

# Economic Trends

November 2013 (October 17, 2013-November 12, 2013)

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FEDERAL RESERVE BANK  
*of* CLEVELAND

## Banks' Liquidity Position

11.12.13

by Lakshmi Balasubramanyan and Patricia Waiwood

Ensuring adequate liquidity is an integral part of a financial institution's management. But how much liquidity is enough? A financial firm is considered liquid if it can obtain immediately spendable funds at reasonable cost exactly when it needs them.

In light of the 2008 financial crisis, new international banking regulations, notably those of the Third Basel Accord, pay close attention to banks' liquidity. We make a high-level assessment of how banks' liquidity positions have changed since 2009. (Note that the liquidity measures we discuss in this article are not necessarily the same as those the Basel Committee suggests. See this report for a discussion of the Basel measures.) Our sample includes state member, state non-member, and national commercial banks in the United States. For each quarter, our charts show averages across all banks in the sample.

The liquidity position of banks has been improving gradually since the end of the recession, partly because aggregate core deposits have increased. Core deposits are those made by customers in a bank's general market area; they are a relatively stable source of funds for lending because they are less vulnerable than other funding sources to changes in short-term interest rates. (Core deposits are calculated as total deposits minus total time deposits of \$100,000 or more minus total brokered retail deposits of \$100,000 or less.) Between the first quarter of 2009 and the second quarter of 2013, core deposits relative to assets rose steadily from 65 percent to about 70 percent.

But are core deposits capable of funding loan growth? If not, banks would either have to curtail lending or dip into more costly sources to fund it. Neither one of these options is very desirable from a borrower's perspective. A simple measure for capturing this is the difference between the growth rates of lending and core deposits. Since the end of

### Core Deposits as a Percent of Total Assets



Source: Federal Reserve, average across Banks for each quarter.

### Loan Growth Less Core Deposit Growth



Source: Federal Reserve, average across Banks for each quarter.

## Net Non-Core Funding Dependence



Source: Federal Reserve, average across Banks for each quarter.

## US Treasury Securities



Source: Federal Reserve, average across Banks for each quarter.

the recession, this measure has been holding steady around zero, with the exception of a drop and rebound during 2012.

A red flag would rise on the liquidity landscape if banks were relying heavily on non-core funding to finance loan growth. This is not the case, according to a measure called the net non-core funding dependence ratio, which, as the name suggests, gauges how heavily banks rely on non-core funding. This measure has declined steadily from almost 20 percent since 2009:Q1.

Banks can tap another source of funds by selling securities, such as US Treasury bonds, on their books. Knowing this, we consider banks' holdings of US Treasury securities. Though banks' holdings have been somewhat volatile, they have increased gradually. Starting at just under \$200 million in 2009:Q1 and standing at just under \$300 million in 2013:Q2, the gradual increase is a plus, albeit a small one, in our assessment of banks' liquidity.

According to the Bank for International Settlements, during the early phase of the financial crisis, many banks—despite adequate capital levels—experienced difficulties because they did not manage their liquidity prudently. The crisis drove home the importance of liquidity to the proper functioning of financial markets and the banking sector to the Basel III participants. Our basic analysis of banks' liquidity position shows that, on average, banks have improved in managing their liquidity.

## Does GDI Point to a Stronger Recovery?

11.05.13

by Filippo Occhino

Gross Domestic Product (GDP) and Gross Domestic Income (GDI) both measure the same economic variable—the aggregate production of goods and services within the US in a year. GDP computes it as the sum of all expenditures (consumption, investment, government spending, and net exports), while GDI computes it as the sum of all incomes (employee compensation, profits, interest, rent, income from unincorporated businesses, indirect taxes minus subsidies, depreciation). These two measures may, sometimes, diverge because of measurement errors. In the current recovery, in particular, GDI has been growing faster than GDP. Between the second quarter of 2009 and the second quarter of 2013, GDI grew at a 2.65 annual rate, while GDP grew only at a 2.23 annual rate, quite a large difference for a four-year-long period. What is the actual rate at which the economy is growing?

Both GDP and GDI have measurement strengths and weaknesses, but if we compare the source data used to compute the two measures, we are led to put more trust in GDP than GDI as an indicator of aggregate output. The source data used to compute GDP is generally better because it is mainly based on business surveys collected for statistical purposes, and it uses a consistent set of concepts and definitions. In contrast, the source data used to compute GDI is produced for a variety of other purposes, since it is mainly based on financial statements and information from tax and regulatory agencies, and it uses heterogeneous concepts and definitions. GDP source data is also timelier—a much larger fraction of source data is available for the early GDP estimates than for the early GDI estimates, so judgment and trend adjustments play a much smaller role in the early GDP estimates (See Landefeld 2010 for a thorough discussion of the topic in this paragraph).

Some evidence, however, favors GDI over GDP as a measure of aggregate output. Aruoba, Diebold, Nalewaik, Schorfheide, and Song (2013) estimate

### Real Output

Billions of chained 2009 dollars



Note: Shaded bar indicates a recession.  
Source: Bureau of Economic Analysis.

## Real Output Growth

Four-quarter percent change



Source: Bureau of Economic Analysis; author's calculation based on the second model of Aruoba, Diebold, Nalewaik, Schorfheide and Song 2013.

the unknown path of aggregate output solely based on the known paths of GDP and GDI, and find that GDI is, overall, a more accurate measure than GDP. For instance, if we use their estimation method (and the second model in their paper), we find that aggregate output grew at a 2.51 annual rate between the second quarter of 2009 and the second quarter of 2013, closer to the GDI growth rate than to the GDP growth rate.

On balance, the evidence suggests that the growth rate of aggregate output in the recovery has been in between the growth rates of GDP and GDI, up to 0.25 percentage points faster than indicated by GDP. The implications of this upward revision, however, are rather limited.

The overall picture of the recovery is not much changed. Even if we focus on the estimate of aggregate output in the second chart above—which is obtained with a method that favors GDI over GDP—the recovery still lacks an initial strong rebound after the Great Recession, and its pace continues to be moderate. The current level of output is still well below the forecasts that were made back in 2007, before the beginning of the crisis (see *Behind the Slowdown of Potential GDP*, Jacobson and Occhino, February 2013).

