diverge substantially from its underlying long-term trend. Over the business cycle, changes in productivity are typically associated with temporary changes in the utilization rates of capital and labor, often in response to temporary changes in the demand for output, and do not necessarily reflect any permanent, more fundamental changes in trend productivity. In the second half of 2013, output grew rapidly at an average 4.45 percent annual rate, and this likely boosted productivity growth temporarily.

Forecasting the long-run growth of labor productivity is important because it helps to determine the long-run growth rates of wages, per-capita income, and aggregate output. One way to forecast future long-run growth is to consider how trend productivity has grown in the past. From 1948:Q1 to 1973:Q1, labor productivity in the nonfarm business sector grew rapidly at an average 2.9 percent annual rate. Then, the average annual growth rate dropped to a modest 1.46 percent between 1973:Q2 and 1997:Q1, accelerated to 3.6 percent between 1997:Q2 and 2003:Q4 (a period associated with new information and communications technologies), and declined again to 1.63 percent afterward. The most recent productivity slowdown

Productivity, Compensation per Hour and Unit Labor Costs

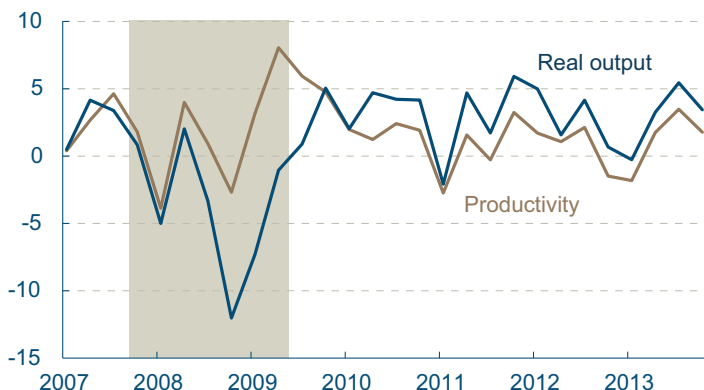
| | Productivity | Compensation per Hour | Unit Labor Costs |
|---------------|--------------|-----------------------|------------------|
| 2013:Q4 | 1.78 | 1.65 | -0.12 |
| 2013:H2 | 2.63 | 1.50 | -1.09 |
| 2013 | 1.30 | 0.38 | -0.93 |
| Since 2009:Q3 | 1.59 | 2.16 | 0.62 |

Notes: Nonfarm business sector. Q4 indicates the fourth quarter; H2 indicates the second half of the year.

Sources: Bureau of Labor Statistics, authors' calculations.

Productivity and Output

Annualized quarterly growth rate



Notes: Nonfarm business sector. Shaded bar indicates a recession.

Source: Bureau of Labor Statistics.

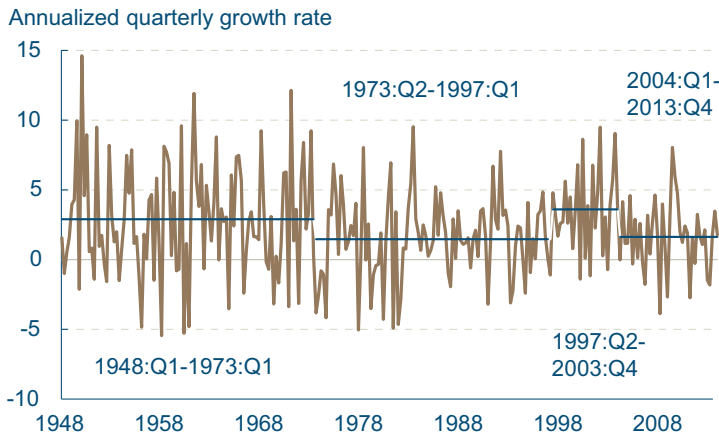
began well before the Great Recession, in the first half of the 2000s, as the economist John Fernald emphasized in 2012.

Based on this evidence, the best estimate for the current trend productivity growth rate is close to the post-2003 average, 1.63 percent per year. This estimate is surrounded by large uncertainty though. More importantly, the fact that trend productivity growth has varied so widely in the past suggests that the future growth rate may diverge substantially from the current one.

Another approach to forecasting future productivity growth consists of forecasting separately each of the factors that determine labor productivity in the long run: capital deepening, labor quality, and total factor productivity. Labor productivity rises when workers have more and better capital to work with (capital deepening). It also rises when the average labor quality (skills, education, etc.) of the workforce improves. Finally, it rises because of other factors that improve the productivity of capital and labor, such as research and development, new technologies, efficiency gains in production processes, etc. (total factor productivity). Using this approach, Fernald forecasted that labor productivity in the nonfarm business sector will grow at a 1.9 percent annual rate. Another economist, Robert Gordon, forecasted in a 2010 paper that it will grow at a 2.05 percent annual rate in the years 2007 through 2027, the result of a 0.85 percent contribution from capital deepening, a 0.15 percent contribution from labor quality improvements, and a 1.05 percent contribution from total factor productivity.

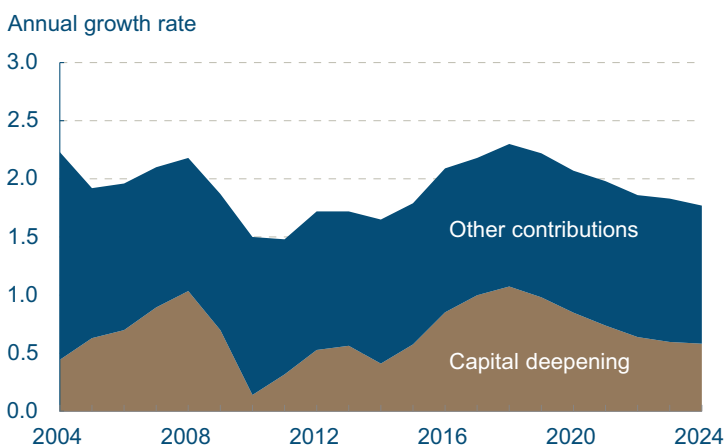
The Congressional Budget Office's projections focus on a slightly different concept, potential labor productivity, the labor productivity corresponding to a high utilization rate of capital and labor. In the long run, actual and potential labor productivity will grow at the same rate. According to the Congressional Budget Office's estimate, potential labor productivity is rising at a 1.65 percent annual rate in 2014. In the next decade, it will first accelerate and then decelerate, following a pattern analogous to capital services. In 2024, potential labor productivity is forecasted to grow at a 1.77 percent annual rate, of which 0.58 percent is due to capital deepening.

