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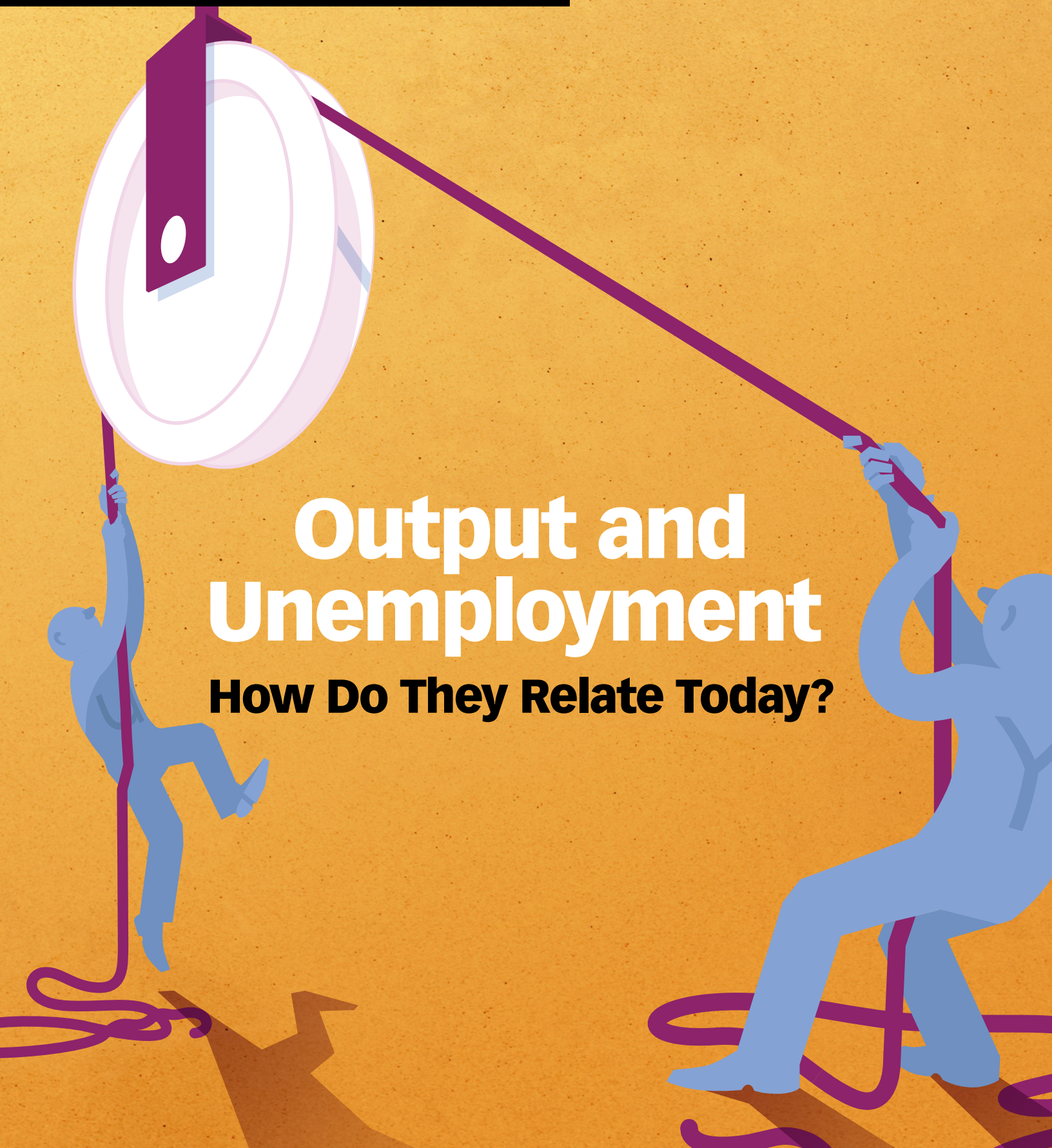

# Output and Unemployment

## How Do They Relate Today?

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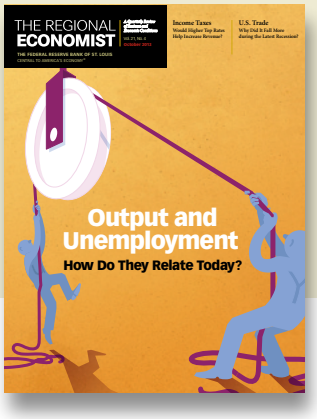
## Output and Unemployment: How Do They Relate Today?