Higher estimated output growth leads to only slightly higher statistical estimates of trend output growth. For instance, if we compute trend GDP using a band-pass filter that eliminates all cycles shorter than 30 years from GDP data, we find that trend output is currently growing at a 2.21 annual rate. If we apply the same method to the estimates of aggregate output obtained using the estimation method of Aruoba, Diebold, Nalewaik, Schorfheide, and Song, we find that trend output is currently growing at a 2.28 percent annual rate, just a few basis points higher.

Faster estimated growth is only slightly more consistent with the improvement that the labor market has experienced in the recovery. While typically output grows fast when the unemployment rate declines, in this recovery it has grown slowly, even though the unemployment rate has declined steadily. Higher estimated output growth, then, is slightly more in line with past business cycles.

However, the size of the revision is small relative to the overall decline of the unemployment rate. An upward revision to output of 0.25 percentage points over a four-year period—for a cumulative 1 percentage point—roughly corresponds to a decline in the unemployment rate of only 0.25 to 0.50 percentage points, based on common estimates of Okun’s Law. This is rather small compared with the overall decline of the unemployment rate over the same period—almost 2 percentage points.

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#### References

B. Aruoba, F. X. Diebold, J. Nalewaik, F. Schorfheide and D. Song, “Improving GDP Measurement: A Measurement-Error Perspective”, unpublished manuscript, April 2013.

J. Steven Landefeld, Spring 2010, comment to Jeremy J. Nalewaik, “The Income- and Expenditure-Side Estimates of U.S. Output Growth”, *Brookings Papers on Economic Activity*, pages 112-123.

## Implications of the Government Shutdown on Inflation Estimates

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10.17.13

by Randal Verbrugge and Sara Millington

Each month, the Bureau of Labor Statistics (BLS) releases estimates of the Consumer Price Index (CPI) and the Producer Price Index (PPI). The government shutdown, which ended late on October 16, caused a delay in the release of these statistics and many of the statistics and data products that rely on them. But the shutdown will also affect the accuracy of these statistics for months to come. This article outlines the impact of the shutdown, particularly on the accuracy of the CPI.

The repercussions on CPI estimates will continue for at least seven months. Some of these repercussions will occur later this month, but the majority of the influence will occur the next month, in November, when the monthly overall inflation estimates derived from the CPI will be subject to significant error. However, year-over-year inflation estimates will continue to be quite reliable.

### **October Impact: Delay and Potential Processing Error**

There is always a half-month delay between the collection of data and the construction of the CPI: Releases in the middle of the month of October pertain to data that were collected during September. Putting this differently, the September inflation rate (the difference between September's CPI and the previous month's CPI) becomes known in mid-October. Likewise, October data are released in November.

Since the October release pertains to September data, and all of these data were collected prior to the shutdown, the chief October impact of the shutdown will be that the release of the CPI will be delayed. Commodity analysts in the BLS usually spend the entire month processing data flowing in from field offices around the country. Up until the shutdown on October 1, these analysts were able to process some of the data that had been obtained in September, but as they return to work, they will have a hard time catching up. The early parts

of the month are typically periods of heightened activity, and there are strict limits on the amount of overtime work that these analysts can undertake. October's CPI may also be subject to processing error; under normal conditions, processing error is miniscule, but under rushed conditions it is easy to imagine some processing errors inadvertently creeping in.

Of course, the fact that many prices will not be collected in October will have repercussions later on. In fact, these repercussions do not end until May of 2014.

### **November through May Impact: Sampling Error**

There are two kinds of errors that might enter the November release of October CPI data. First, it is possible that there will be some processing error. During the months of October and early November, commodity analysts will be rushing to catch up their processing of the October data, subject again to the constraint of limited overtime.

Second, and more importantly, is sampling error. All statistics are prone to some sampling error, leading to uncertainty surrounding those statistics. By definition, statistics are based upon a sample of the data, rather than the entire universe of data. An estimate of the average is only an estimate; most likely, the estimate is a little too high or a little too low.

Statisticians measure the amount of uncertainty (or the degree of accuracy) in a given statistic with another statistic, the standard error. The standard error of a statistic can be used to construct confidence intervals, or likely ranges for the true value given the specific estimate obtained from the sample. In particular, the chance that an estimated statistic is farther than one standard error away from the true value is about 30 percent, while the chance that a statistic is off by more than two times the standard error is less than 5 percent. For example, if the standard error is 0.4 percent, then we know that there is less than a 5 percent chance that the statistic misses the true value by 0.8 percent or more. All else equal, a bigger sample yields a more accurate statistic; in other words, a bigger sample yields a statistic with a smaller standard error.

Since the CPI price collection relies upon field staff visiting shops, some of the October data will never be collected. As a result, the November CPI release, which is based upon October data, will have a much bigger standard error due to the smaller sample. We can estimate how much bigger by weighing the potential size of the October sample against typical sample sizes, historical standard errors, and the likely inflation rate.

The October sample will be half its usual size. Price collection happens during the working days of the month. The government was shut down for 11 working days, so the missing data represent about 50 percent of the price quotes (since there are 21 working days a month on average).