Productivity



Notes: Nonfarm business sector. Horizontal lines indicate long-term averages.
Sources: Bureau of Labor Statistics, authors' calculations.

Contributions to Potential Labor Productivity



Note: Nonfarm business sector.
Sources: Congressional Budget Office, authors' calculations.

Taken together, these results suggest that the best forecast for the long-run labor productivity growth rate in the nonfarm business sector lies in the range between 1.63 percent and 2.05 percent. Productivity in the overall economy will likely grow a few tenths of a percentage point slower than in the nonfarm business sector, as has been the case in the past. Any forecast of future productivity growth is surrounded by very large uncertainty though, so future productivity growth may turn out to be different from these forecasts.

References

John Fernald. "Productivity and Potential Output Before, During, and After the Great Recession." Federal Reserve Bank of San Francisco. Working Paper Series, Working Paper 2012-18. <http://www.frbsf.org/publications/economics/papers/2012/wp12-18bk.pdf>.

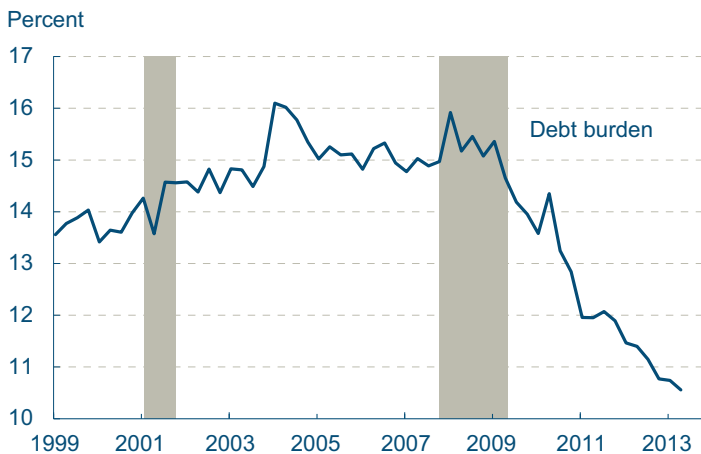
Robert J. Gordon. "Revisiting U.S. Productivity Growth over the Past Century with a View of the Future." NBER Working Paper Series, Working Paper 15834. <http://www.nber.org/papers/w15834>

Household Credit Shifts Higher; Debt Burden Continues to Decline

03.10.14

Yuliya Demyanyk and Daniel Kolliner

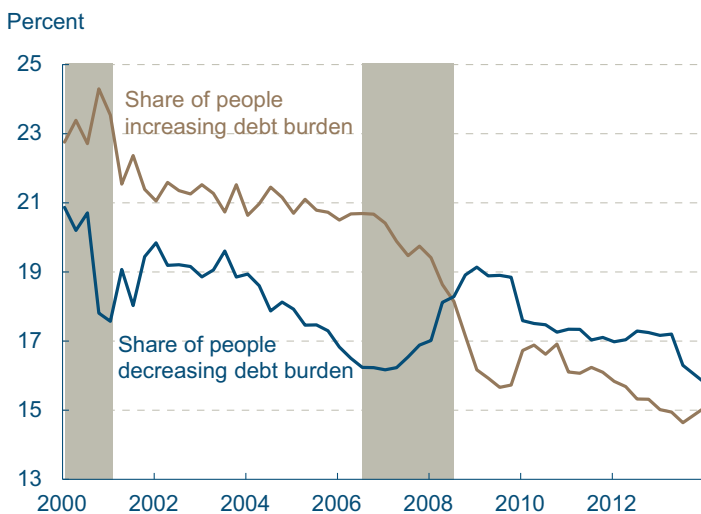
Debt Burden as a Percent of Disposable Income



Notes: Debt burden is defined as the aggregated sum of all minimum payments that the consumers are required to make on all of their debt obligations (excluding student loans), as a fraction of aggregate disposable income. Disposable income is seasonally-adjusted.

Source: Authors' calculations are based on the Federal Reserve Bank of New York's Equifax Consumer Credit Panel and the Bureau of Economic Analysis.

Debt Burden Breakdown



Note: Shaded bars indicate recessions.

Source: Federal Reserve Bank of New York's Equifax Consumer Credit Panel; authors' calculations.

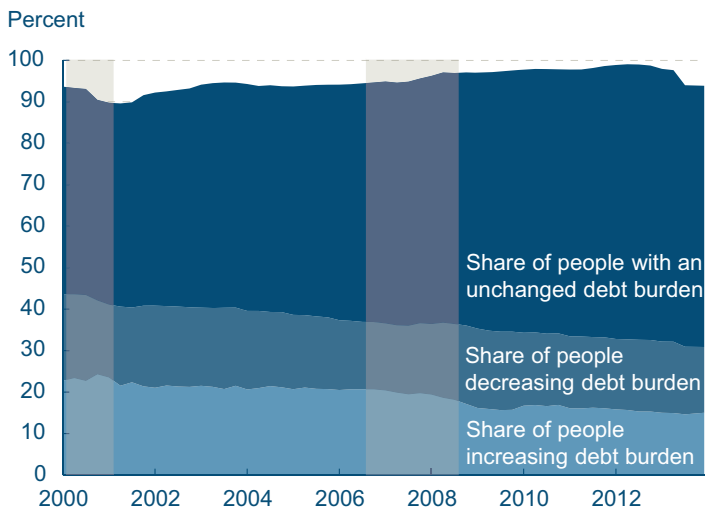
During the last recession, the aggregate level of household credit began to fall, raising concerns about the prospects for the recovery. The decline suggested that consumers could be scaling back their demands for credit and lenders could be unwilling or unable to lend. Finally, in the last two quarters of 2013, the total level of outstanding household credit has begun to rebound. Total consumer debt outstanding rose from \$11.15 trillion in the second quarter of 2013 to \$11.28 trillion in the third quarter and \$11.52 trillion in the fourth quarter of the year.

Even though household credit has risen, the debt burden has not. Debt burden refers to the amount of consumers' regular monthly payments, which are determined by the amounts they borrowed and their interest rates. The aggregate debt burden, the sum of all minimum payments consumers are required to make for all their outstanding debt balances, has been sharply declining since 2008. The end of 2013 showed a minor leveling off in this trend.