*By Michael T. Owyang, Tatevik Sekhposyan and E. Katarina Vermann*

Fifty years ago, Arthur Okun examined the relationship between output growth and the unemployment rate. The empirical relationship of the resulting "Okun's law" has remained largely intact for 50 years, including during the Great Recession. However, while the law does fit our intuition about economic relationships, it should not necessarily be taken to be causal.

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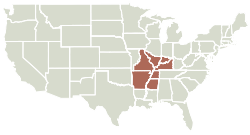





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**Virtual Currency: Examining the Bitcoin**

*By Maria A. Arias and Yongseok Shin*

Central to Bitcoin is its independence from any institution or government, allowing anyone to engage in a direct transaction at a low cost. So, what exactly is it, and how does it work?

**Planning the Return to "Normal" Policy**

*By Kevin L. Kliesen*

In the wake of the crisis, the Fed's balance sheet increased from the historical 6 percent of GDP to more than 20 percent. As plans are made to return to normal monetary policy, it's important to be aware of the challenges and potential pitfalls of this transition.






# The Importance of Connecting the Research World with the Policy World

Monetary policymakers throughout the world face many intellectual challenges. In calm times, we tend to grow comfortable with existing models and existing conceptions of how the world works. Of course, we recognize that economic models are simple abstractions of the world around us and that the real-life economy might behave quite differently. Nonetheless, when actual macroeconomic behavior departs dramatically from predictions, as it has in the past five years, it is still a shrill wake-up call. Not surprisingly, such events make us reconsider our fundamental conceptions about how the economy works.

This column is primarily based on my interview for the *EconomicDynamics Newsletter* forthcoming in November. See www.economicdynamics.org/News280.htm.

The St. Louis Fed has long sought to provide perspectives on whether the policies adopted in the past still serve us well and whether developments at the research frontier can be applied to improve policy. One priority is to encourage better dialogue between leaders in the research world and policymakers. **I have been dissatisfied with a state of affairs that has evolved over the past 25 or 30 years in which a certain group of economists worked on rigorous models and published in journals and a separate group of economists focused on policymaking issues. These two groups often did not interact.** Yet, the issues discussed in the academic journals are our core ideas about how the economy works and how to think about the economy. Those ideas should be an integral part of the thinking of any policymaker.

As one example of present-day disconnect, research by Jess Benhabib, Stephanie Schmitt-Grohé and Martín Uribe—on what can be thought of as a liquidity trap steady-state equilibrium—has influenced my thinking about how we should attack policy issues in the aftermath of the crisis. Benhabib et al. theorize that two possible focal points for the economy exist—a desired steady state with relatively high nominal interest rates and inflation at target, and an unintended steady state with very low short-term nominal interest rates and mild deflation. The Japanese economy seems to have been stuck in this second, unintended steady state for quite a while. Much of the thinking in the monetary policy world is that the U.S. should not repeat the Japanese experience. Yet, despite the important work by Benhabib et al., and despite the policy desire to avoid the Japanese experience, in the research closer to policymaking it is a rarity to see the second steady state even included as part of the analysis. **This is the type of intellectual disconnect that should not happen—but unfortunately it does.**

Unemployment issues provide another example. In this area, I have been influenced by some recent theoretical studies by Federico Ravenna and Carl Walsh. These authors put a rigorous and state-of-the-art version of unemployment search theory into a standard monetary policy framework with an eye toward describing optimal policy in terms of both unemployment and inflation. The core monetary policy advice that comes out of the model is that the policymaker should "maintain price stability." That is, the policymaker in the model does best by maintaining inflation close to target on average, without placing special emphasis on unemployment, even though there is an important unemployment problem in the model. That is an important finding given that unemployment has been much higher than what we have been used to in the U.S. in recent years. My sense is that the Ravenna and Walsh results have received insufficient attention in the policymaking world.