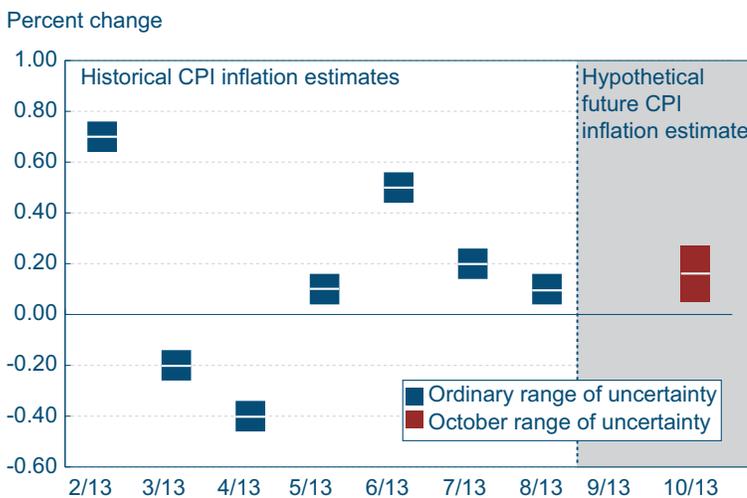
The monthly standard error was most recently estimated by the BLS to be 0.03 percent for the 2011 CPI, based upon 83,300 price quotes. A standard error estimate of 0.03 percent is probably still the best estimate for post-2012 data. The median monthly percentage price change in the CPI for this period was 0.14 percent (roughly corresponding to an annualized average of about 1.6 percent), and the available evidence suggests that the noise in CPI estimates does not fall appreciably when inflation is low. However, with approximately half of the price quotes missing, the standard error would rise to at least 0.042 percent.

This level of error gives rise to considerable uncertainty about the true monthly inflation rate. For example, suppose that the October CPI ends up being estimated at its median, 0.14 percent, and we wish to have a wide-enough confidence interval so that we are wrong only 5 percent of the time. In this case, the range of uncertainty about this 0.14 percent estimate would be that true monthly inflation in September was somewhere between 0.05 percent and 0.22 percent.

### Impact on Annual CPI Statistics

While the monthly inflation rate will be subject to this uncertainty, other commonly used statistics computed using CPI data will have smaller errors. For example, the estimated standard error in year-over-year inflation under ordinary circumstances is 0.07 percent, but that is compared to a median

## CPI Uncertainty: Monthly



Source: Bureau of Labor Statistics/Haver Analytics.

of about 1.88 percent in 2013. Because the year-over-year inflation rate is computed based upon twelve separate one-month inflation estimates, even if one particular month has a standard error as large as 0.042 percent, this will cause only a modest increase in the uncertainty of this twelve-month measure. Furthermore, in the situation we are examining, errors in the October CPI (released in November) start to be cancelled out in the November CPI (released in December).

Why doesn't the October CPI error just disappear in the November CPI (which is released in December)? If the prices of all goods and services were collected each month, then this is exactly what would happen. For example, if the October inflation estimate happened to be too high because of missing price quotes, then—once those prices were once again collected—the November inflation estimate would be too low, owing to all those price changes being properly accounted for, and that would be the end of it. Any errors due to a small sample that cause a problem in one month would be exactly reversed in the next month, so that the price level—the index itself, not the inflation estimate—would go back to where it would have been, had all the data actually been collected in October.

But since not all prices are collected every month, not all of the error will be reversed right away. In fact, the price index will not return to its original course for another six months. This period is so long for cost reasons. The BLS has divided all the goods and services it collects prices on into three categories: goods whose prices are collected each month in all cities; goods whose prices are collected only every other month in most cities (exceptions are Chicago, Los Angeles, and New York City, where all commodities and services except rents are priced monthly); and rents. Rents are collected only every six months; if the rental price on a particular rental unit is collected in January, then the rent on that unit will next be collected in July.

Because of this, pricing errors that relate to monthly items (such as food) will be reversed in the November inflation estimate. But pricing errors that relate to bimonthly items (such as vehicles in Cleveland or women's shoes in Baltimore) will not

be reversed until the December inflation estimate is released (in January). To see how this works, consider a hypothetical example.

Suppose that the true average price increase of automobiles in Cleveland between August and December is 1.0 percent per month. Of course, some cars rise more in price, and some rise less in price. Suppose that the BLS normally collects 30 vehicle prices per month, but owing to the shutdown, it was only able to collect 15 vehicle prices in October. And suppose that these vehicles just happened to be cars that experienced quite rapid increases in price, so that the estimated October price increase for Cleveland automobiles happened to be 1.9 percent. The missing price quotes are not used in the October CPI, but the BLS still estimates the missing prices. It does so by assuming that those prices also rose by 1.9 percent.

In December, the BLS field staff is once again able to visit all the dealerships in their Cleveland sample. Those rapid-price-increase cars are again priced, and their two-month price changes enter the inflation estimate as usual. But this time the field staff is also able to collect prices from those other vehicles, the ones that did not experience much inflation. The estimated inflation rate is based upon the actual price versus the estimated October price—so the estimated inflation rates are negative for those cars. As a result, the December inflation estimate will be about 0.1 percent.

This means that over the four-month period, September to December, the average inflation rate for cars in Cleveland ends up being about 1.0 percent, as it should be. (For a more detailed description of BLS methods used in constructing the CPI, see chapter 17 in the BLS Handbook of Methods, available at [www.bls.gov](http://www.bls.gov).)

Meanwhile, since rents are only collected every six months, errors would only be removed in the April collection. In other words, any error in the October rent inflation estimate would be reversed in the April inflation estimate.

In terms of CPI inflation estimates, then, the following summarizes the errors owing to the shutdown:

- October—delays and possible processing errors in the September CPI estimate
- November—sampling error in the October CPI estimate
- December—unwinding of October sampling error in monthly items in the November CPI estimate
- January—unwinding of October sampling error in bimonthly items in the December CPI estimate
- May—unwinding of October sampling error in rents in the April CPI estimate

### **Other Aggregate Statistics**

The CPI is not the only statistic that will be affected by the government shutdown. The Federal Reserve System focuses on the price index associated with the Personal Consumption Expenditure estimate in the national accounts. This index is called the PCE-PI. Since CPI data movements underlie most of the PCE-PI computation, most of the errors and any delays in the CPI would be reflected in the PCE-PI. Furthermore, the PCE-PI computation will be affected by other data products produced by the BLS. The BLS produces Producer Price Indexes, which will also be delayed and subject to errors over the coming months. These data are used fairly intensively in the PCE-PI as well.

These delays and errors don't just influence inflation estimates: any errors in PCE-PI translate directly into errors in aggregate consumption estimates. Furthermore, aggregate GDP computations will also suffer from missing producer price data; these directly impact productivity estimates and aggregate output estimates. However, aggregate GDP computations occur quarterly, based upon three months of data. Most of the error in the CPI that was induced by the small sample will disappear by December.