The declining trend in the debt burden is driven mostly by two groups of consumers, those whose burdens increased year over year and those whose burdens did not change. The fraction of consumers with unchanged debt burdens began to grow steadily in 2000. In early 2000, it was 50 percent, in 2007 it was about 60 percent, and after the Great Recession it peaked in the third quarter of 2012 at 66 percent. Since then, it has fallen to 63 percent. Meanwhile, the fraction of consumers whose debt burden increased drastically declined from about 23 percent in the early 2000s to 15 percent in 2013. The share of consumers with decreasing debt burdens has been fluctuating around 18 percent for the last 13 years.

Prior to the crisis in 2007, there have been more consumers who had their debt burden increasing than those with decreasing burdens year to year.

Debt Burden Breakdown

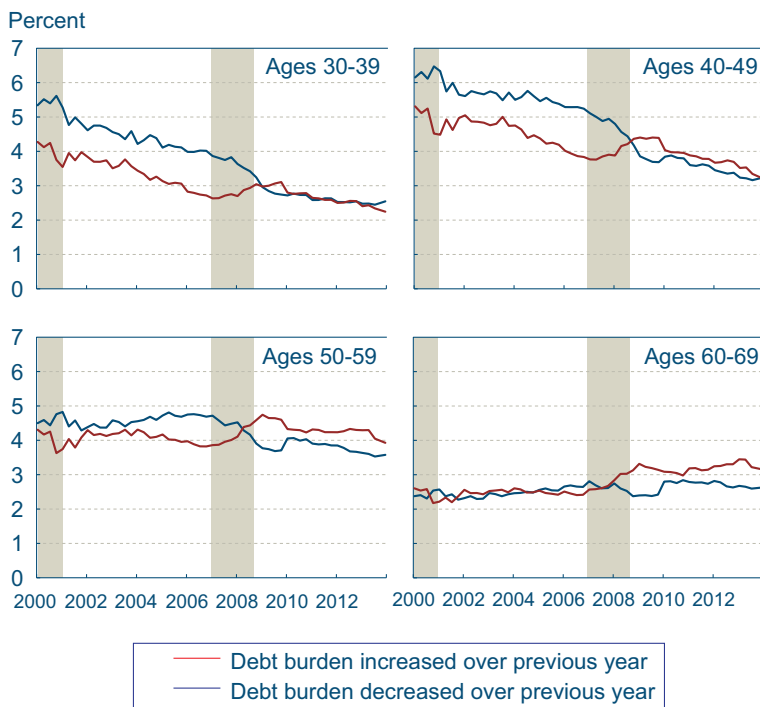


Note: Shaded bars indicate recessions.
Source: Federal Reserve Bank of New York's Equifax Consumer Credit Panel; authors' calculations.

Since 2009, however, the pattern has reversed. The economy had more consumers whose debt burden was declining than those for whom it was increasing. In 2013:Q4, the gap between these two shares started closing, when the fraction of consumers with increasing debt burden reached 15 percent and those with decreasing burden reached 15.8 percent.

Consumers in different age groups show different patterns of debt burden before and after the last recession. Among individuals aged 30 to 39, those with increasing debt burdens exceeded those with decreasing burdens before the financial crisis in 2007. By the end of the recession, however, the proportions of the two groups were almost identical. Now the pattern seems to be returning to its former shape. In the last quarter of 2013, the fraction of those with increasing debt burdens was again higher than the fraction with decreasing burdens.

Debt Burden Changes Differently Over Time Depending on Consumer's Age



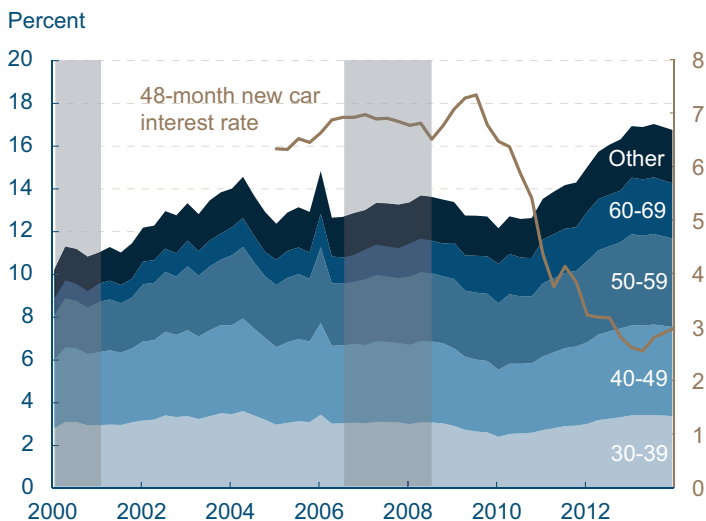
For people aged 40 to 49, the trend resembles that of the entire population. In 2013:Q4, the shares of consumers with increasing and decreasing debt burdens have become roughly even. In contrast, older age groups of 50-59 and 60-69 recently have a higher share of people decreasing their debt burden. Prior to the recession, these age groups were close to even or had a slightly higher share of people increasing their payments.

One major factor contributing to shrinking debt burdens has been low interest rates. As interest rates decline, debt burdens will also decline, even for the same amount of debt. The biggest part of overall consumer debt is mortgage debt, and with interest rates for mortgages at historical lows, many homeowners have had the opportunity to refinance at lower rates. The general refinance trend has followed the 30-year mortgage interest rate, and has recently begun to slow down.

To gauge the impact of refinancing on the total debt burden, we looked at the number of consumers who experienced both a decrease in their debt burden and no change in the number of their open mortgages. This measure does not include homeowners who refinanced their homes at lower

Note: Shaded bars indicate recessions.
Source: Equifax Panel Data; authors' calculations.

Increasing Total Debt Burden Due to New Auto loans

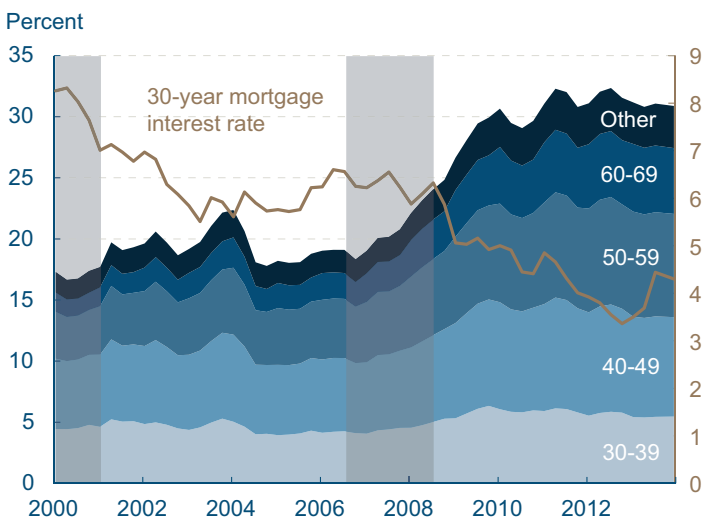


Note: Shaded bars indicate recessions.
Source: Board of Governors of the Federal Reserve System; Federal Reserve Bank of New York's Equifax Consumer Credit Panel; authors' calculations.

interest rates and shorter maturities, which could potentially lead to increases in their debt burden. According to this estimate, 30.8 percent of people who have decreased their debt burden did so as a result of refinancing their home. Consumers aged 40 to 49 and 50 to 59 made up the largest portion of people whose debt burden fell as a result of refinancing their home, contributing to 26.3 percent and 27.3 percent to total refinances, respectively.