**In macroeconomics, the intellectual challenge is every bit as great as it is in other fields that have unsolved problems.** The economy is a gigantic system with billions of human decisions made every day. Furthermore, people look to the future and try to predict the behavior of the system as they make their decisions today. How are all these decisions being made? How are people reacting to the market forces around them and to the changes in the environment around them? How can we effectively summarize their behavior at an aggregate level? How is policy interacting with all those decisions? These are not questions that can be addressed with a wave of the hand, a clever speech or a witty blog posting. There is just no substitute for heavy technical analysis—plenty of math and statistics combined with plenty of computing power and plenty of intellectual creativity—to get to the bottom of these issues. We might as well admit that progress in attaining satisfactory answers is going to be slow, but still this is the only reasonable course to make progress.

Individual researchers often wish to focus attention on relatively small problems that can be analyzed effectively. This is natural: We need an answer in a reasonable amount of time. **But working on stripped-down problems is inadequate in the medium and longer run to get a clear understanding of how the economy works and how various policies are affecting macroeconomic outcomes.** The macroeconomic research effort in the U.S. and around the world needs upgrading. At some point, the economics profession needs to have bigger, more elaborate models with many more important features, remaining consistent with microeconomic theory and evidence, to see more clearly how those features interact and to obtain a more sound understanding of how policy affects the entire picture.

It is clear to me that policymakers must be receptive to working through and understanding rigorous theory, while researchers must be receptive to grappling with policy issues. Success is much more likely when the theorist and the policymaker communicate with each other. The foundation for good policy to deal with our pressing and vexing policy issues is rigorous and relevant theory. There are simply no shortcuts. Ω

**James Bullard,** President and CEO
Federal Reserve Bank of St. Louis

# Output and Unemployment

## How Do They Relate Today?

*By Michael T. Owyang, Tatevik Sekhposyan and E. Katarina Vermann*

*Potential output* measures the productive capacity of the economy when unemployment is at its natural rate. Because people move from job to job as a regular event, the natural rate of unemployment is generally believed to be greater than zero: There will almost always be some unemployment in the economy. Thus, potential output is not the maximum an economy could theoretically produce, but a lower, sustainable number.

In most economic models, the level of output that is produced is proportional to the level of the inputs—typically, capital and labor. Thus, one might imagine that increasing unemployment above its natural rate might be associated with output falling below its potential, and vice versa.

This line of thinking led economist Arthur Okun to attempt to uncover a relationship between these two variables: (1) the difference between the actual level of output and its potential and (2) the difference between unemployment and its natural rate. As a byproduct of his study of potential and the natural rate, Okun discovered a strong empirical relationship between output growth and changes in the unemployment rate. In his 1962 paper, Okun used data on the quarter-to-quarter growth rate of the real gross national product (GNP) and the quarter-to-quarter difference in the unemployment rate from 1947 to 1960. He estimated that if real GNP growth were held at zero, the unemployment rate would grow 0.3 percentage points, on average, from one quarter to the next. In addition, for each 1-percentage-point increase in real GNP growth, the unemployment rate would decrease 0.3 percentage points. Economists call this latter number Okun's coefficient. This empirical relationship—dubbed Okun's law—has remained largely intact for 50 years. It is important to note that, although subsequent studies have attempted to develop theories explaining the existence of Okun's law, the original manifestation was a purely statistical relationship. Nonetheless, it has been used in policymaking, in classrooms and in the media. Okun's law is a back-of-the-envelope method of translating changes in production to changes in the unemployment rate.[1]

### Okun's Law over Time

The first panel of Figure 1 shows the data similar to those viewed by Okun in 1962. Because the data have been revised over time, the sample is not identical. Each point represents the quarterly difference in the unemployment rate and the quarterly growth rate in real GNP. Okun essentially drew a line through the cloud of points, measuring the slope and intercept. The absolute value of the slope of this line is Okun's coefficient. The second panel of the figure shows the updated data through 2013:Q1, substituting real gross domestic product (GDP), the current standard measure of output, as the output measure. The red triangles represent the data starting from 2008 through the end of the sample (which spans the Great Recession and the subsequent recovery), and the blue squares represent data from the original Okun sample. Black dots are data from the intervening period. As a basis for comparison, we re-estimated Okun's law for data from 1948 through 2013:Q1. For this sample period, the estimate of Okun's coefficient was 0.28, that is, for each 1-percentage-point

Over the years, economists have studied Okun's law in various forms using different models, different data and different time samples. One of their motivations has been to determine whether Okun's law has changed over time. In general, the relationship has held up with some variation in the responsiveness of unemployment to the deviation of output from its potential.

increase in the growth rate of real GDP, there was a decrease of 0.28 percentage points in the unemployment rate.