## Implications of Uncertainty in Price Measures

Monetary policymakers are keenly interested in inflation, and one of the main challenges they face is distinguishing signal from noise in the current inflation data. Even in the best of times, some part of the inflation data is simply noise—transitory movements in inflation, either up or down, that go away in a month or two.

Some of these transitory movements are due to sampling error in the CPI. Some are due to temporary movements in prices that will reverse themselves in a few months. Analysts within the Federal Reserve System spend enormous time and effort to try to determine whether the latest aggregate price movement is mostly transitory or mostly persistent and what the true underlying trends in inflation are.

An increase in the standard error of the CPI reduces its usefulness to policymakers. It makes it hard to judge whether a number like 1.5 percent reflects real inflation, or whether it is simply error. For example, if the inflation rate is mistakenly reported as too high, the monetary authority might begin raising interest rates prematurely, threatening the recovery. If the inflation rate is mistakenly reported as too low, the monetary authority might keep interest rates too low for too long, which could ignite inflation.

To avoid policy errors, the usual advice—based on the “Brainard” theory of policy practice under uncertainty—is for policymakers to react more cautiously than they otherwise would, when faced with data that is measured with more error than usual.

Similarly, an increase in uncertainty about inflation estimates reduces the usefulness of those estimates to consumers, workers, and producers, and also makes planning errors more likely. For example, in the hypothetical cars-in-Cleveland scenario above, consumers tracking auto prices might be alarmed by the seemingly rapid rise in car prices and be prompted to buy too quickly. Cleveland auto dealers might be encouraged to raise their prices more, thinking that they are only doing what everyone else is doing.

The government shutdown caused increased uncertainty in the economy for a host of reasons. The increased uncertainty for policymakers owing to increased uncertainty in the CPI is another contributor to that overall uncertainty. But since the shutdown was resolved in mid-October, the degree of increased uncertainty in the CPI over the coming months will not seriously damage the Federal Reserve System's ability to determine the current state of the economy.

## Taking Stock of the Labor Market Recovery

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10.18.13

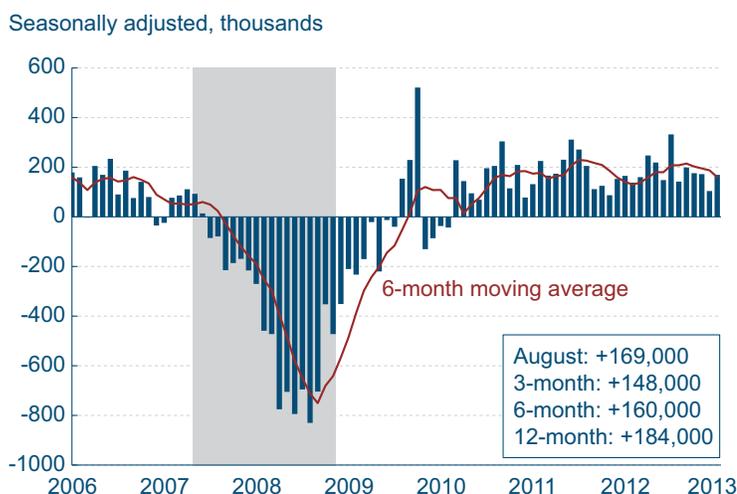
by Maggie Jacobson and Murat Tasci

A number of factors are putting the pace of labor market improvements on center stage for many financial market observers. At its September 2012 meeting the Federal Open Market Committee (FOMC) decided to provide further policy accommodation using large-scale asset purchases, and citing anemic growth in the economy and no substantial reduction in the unemployment rate, declared that it would continue to buy agency mortgage-backed securities until the outlook for the labor market had improved substantially. At the time of that meeting, the unemployment rate stood at 8.1 percent, having been above 8 percent for an exceptionally long period—43 consecutive months. Moreover, in December 2012 the FOMC announced that the low level for the federal funds rate would be appropriate at least as long as the unemployment rate remains above 6-1/2 percent.

Whether improvement is viewed as substantial is inherently a judgment call that the FOMC will make. In this article, we provide a broad summary of the changes in the major labor market measures for the US economy over the last year. (Note that due to the lapse in federal funding, the BLS did not release the employment report for September on October 4, as originally scheduled.)

Employment as reported by business establishments (payroll survey) expanded on average by 184,000 workers every month in the last year. The most recent data we have (for the month of August) suggests slightly lower growth, at 169,000. Monthly payroll changes are always volatile, but even the smoother 6-month moving averages have stayed above 160,000 this year so far. Employment growth has been very broad based across different industries. All major sectors, with the exception of government, increased payrolls on average each month. Professional and business services added 51,000 jobs per month, leading the pack, followed by trade, transportation, and utilities (43,000), leisure and hospitality (35,000) and education and

## Payroll Employment Monthly Change



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

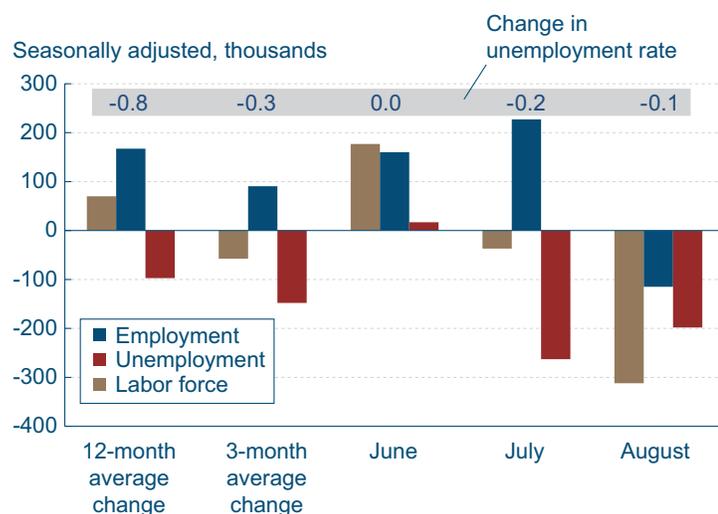
health (31,000). Even though the strong performance in manufacturing and construction in the early part of 2013 declined somewhat, these sectors have added 2,000 and 14,000 jobs, respectively, per month over the past 12 months on average. One point to note, however, is that the 3-month average suggests the pace of the increase has lost some momentum over the last several months, with the last three months registering fewer than 150,000 new jobs every month on average.