Auto loans have showed strong growth since mid-2011, even though total debt was mostly on the decline. Part of the reason for this growth is, again, historically low interest rates. Of the people increasing their debt burden, 16.7 percent did so by purchasing a vehicle and adding a new auto loan. The most active consumers in the auto loan market were between the ages of 40-59. Combined, they contributed to about 50 percent to total new auto loans in 2013:Q4.

Decreasing Total Debt Burden Due to Refinances



Note: Shaded bars indicate recessions.
Source: Federal Reserve Bank of New York's Equifax Consumer Credit Panel; authors' calculations.

Cleveland Fed Estimates of Inflation Expectations

News Release: February 20, 2014

Ten-Year Expected Inflation and Real and Nominal Risk Premia

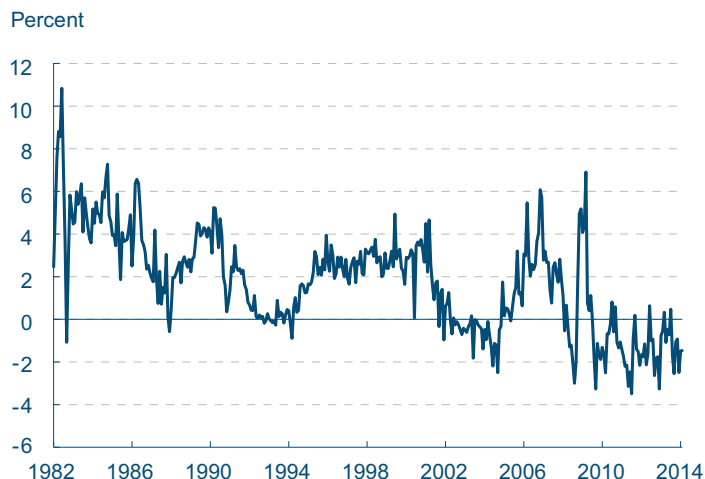


Source: Haubrich, Pennacchi, Ritchken (2011).

The latest estimate of 10-year expected inflation is 1.77 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.

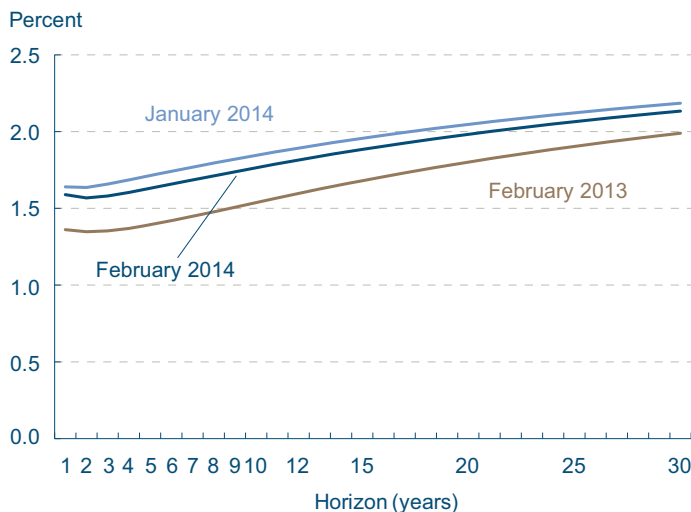
The Cleveland Fed’s estimate of inflation expectations is based on a model that combines information from a number of sources to address the shortcomings of other, commonly used measures, such as the “break-even” rate derived from Treasury inflation protected securities (TIPS) or survey-based estimates. 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 (2008).

Expected Inflation Yield Curve



Source: Haubrich, Pennacchi, Ritchken (2011).

What's Up in Inflation? Shelter and OER

02.21.14

by Edward S. Knotek II and William Bednar

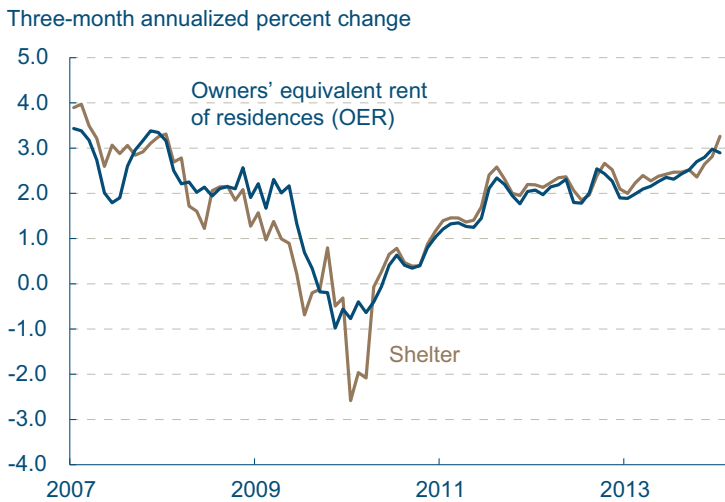
The Consumer Price Index (CPI) increased 0.1 percent from December to January according to the Bureau of Labor Statistics (BLS). Cold weather across the country contributed to the increase in the CPI, as the electricity and natural gas components of the index both rose sharply. But more generally, an important factor behind recent inflation readings has been an upward trend in inflation in the shelter component of the CPI.

Shelter inflation is now the highest it has been since January 2008, based on annualized three-month growth rates to help smooth the data. Lodging away from home gave a boost to shelter inflation in January, but lodging away from home is pretty volatile over short time spans. A bigger driver of the trend in shelter inflation has been a run-up coming from owners' equivalent rent of residences (OER). Over the last few months, OER inflation has also been at its highest levels since the beginning of 2008.