Over the years, economists have studied Okun's law in various forms using different models, different data and different time samples. One of their motivations has been to determine whether Okun's law has changed over time. In general, the relationship has held up with some variation in the responsiveness of unemployment to the deviation of output from its potential. For example, using the quarterly growth rate of real GDP and changes in the unemployment rate from 1948 to 2007, economist Edward Knotek argued that the magnitude of Okun's coefficient decreased dramatically in the late 1990s and has since remained at a lower level. However, economists Laurence Ball, Daniel Leigh and Prakash Loungani reported in a study earlier this year that these discrepancies largely disappear when using annual data, suggesting that deviations are caused by temporary fluctuations of the unemployment rate or output growth. Overall, the research on Okun's law at the national level shows that the relationship has held in some form for over 50 years.

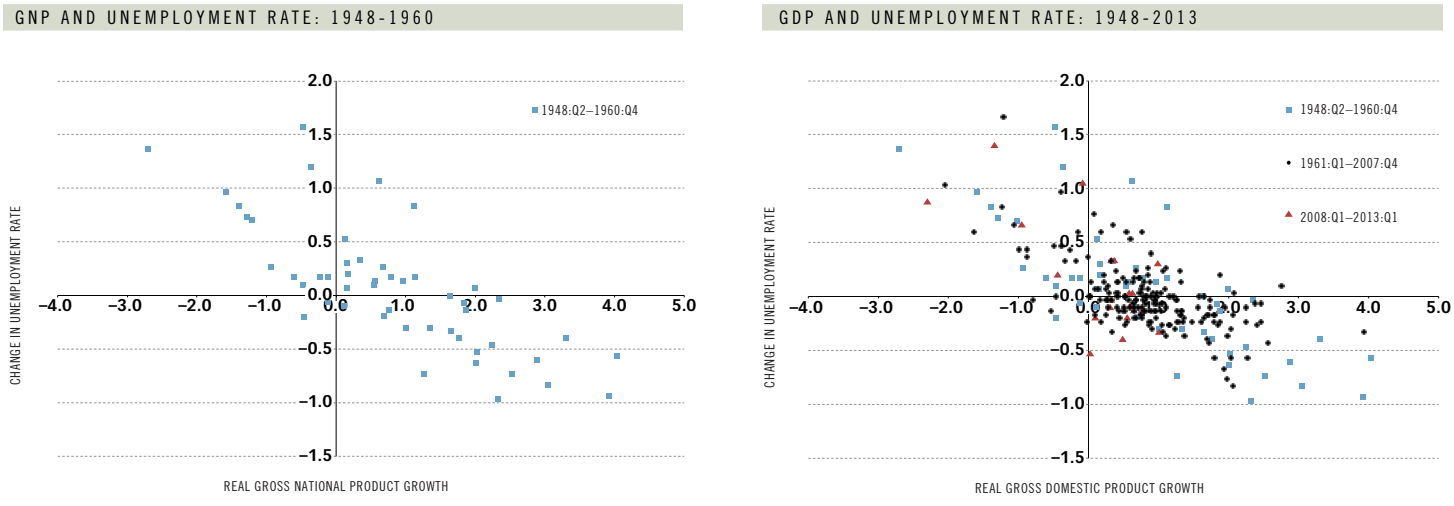
However, one critique of Okun's law is that it may not hold during and after recessions, as evidenced by the "jobless recoveries" following the past three recessions (1990-91, 2001 and 2007-09). To assess the stability of Okun's law during recessions, Knotek used different time periods from 1948 through 2007 to see how Okun's coefficient changed during time periods with and without recessions. His results suggest that Okun's coefficient is smaller in magnitude during periods of economic expansion than during periods of economic recession. In other words, a 1-percentage-point increase in the output growth rate is associated with a larger decline in the unemployment rate during a recession than during an expansion.

Similarly, economists Michael Owyang and Tatevik Sekhposyan found that the relationship described by Okun's law is less stable during times of high unemployment. Using quarterly GDP and unemployment data, they found that the Great Recession generally increased the size of Okun's coefficient relative to an average historical recession. Further statistical tests, however, indicated that the increases in Okun's coefficient during the three most recent U.S. recessions (1990-91, 2001 and 2007-09) and during the Great Recession alone are not statistically different from Okun's coefficients estimated for historical recessions.