Employment as reported by households (household survey) has increased by more than 160,000 jobs a month on average since August 2012. Monthly changes in the household survey can be much more variable than the payroll survey, as it comes from a smaller sample.

This variability can make it hard to interpret the data. For instance, in the most recent household data we have (August 2013), the labor force shrank by a sizeable 312,000 workers, employment fell by 115,000, and unemployment declined by 198,000. As a result, the 0.1 percentage point decline in the unemployment rate in the month of August could be perceived as being due to a decline in the size of the labor force. However, over the past 12 months, the general picture remains relatively healthy, with the increase in employment (+167,000) accompanied by a decline in the stock of the unemployed (-97,000) and a modest rise in the size of the labor force (+70,000). This combination of changes has resulted in a sizable decline in the unemployment rate over the past 12 months of 0.8 percentage points.

Elsewhere in labor market data, one can find other encouraging signs, such as very stable levels of average workweek hours for production workers as well as other private employees. Current levels are essentially the same as before the recession, suggesting very little potential for improvement on this measure going forward. Employers' demand for more labor most likely will be met with new hiring rather than more hours per worker. Nevertheless, we observe that manufacturing overtime hours have increased by a bit since a year ago, from 4.1 hours to 4.4 hours per week. As a result, data on the labor demand of employers in the near term, such

## Unemployment Rate Decomposition, September 2013



Source: Bureau of Labor Statistics.

as job openings from JOLTS or the help-wanted online advertising index by the Conference Board, all point to a relatively firm demand for hiring by employers going forward.

Not all labor market indicators are as encouraging. For instance, the monthly average increase of 70,000 workers in the labor force is far below the level needed to keep the labor force participation rate stable with a growing population. As a result, labor force participation has continued to decline gradually over the past year, falling from 63.5 percent to 63.2 percent, one of its lowest points since the late 1970s. As the population active in the labor market shrinks—relative to the total population—observed increases in the employment pool of 167,000 per month do not increase the fraction of the population that is employed. The employment-to-population ratio has been virtually stuck around 58.5 since the beginning of the recovery in mid-2009.

Another reason to be cautious about overstating the extent of improvement in the labor market is the composition of the employed and the unemployed. Two observations stand out. First, a significant fraction of the unemployed consists of the long-term unemployed, workers who have been unemployed for more than six months. These workers will suffer more from the long-term consequences of the recession. Second, a substantial portion of the employed consists of workers who are employed part-time due to economic reasons. The breadth of part-time employment underscores the presence of labor market slack even among the employed.

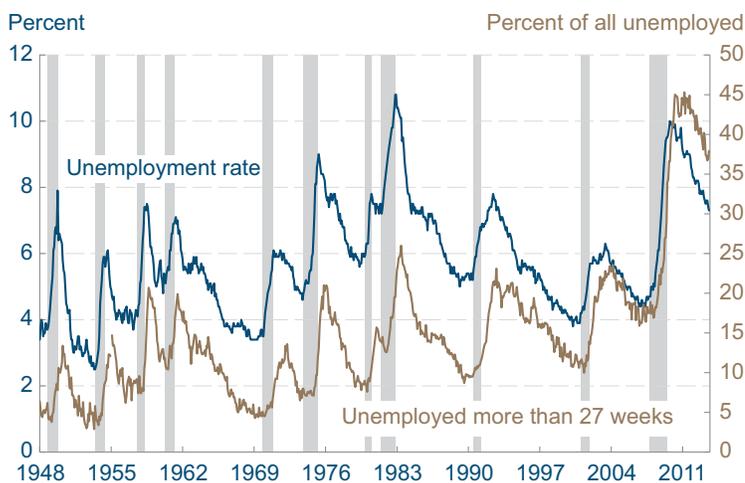
The fraction of unemployed workers who have been unemployed for more than six months skyrocketed during the course of the recession, almost tripling to 45 percent at one point. This fraction has nudged down a bit but still stands at 37.9 percent as of August 2013. Early in the recovery, one concern was that these unemployed workers are provided with incentives to stay unemployed due to the generous unemployment compensation enacted as part of the Emergency Unemployment Compensation (EUC) legislation and extensions. Early in 2010, there were 5.8 million unemployed workers receiving EUC and extended benefits com-

## Labor Force Participation



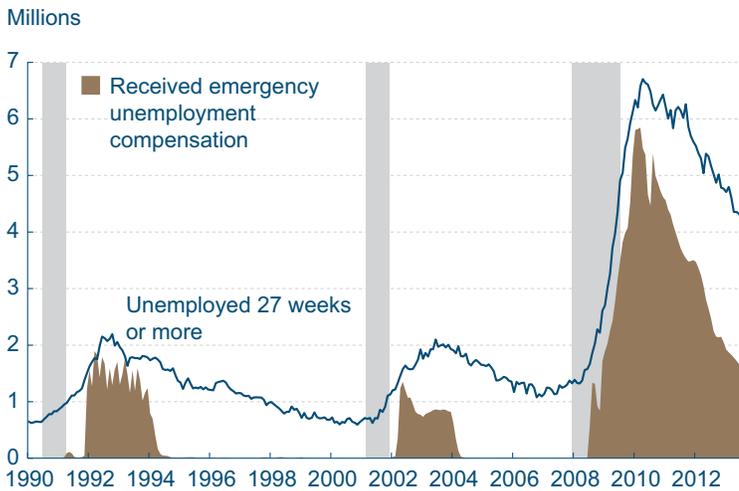
Note: Shaded bar indicates recession.  
Source: Bureau of Labor Statistics (household survey).