Interestingly, the recent trend in OER has diverged from the trend in rent of primary residences. Inflation in rents has been moving sideways since mid-2011, while OER has trended up since the start of 2013.

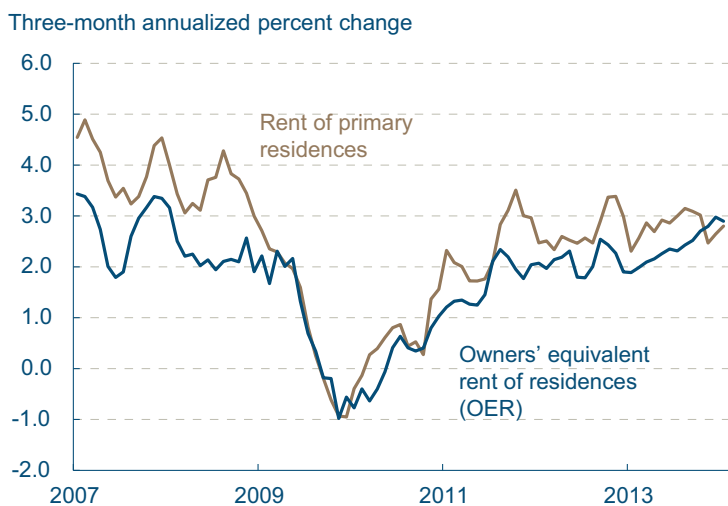
These two rental measures tend to move together over a very long time horizon. But there are important conceptual differences between the series that can explain both short-term and longer-lasting divergences. To construct the OER and rent of primary residences indexes, the BLS samples a single set of rental units. It then adjusts the sample weights for those units according to their shares in either the owner-occupied or rental market. But the universes of rental and owner-occupied housing naturally differ—think single-family owner-occupied houses versus large multifamily apartment complexes—and the changes in their rents or implied rents differ as well. In addition, the treatment of utilities differs depending on whether

Shelter and OER



Source: Bureau of Labor Statistics.

Rent and OER



Source: Bureau of Labor Statistics.

utilities are included in rents or not, because owners pay for their own utilities and the BLS measures utility prices separately. (The BLS provides excellent resources to explain the differences in rent of primary residences and OER; for example, see this pamphlet.)

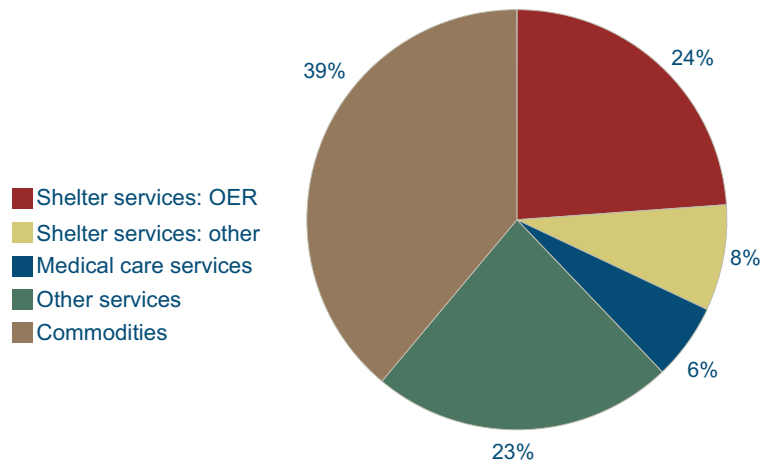
Changes in OER have a significant impact on aggregate inflation as measured by the CPI. Shelter accounts for 32 percent of the CPI basket, and OER accounts for about three-fourths of the shelter index, or nearly one-fourth of the total CPI basket. (The other two main components of the shelter index are rent of primary residences, which accounts for 7 percent of the total basket, and lodging away from home, which makes up less than 1 percent of the total basket.) By far, OER has the largest relative weight of a single component in the CPI.

The story is slightly different for inflation statistics based on the Personal Consumption Expenditures (PCE) price index, where the equivalent concept to OER is called imputed rent. Imputed rent only accounts for 11 percent of PCE. With this smaller weight, movements in the OER equivalent play a smaller role in PCE inflation than they do in CPI inflation. Instead, health care services receive more weight in the PCE, accounting for 17 percent of the total basket, more than housing services' combined 15 percent share. (Lodging away from home is not included in housing services in the PCE.) The reversal of the relative importance of housing and health care is one notable difference between the CPI and the PCE price index.

When food and energy prices are removed from the mix in the core CPI, OER has an even larger impact on inflation than it does on the all-items index: OER is 31 percent of the core CPI index. But year-over-year core CPI inflation was 1.6 percent in January, little different from its readings through most of 2013. Thus, the recent upward trend in OER inflation has been offset by other components in the core CPI.

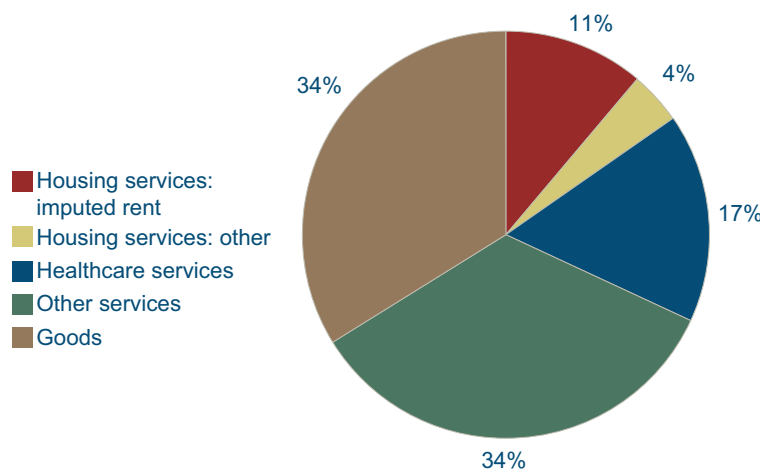
How does this recent upward trend in OER inflation affect alternative measures of underlying inflation, such as the Cleveland Fed's median CPI? Year-over-year inflation in the median CPI was 2.0

Breakdown of CPI Relative Weights



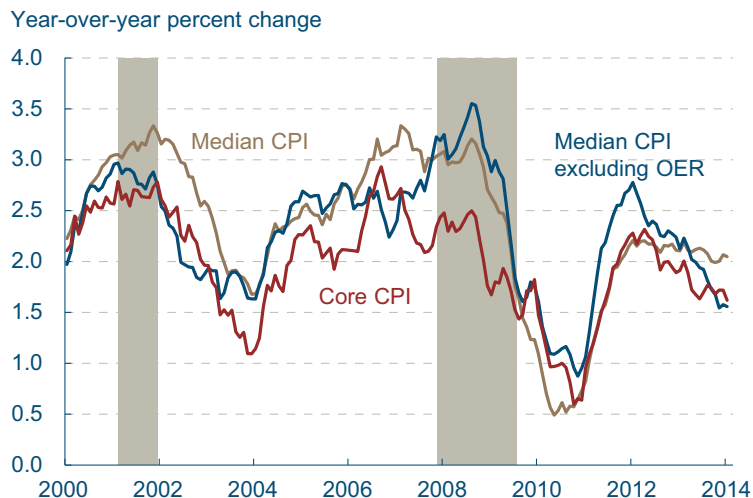
Source: Bureau of Labor Statistics.