The 2013 study by Ball, Leigh and Loungani also confirms that Okun's coefficient did not change significantly

**FIGURE 1**

**The Okun's Law Relationship**




SOURCES: Bureau of Economic Analysis and Bureau of Labor Statistics.

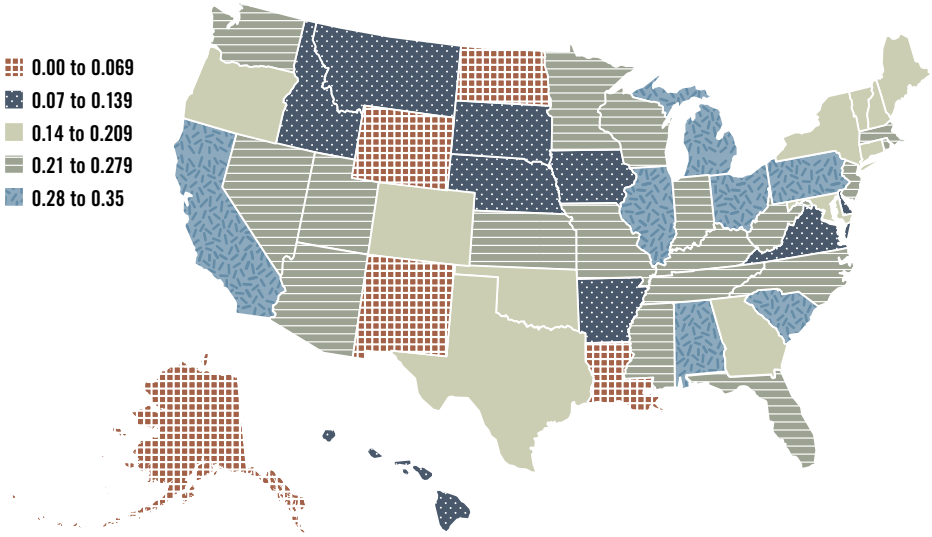
NOTES: The figure shows the relationship between the quarterly difference in the unemployment rate and the quarterly growth rate in output. The left panel shows the relationship from 1948-1960. The right panel shows the relationship from 1948-1960 (blue squares), 1961-2007 (black dots) and 2008-2013 (red triangles).

during the Great Recession. This is evident by careful examination of the second panel of Figure 1. The red triangles do not appear to be distributed much differently than the others.

We computed Okun's coefficient using quarterly GDP and the unemployment rate for the recessions defined by the National Bureau of Economic Research's Business Cycle Dating Committee. Okun's coefficients (one for expansion and one for recession) were similar for different business cycle phases even across these periods: The estimated coefficient during expansions was 0.16, while it was 0.17 for periods of recession. These results indicate that there was no clear difference in Okun's coefficient during different stages of the business cycle. Similarly, the estimated Okun's coefficient during the past three recessions was 0.23 and the estimated Okun's coefficient during the Great Recession by itself was 0.22. These estimates are not significantly different from those of all past recessions.

**FIGURE 2**

**Okun's Coefficient across Space**




SOURCES: Bureau of Economic Analysis and Bureau of Labor Statistics.

NOTES: The figure shows the value of Okun's coefficient across states. Our estimated value of the coefficient for the nation was 0.27.

### Okun's Law over Space

Most studies of Okun's law use the national level of GDP and the unemployment rate for the entire U.S. International studies of Okun's law have found that Okun's coefficient can vary substantially across countries. This variation could be used to test theories about what determines the magnitude of Okun's coefficient.

We could also examine the variation in Okun's coefficient by state. Indeed, according to economist Donald G. Freeman, "Using regional data to measure Okun's coefficient … has the potential to uncover geographic differences in the responsiveness of labor markets to changes in output." [2] These differences could occur for a number of reasons, according to economist Paul Blackley. For example, variation across states can reflect differences in industrial mix (e.g., large fluctuations in unemployment in states with more manufacturing), labor-force characteristics (e.g., states with older labor forces, slower labor-force growth and a higher proportion of male workers have higher unemployment fluctuations) and tax policy (e.g., high income-tax burdens are associated with higher unemployment fluctuations). State-level analysis also has the advantage that national fiscal and monetary policies are essentially the same across states.[3] Controlling for these two factors (national fiscal and monetary policies) allows us to isolate the contribution of intrinsic characteristics, such as industrial mix and the demographics of the labor pool.