## Unemployment and the Share of the Long-Term Unemployed



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

## Size of the Long-Term Unemployed Pool



Note: Emergency unemployment compensation includes Emergency Unemployment Compensation tiers 1-4 (2008-2012) plus extended benefits. Shaded bars indicate recession.  
Source: Bureau of Labor Statistics.

## Reason Given for Part-time for Economic Reasons



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

bined, when the number of long-term unemployed workers was hovering around 6.5 million. As of August 2013, the size of the long-term unemployed pool has shrunk to 4.2 million, along with a much sharper decline in the number of beneficiaries of EUC and extended benefits, to a mere 1.5 million. It is hard to discern whether those unemployed exited the pool because they found jobs or because they just gave up and dropped out of the labor force. However, the sheer size of the smaller pool of beneficiaries suggests that EUC cannot be a major factor in explaining the persistence of long-term unemployment.

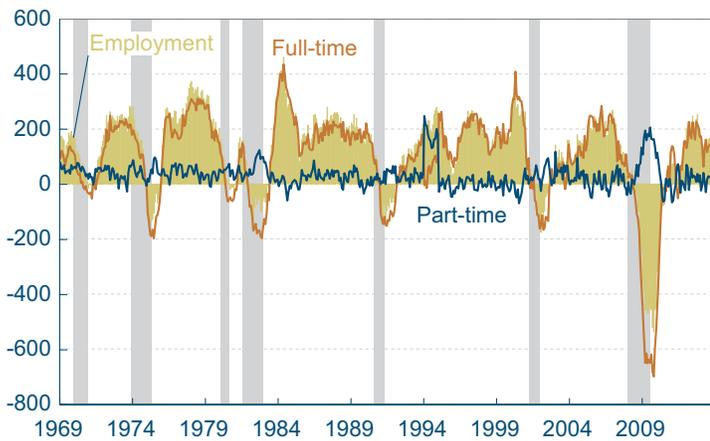
Part-time employment due to economic reasons surged during the recession. The sum of the two categories in the BLS report that are used to calculate the number of those employed part-time due to economic reasons—part-time due to slack work and part-time due to lack of full-time job availability—was nearly equal to 6 percent of all employment in the United States at one point. This has declined somewhat but still stands at 4.8 percent as of August 2013.

Part-time employment could serve as a way to adjust the labor force in the wake of a large downturn, and in fact it seems like this is what happened during the last episode. Even though employment was shrinking by large numbers, the pool of part-time workers was increasing to unprecedented levels. For instance, in the first six months of 2009, part-time employment increased by 205,000 per month on average. Meanwhile, total employment was shrinking by 450,000 workers per month over the same period, led by a 650,000 per month decline in full-time employment. It is likely that much of this situation is explained by employers reducing the work hours of their full-time workers.

Since September 2012, we have received a lot of information about the labor market that is encouraging and suggestive of overall improvement. There are, however, still soft spots indicating continued weaknesses. When the FOMC emphasized the importance of labor market improvements last year, Committee members were looking at a very weak labor market outlook. Most members expected the unemployment rate to drop below 8 percent by the

## Changes in Part-time and Full-time Employment

Six-month moving average

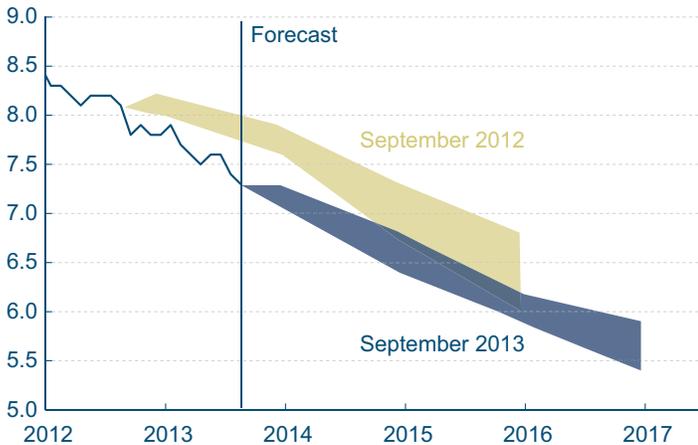


Sources: Bureau of Labor Statistics; author's calculations.

end of 2013 and to settle between 6 percent and 6.8 percent by the end of 2015 (as reported in the Summary of Economic Projections). Since then, the unemployment rate has declined to 7.3 percent. The most recent projections, from September 2013, show that most Committee participants now expect the unemployment rate to be somewhere between 7.1 percent and 7.3 percent by the end of this year and somewhere between 5.4 percent and 5.9 percent by the end of the projection period, 2016.

## Unemployment Rate and Central Tendency of FOMC Survey of Economic Projections

Percent



Sources: Bureau of Labor Statistics; Federal Reserve Board.

# Yield Curve and Predicted GDP Growth, October 2013

Covering October 5, 2013–October 18, 2013  
by Joseph G. Haubrich and Sara Millington

## Overview of the Latest Yield Curve Figures

Concerns over the debt ceiling apparently had some impact on the shorter end of the yield curve, pushing the three-month Treasury bill rate up to 0.08 percent (for the week ending October 18), the highest level since March and a big jump up (at these low levels, anyway) from September’s 0.02 percent and even August’s 0.05 percent. The ten-year rate moved up, but not as much (either absolutely or proportionally) to 2.66 percent, above September’s 2.64 percent, but below August’s 2.73 percent. The slope decreased to 258 basis points, down from September’s 262 basis points, and August’s 268 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 1.2 percentage rate over the next year, even with September’s rate and just up from August’s rate of 1.1 percent. The influence of the past recession continues to push toward relatively low growth rates. Although the time horizons do not match exactly, the forecast comes in on the more pessimistic side of other predictions but like them, it does show moderate growth for the year.

The 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 October is 2.24 percent, up from last month’s 2.12 percent and just above August’s 2.23 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)	0.08	0.02	0.05
Ten-year Treasury bond rate (percent)	2.66	2.64	2.73
Yield curve slope (basis points)	258	262	268
Prediction for GDP growth (percent)		1.1	0.9
Probability of recession in one year (percent)		2.12	2.23

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.