Breakdown of PCE Shares



Source: Bureau of Economic Analysis.

Underlying Inflation Measures



Note: Shaded bars indicate recessions.

Sources: Bureau of Labor Statistics, Federal Reserve Bank of Cleveland.

percent in January, not much different from where it has been through most of 2012 and 2013. So the upward trend in OER inflation has not pushed up the median CPI. This is somewhat surprising. Because OER has such a large weight in the total index, it is split into four regional subindexes when computing the median CPI; without this adjustment, the large weight of OER would usually cause it to be “the” median component. Nevertheless, even with this adjustment, one of the four OER regional subindexes is typically the median component (see this page for more detail).

Because both the core CPI and the median CPI are heavily influenced by OER, what would happen if we removed all four regional OER subindexes from the calculation of the median CPI? Doing so, we find that inflation in the median CPI excluding OER peaked in early 2012 and has been on a downward trend since then. In January, the median CPI excluding OER was 1.6 percent, significantly lower than the normal median CPI inflation measure but virtually identical to core CPI inflation. While the last few median CPI excluding OER readings have leveled off, we will have to see some additional data before we can call this a new trend.

Yield Curve and Predicted GDP Growth, February 2014

Covering January 17, 2014–February 14, 2014
by Joseph G. Haubrich and Sara Millington

Overview of the Latest Yield Curve Figures

The yield curve flattened slightly over the past month, with the three-month (constant maturity) Treasury bill rate at 0.04 percent (for the week ending February 14), even with January’s reading and down from December’s 0.07 percent. The ten-year rate (also constant maturity) dropped to 2.75 percent, down from the January level of 2.86 percent, which was also the rate for December. The slope decreased to 271 basis points, down from January’s 282 basis points and still below December’s 279 basis points.

The steeper slope had a negligible 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 1.3 percentage rate over the next year, even with January’s rate and just barely above the 1.2 percent seen in December. The influence of the past recession continues to push towards relatively low growth rates. Although the time horizons do not match exactly, the forecast is slightly more pessimistic than some other predictions, but like them, it does show moderate growth for the year.

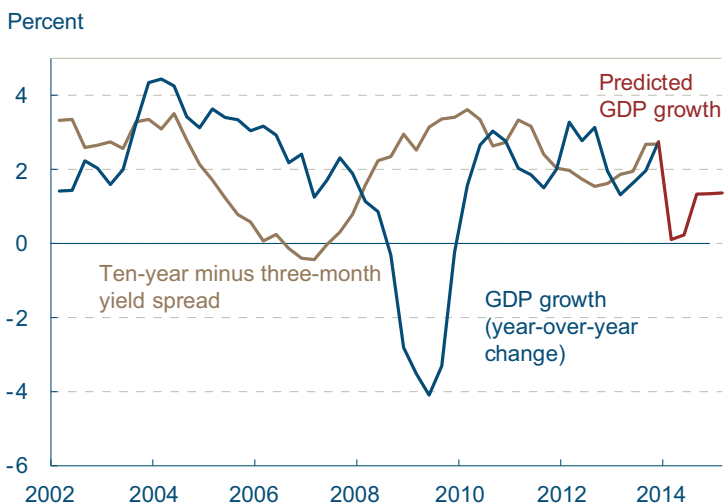
The slope change had only a slight impact on the probability of a recession. Using the yield curve to predict whether or not the economy will be in recession in the future, we estimate that the expected chance of the economy being in a recession next February at 1.74 percent, up a bit from January’s estimate of 1.48 percent and December’s 1.50 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

| | February | January | December |
|--|----------|---------|----------|
| Three-month Treasury bill rate (percent) | 0.04 | 0.04 | 0.07 |
| Ten-year Treasury bond rate (percent) | 2.75 | 2.86 | 2.86 |
| Yield curve slope (basis points) | 271 | 282 | 279 |
| Prediction for GDP growth (percent) | | 1.3 | 1.2 |
| Probability of recession in one year (percent) | | 1.48 | 1.50 |

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, 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.

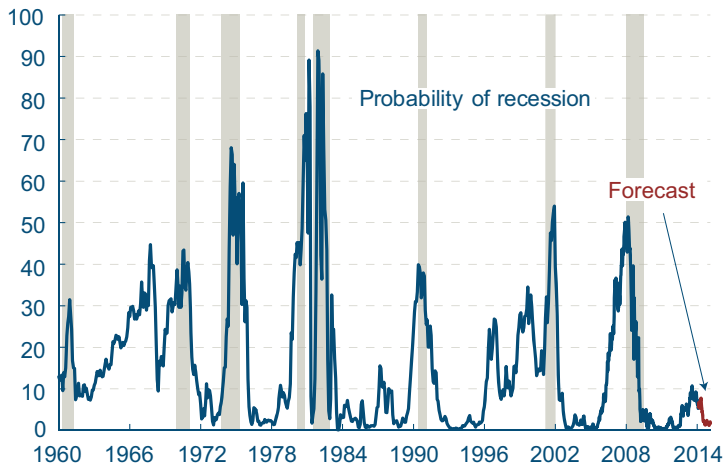
Predicting the Probability of Recession

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 de-

Recession Probability from Yield Curve

Percent probability, as predicted by a probit model

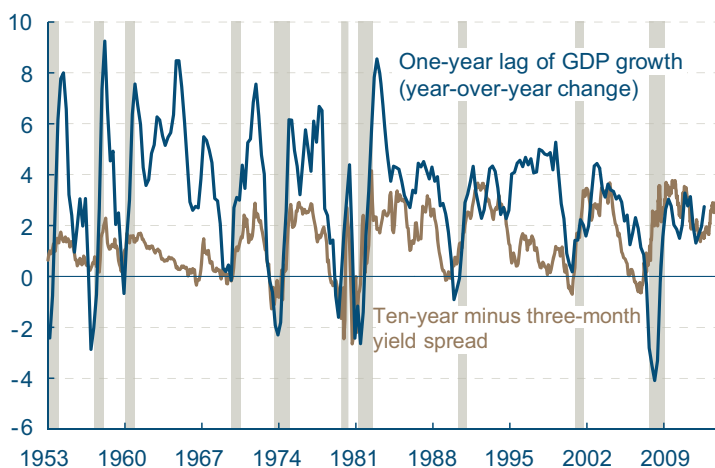


Note: Shaded bars indicate recessions.