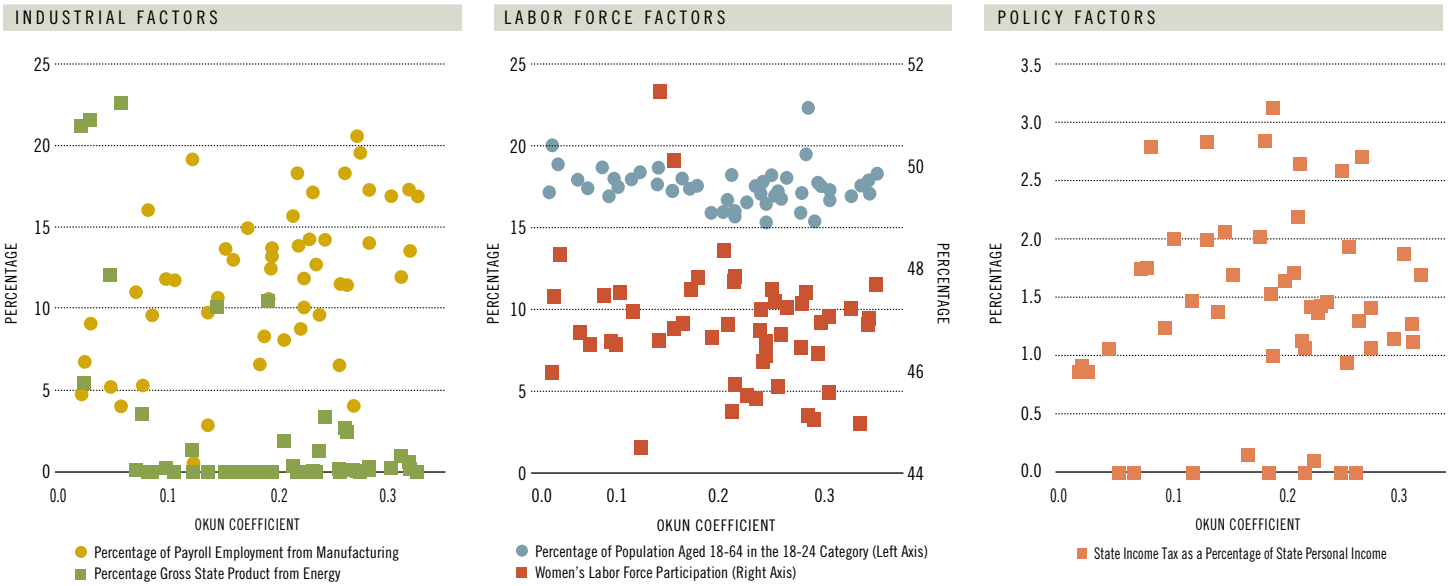
Two previous studies of Okun's law using regional data suggest that there may be differences in the regional estimates of the coefficient. One of these studies, by Blackley, estimated Okun's law for 26 states in the U.S. for the 1970-86 period. In this study, he found Okun's coefficients ranged from 0.15 (Louisiana) to 0.47 (Alabama). Blackley then took Okun's coefficients and examined whether there were underlying factors that could explain the differences across states. He found that the differences were related to three factors: the state's industrial mix, labor force and level of personal income tax. Specifically, he found that increases in the share of gross state product (GSP, the state-level equivalent of GDP) attributable to the manufacturing sector and increases in a state's personal tax rate would increase Okun's coefficient. Thus, the unemployment rate is more responsive to changes in output in states that have a higher percentage of income from manufacturing and that have high personal taxes. Blackley also found that states with younger residents and more women in the labor force had lower Okun's coefficients.