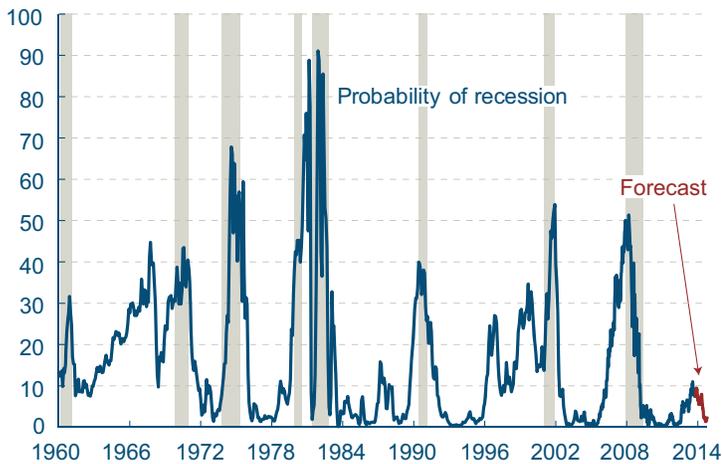
### Predicting the Probability of Recession

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 determinants of the yield spread today are materi

## Recession Probability from Yield Curve

Percent probability, as predicted by a probit model

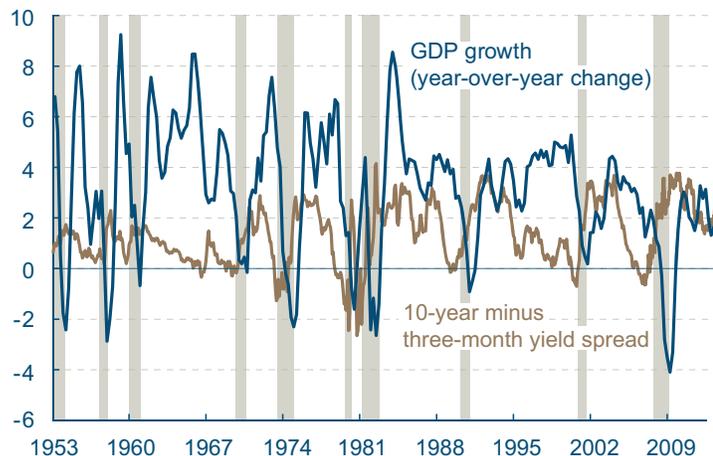


Note: Shaded bars indicate recessions.

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

## Yield Curve Spread and Real GDP Growth

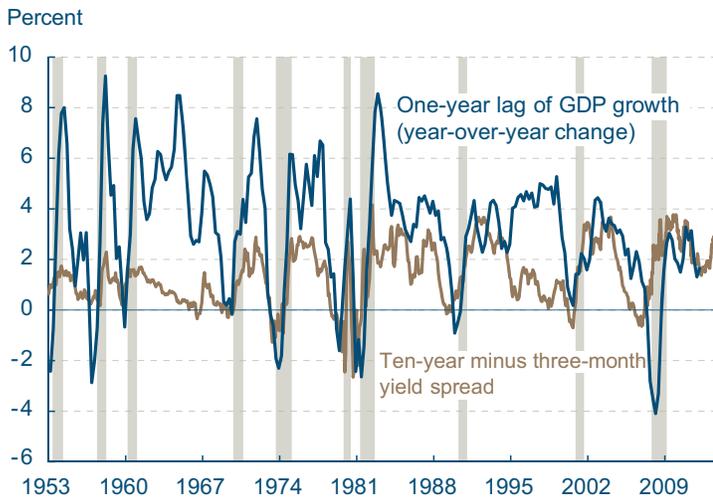
Percent



Note: Shaded bars indicate recessions.

Source: 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.

11.06.13

by Daniel Hartley

Gentrification is a form of neighborhood change. While it does not have a precise definition, it is commonly associated with an increase in income, rising home prices or rents, and sometimes with changes in the occupational mix and educational level of neighborhood residents.

Gentrification is sometimes viewed as a bad thing. People claim that it is detrimental to the original residents of the gentrifying neighborhood. However, a look at the data suggests that gentrification is actually beneficial to the financial health of the original residents. From a financial perspective, it is better to be a resident of a low-price neighborhood that is gentrifying than one that is not. This is true whether residents of the gentrifying neighborhood own homes or do not and whether or not they move out of the neighborhood. This is interesting because one might expect renters to be hurt more by gentrification, and one might also be concerned that people who moved out of the neighborhood did so because they were financially strained.

In this article I consider a measure of gentrification based on neighborhood home values, and examine how this measure correlates with changes in credit scores and debt delinquency measures in gentrifying neighborhoods.

### **Variation in Gentrification across Large Cities**

For the purpose of this analysis, I will say a neighborhood is gentrifying if it is located in the central city of a metropolitan area and it goes from being in the bottom half of the distribution of home prices in the metropolitan area to the top half between 2000 and 2007. Housing prices are a good measure of gentrification since they provide a summary of the various amenities in the neighborhood. Changes in neighborhood amenities such as increases in school quality or decreases in crime should be reflected in changes in neighborhood home prices.

The number of neighborhoods that could have potentially undergone gentrification within this time-frame is large and varies greatly across US cities. Looking at the 55 largest US cities in 2000 shows that the share of neighborhoods that fit my definition ranges from 17 percent in Seattle to 95 percent in Baltimore. The number of neighborhoods that did actually gentrify by 2007 is smaller. Though all cities experienced some gentrification, most saw less than a third of neighborhoods with the potential to gentrify do so. Four cities saw significant shares of the neighborhoods that could gentrify, do so: Boston (61 percent), Seattle (55 percent), New York (46 percent), and San Francisco (42 percent). In Boston, the gentrifying neighborhoods represented about a fourth of the entire city's population. In other cities, the proportion was much smaller.