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

Yield Spread and Lagged Real GDP Growth

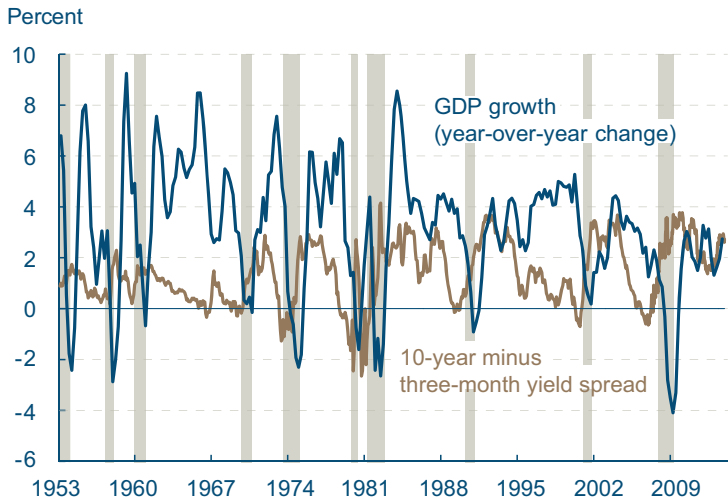
Percent



Note: Shaded bars indicate recessions.

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

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.

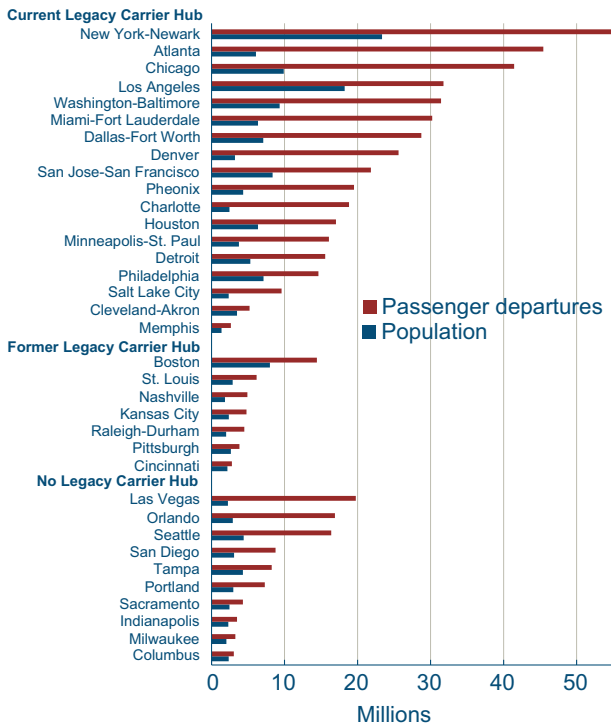
terminants of the yield spread today are materially different from the determinants that generated yield spreads during prior decades. Differences could arise from changes in international capital flows and inflation expectations, for example. The bottom line is that yield curves contain important information 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.

Airline Hubs and Air Traffic Trends

03.06.14

by Stephan Whitaker and Chris Vecchio

Passenger Departures and Population of Carrier Hub Cities



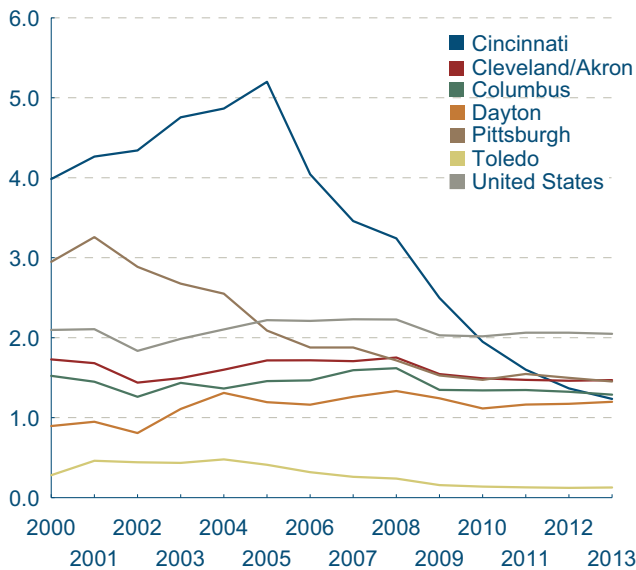
Note: Delta has not officially removed its hub designation from the Cincinnati/Northern Kentucky airport. The hubs at Memphis and Cleveland are in the process of closing.
Sources: Bureau of Transportation Statistics T-100 Market Data, Census Bureau, authors' calculations.

Consolidation of air carriers has caused a steady retreat of hubs from mid-sized metropolitan areas like those of the Fourth District. Of the eleven largest airlines before the 1978 deregulation, the “legacy” carriers, all but three have folded or been absorbed via mergers. Since 1990, 15 metro areas have felt the sting of losing an airline hub. In the Fourth District, Pittsburgh lost its home-grown US Airways hub around 2004, and Cleveland will be losing its United Airlines hub this year. The Cincinnati/Northern Kentucky airport, while still nominally a Delta hub, has seen passenger departures reduced from over 10 million in 2005 to fewer than 3 million in 2013.

While losing a hub costs a region a major employer, it does not preclude ample air service. Passenger volume is relatively high in some metro areas that have never had a legacy carrier hub. Comparing trends in passengers per capita, it is evident that air service adjusts to meet the metro area’s demands after the through-traffic of a hub ceases. Cleveland is unlikely to see declines as dramatic as those in Cincinnati and Pittsburgh because its hub was not handling nearly as many connecting passengers.