## Gentrifying Cities

Metropolitan Statistical Area (MSA)	Proportion of low-price census tracts in the city (those with below-median MSA home value), percent	Proportion of the city's low-price tracts that gentrified, percent	Proportion of the city's total number of tracts that gentrified, percent
Boston	43	61	26
Seattle	17	55	9
New York City	40	46	18
San Francisco	31	42	13
Washington, DC	55	35	19
Atlanta	59	31	18
Chicago	57	28	16
Portland	48	28	13
Tampa	73	24	18
Los Angeles	51	23	12
Denver	52	23	12
Virginia Beach	31	23	7
Minneapolis	71	22	16
New Orleans	59	20	12
Austin	51	19	10
Jacksonville	61	17	10
Nashville	58	16	9
St. Louis	84	16	13
Anchorage	50	15	7
Honolulu	28	15	4
Las Vegas	53	15	8
Colorado Springs	48	14	7
Philadelphia	81	14	11

Table continued on page 9.

## Gentrifying Cities (continued)

Metropolitan Statistical Area (MSA)	Proportion of low-price census tracts in the city (those with below-median MSA home value), percent	Proportion of the city's low-price tracts that gentrified, percent	Proportion of the city's total number of tracts that gentrified, percent
Albuquerque	47	13	6
Houston	55	13	7
Miami	62	12	8
Cincinnati	72	12	9
Fresno	57	11	6
Tuscon	67	11	7
Charlotte	40	11	4
Phoenix	64	10	7
San Diego	46	10	5
Columbus	65	9	6
Indianapolis	60	8	5
Kansas City	68	8	6
Corpus Christi	45	8	4
Sacramento	64	8	5
Milwaukee	83	7	6
Pittsburgh	73	7	5
Dallas	52	7	4
Memphis	62	7	4
San Antonio	58	7	4
Lexington	52	7	3
Cleveland	93	7	6
Oklahoma City	55	7	4
Buffalo	78	6	5
El Paso	46	6	3
Omaha	54	6	3
Raleigh	35	4	2
Toledo	72	4	3
Wichita	57	4	2
Oakland	83	3	3
Baltimore	95	3	3
Tulsa	53	3	2
Detroit	94	3	2
Total	57	17	10

Sources: Neighborhoods are defined using Census 2000 tract boundaries. Median home value tabulations for Census tracts come from the 2000 Census and the 2005–2009 American Community Survey. I use 2007 as a shorthand for the 5-year tract level estimates from the 2005–2009 American Community Surveys.

## Changes in Gentrifying and Nongentrifying Neighborhoods, 2000–2007

Change in	Change (percent points)	
	Gentrified	Not gentrified
Home prices	157.7	49.8
Rents	21.0	16.5
Incomes	10.5	–5.6
Proportion with bachelor's degree	7.3	2.3
Proportion of owner-occupied housing units	3.3	–0.3

Sources: Neighborhoods are defined using Census 2000 tract boundaries. Median home value tabulations for Census tracts come from the 2000 Census and the 2005–2009 American Community Survey. I use 2007 as a shorthand for the 5-year tract level estimates from the 2005–2009 American Community Surveys.

Gentrifying tracts saw bigger increases in home values, rents, incomes, education levels, and owner occupancy rates than low-price tracts that did not gentrify.

### Neighborhood Gentrification and Credit Scores

Rising home values, educational levels, and incomes are all positive developments. But some people have voiced concerns about the side effects of gentrification. The most common is that gentrification displaces existing residents from the neighborhood. Renters face higher rents, and homeowners may face higher property taxes, possibly causing liquidity problems even though their home values have increased. To assess how the existing residents fare in neighborhoods that gentrify, I examine how gentrification is associated with changes in their credit scores. The credit score used is the Equifax Risk Score, which provides a summary measure of a person's creditworthiness and is one of the scores used by lenders to decide whether or not to make a loan to someone.

How does gentrification correlate with changes in individuals' Equifax Risk Scores? I looked at a number of regressions which aimed to assess the differences in changes in Equifax Risk Score from 2001 to 2007 between residents of gentrifying and nongentrifying neighborhoods, controlling for the individuals' ages and credit scores in 2001. In other words, how much did the creditworthiness of people in gentrifying neighborhoods increase compared to people with similar ages and initial credit scores in nongentrifying neighborhoods?

Living in a neighborhood that gentrified between 2000 and 2007 is associated with about an 8 point higher increase in credit score compared to living in a low-price neighborhood that did not gentrify. Improving credit outcomes in gentrifying neighborhoods are also reflected in delinquency rates. The share of people with an account 90 or more days past due fell by 2 percentage points in gentrifying neighborhoods relative to other low-price neighborhoods during this period (again controlling for age and initial credit score).

Furthermore, interesting patterns emerge when I compare changes in the credit scores of the resi-

dents of neighborhoods that gentrified to those that did not gentrify, based upon whether the residents had a mortgage in 2001. Mortgage-holding residents are associated with about the same increase in credit scores in gentrifying neighborhoods as non-mortgage-holding residents. Even though some homeowners do not have mortgages, so having a mortgage is not a perfect proxy for homeownership, this result suggests that renters in gentrifying neighborhoods benefit by about the same degree as homeowners.

Another way to cut the data is to compare movers and nonmovers across gentrifying and nongentrifying neighborhoods. Interestingly, there is a slightly larger increase in credit score (1.5 points more) associated with residents of the gentrifying neighborhoods who moved to a different neighborhood relative to those who lived in a gentrifying neighborhood but did not move. So it appears that, on average, movers are even slightly more positively affected by gentrification than nonmovers.

The data seem to show that there is a positive change in the financial health of the existing residents of gentrifying neighborhoods as measured by their Equifax Risk Score™ and delinquency rates. This positive change is present for mortgage holders, for nonmortgage holders, for those that stay in the neighborhood, as well as for those that move out. The one caveat is that because the data only go back to 1999, I am unable to distinguish between residents who arrived in the neighborhood just two years prior to 2001 and those who are long-time residents.

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Credit score data is generated by Equifax and the Federal Reserve Bank of New York's Consumer Credit Panel.

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