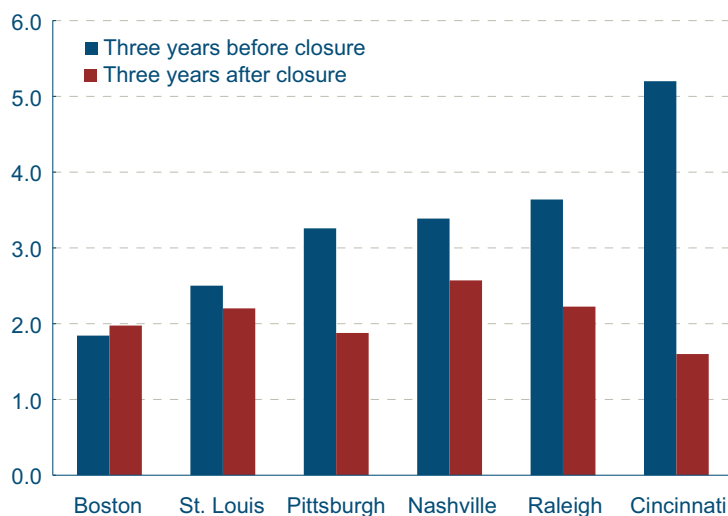
The 12 most-populous metropolitan areas in the United States all have legacy carrier hubs except Boston. Boston is similar to Seattle, Portland, San Diego, and Tampa in that it is a large metro area with a robust air travel market, but no hub. These metro areas have no legacy carrier hubs in spite of their size in part due to their location. All are in the geographic corners of the nation, and three of these corners are served by hubs in other cities: New York, Los Angeles, and Miami. Flight distances and travel times favor central locations for hub activity. This enables the mid-sized metro areas of Minneapolis, Denver, and Salt Lake City to operate major hubs. At least two metro areas, Las Vegas and Orlando, do not have hubs, but their airports carry hub-like volumes of tourists and conventioners.

Domestic Passenger Departures Per Capita in the Fourth District



Source: Bureau of Transportation Statistics T-100 Market Data, Census Bureau, and authors' calculations.

Domestic Passenger Departures Per Capita in Regions with Hub Closures



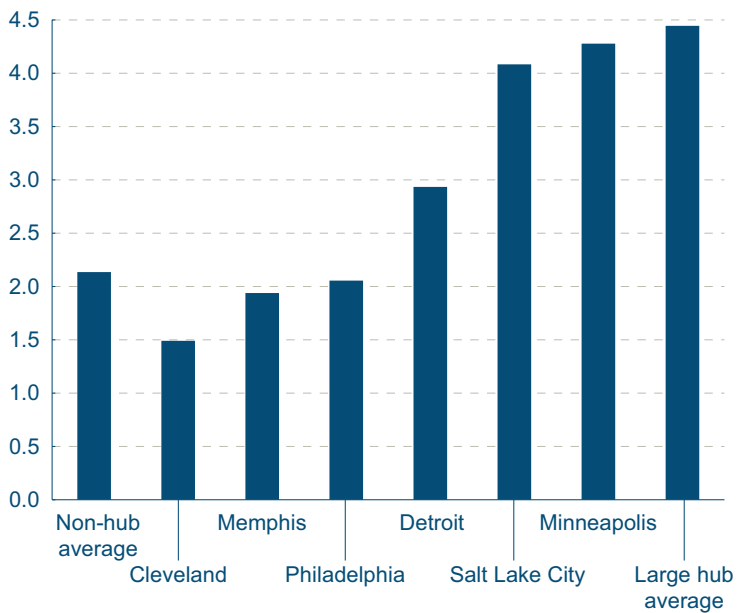
Note: Delta has not officially removed its hub designation from the Cincinnati/Northern Kentucky airport. However, it is represented here as if the hub was closed in 2008.
Source: Bureau of Transportation Statistics T-100 Market Data, Census Bureau, authors' calculations.

Since 2000, passenger volume has been pretty steady at the nation's airports, with dips after the 9/11 terrorist attacks and the most recent recession. Air traffic in Cleveland, Columbus, and Dayton all follow the national trend. But Pittsburgh and Cincinnati are very different. Both had levels of air traffic that were far higher in 2000 relative to their populations than the other Fourth District metro areas. Massive reductions in hub operations have dropped their levels to below the national average. Cleveland's future air traffic trends may differ from Pittsburgh and Cincinnati's, since passenger volume in Cleveland has never been particularly high, even though Cleveland served as a hub for Continental Airlines and its successor, United. At its peak, Cincinnati/Northern Kentucky had nearly 227,000 departing flights per year. Cleveland Hopkins and Akron-Canton together had only 94,000 departures in the most recent year of data.

Data on traffic volumes before and after hub closures suggests that Pittsburgh and Cincinnati have lost more traffic than other cities whose hubs closed. In Boston, the hub operations that ended in 2007 were small relative to the service demanded by local travelers. Growth in local demand has replaced the lost hub traffic. St. Louis lost its hub status with American Airlines in 2010, but so far, passenger volumes have remained relatively high. Raleigh-Durham and Nashville lost American Airlines hubs in 1995. The airports did see declines in traffic after that, but they were offset by strong population growth in these areas and the economic expansion of the late 1990s.

In the near future, forecasting and speculation will continue regarding which other hubs might be closed. We would expect the hubs that are currently handling the least traffic to be the most vulnerable. Salt Lake City, Philadelphia, Detroit, and Minneapolis are the four smallest hubs as measured by the most recent 12 months of passenger departure data. Cleveland and Memphis, the two hubs that are in the process of closing, were carrying fewer passengers per capita than the average city that is neither a hub nor a tourist destination. Philadelphia is also not handling particularly high traffic given the size of its local market. Salt Lake City and Minneapolis

Domestic Passenger Departures Per Capita in Regions with Smaller Hubs



Source: Bureau of Transportation Statistics T-100 Market Data, Census Bureau and authors' calculations. The non-hub, non-tourist destination cities are Milwaukee, Indianapolis, Columbus, Sacramento, Portland, San Diego, Tampa, and Seattle.

both have departures that exceed the local demand in similar proportion to the other high-volume hubs.

As Cleveland anticipates the loss of its hub, there is a tendency to focus on the experiences of nearby Cincinnati and Pittsburgh. However, we have seen that Cincinnati and Pittsburgh were handling high volumes of connecting passengers relative to their regional populations. They had a lot of traffic to lose. The experience in Cleveland and Memphis may be more similar to that in Boston and St. Louis. Like the latter two cities, the hubs closing this year were not handling passenger volumes in excess of what would be expected given their populations.

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