A similar study by Freeman in 2000 used annual data for the eight geographic regions defined by the Bureau of Economic Analysis for the 1977-1997 time period. Freeman found that the values of Okun's coefficient ranged from 0.18 to 0.36 for the regions, while the coefficient was approximately 0.19 for the nation. Thus, a 1-percentage-point increase in the growth rate of a region's GSP corresponded to an 0.18- to 0.36-percentage-point reduction in the region's unemployment rate, but a 1-percentage-point increase in the nation's GDP corresponded to only a 0.19 percentage-point reduction in the national unemployment rate. Unlike Blackley's, Freeman's analysis of the factors that could influence the variability in the regional estimates indicated that "there is no obvious pattern to interregional differences in the magnitude of the Okun coefficients." [4]

Blackley's study used only 26 of 50 states, and Freeman's study aggregated the states into regions, both of which limit the analyst's ability to determine whether state-level characteristics (demographics, state fiscal policy, etc.) might be correlated with the estimates of each state's Okun's coefficient. We estimated Okun's coefficients for all 50 U.S. states and the District of Columbia using annual data on state unemployment rates and the growth rate of GSP from 1976 to 2012. The accompanying map shows the variation in the estimates of Okun's

**FIGURE 3**

**Factors That Influence Okun's Coefficient**




SOURCES: Bureau of Economic Analysis and Bureau of Labor Statistics.

NOTES: The figure shows the relationship between various states' Okun's coefficients and industrial, labor force and policy-level factors. The left panel shows the relationship between Okun's coefficient and the percentage of payroll employment from manufacturing (circles) and the percentage of GSP from energy (squares). The middle panel shows the relationship between Okun's coefficient and the percentage of a state's working-age population under 25 (circles) on the left axis and the female labor force participation rate (squares) on the right axis. The right panel shows the relationship between a state's Okun's coefficient and its state income tax as a percentage of state personal income.

coefficients for the states. Each colored pattern represents a range of values for Okun's coefficients; these values range from 0.00 (indicating no correlation between state unemployment rates and GSP growth) up to 0.35 (indicating a relatively high correlation). Further, we estimated a national-level Okun's coefficient at 0.27.[5] As such, states with light-blue shading (and broken lines) had Okun's coefficients higher than the nation's, states with gray shading (and horizontal bars) had Okun's coefficients similar to the nation's and states with other patterns had Okun's coefficients lower than the nation's.

The largest values of the state-level Okun's coefficients were found for South Carolina and Illinois, at 0.33 and 0.32, respectively. The map indicates that these states, along with Alabama, California, Michigan, Ohio and Pennsylvania, had Okun's coefficients that were larger than that for the U.S. That means that in those states the unemployment rates were more highly correlated with the growth rates of their GSP. Perhaps surprisingly, all other states had unemployment rates less correlated with the growth rates of their GSP. Some states—for example, North Dakota (0.03), Louisiana (0.03) and Alaska (0.02)—appeared to have unemployment rates that were uncorrelated with the growth rate of GSP. These states are shown in a red checkered pattern. In these states, when the growth rate of GSP rose, the unemployment rate was just about as likely to rise as it was to fall.

Some of these states may have had relatively low correlation between output and unemployment because of large transitory fluctuations in either unemployment or output growth. For example, Louisiana may have had less correlation in its unemployment and output relationship because of the high incidences of natural disasters, such as hurricanes. Alaska, Louisiana and Wyoming had the highest percentage of their state income attributable to the energy sector. Large fluctuations in energy prices may have affected their income disproportionately, breaking the correlation between the unemployment rate and GSP.

Are there common factors that determine the magnitude of Okun's coefficients for different states? We did find some regional clustering in the size of the coefficient. For example, five of the seven states in the Federal Reserve's Eighth District (Arkansas, Illinois, Indiana, Kentucky, Mississippi, Missouri and Tennessee) appeared to have similar correlation between their unemployment rates and the growth rates of their GSP. Only Arkansas and Illinois had very different Okun's coefficients. However, many other states outside of the Eighth District also had similar correlations between their output growth rates and their unemployment rates. Thus, it was unlikely that geography alone was an important factor; it is more likely that it was a proxy for another characteristic, such as those discussed below.

We wanted to shed a little light on the factors that might lead to similarity in states' Okun's coefficients. We analyzed whether the size of the coefficient was related to industrial factors, labor market composition (demographics) and/or state policies. We considered two industrial factors: the percentage of a state's GSP attributable to the energy sector and the percentage of a state's employment attributable to manufacturing.[6] The two labor market composition factors were the proportion of the working-age population under age 25 and the female labor force participation rate.[7] The state policy variable was the state's personal income tax as a share of state personal income.[8]

Figure 3 shows the relationship between each state's Okun's coefficient on the x-axis

and the industrial-level (left panel), labor market (middle panel) or policy (right panel) characteristics on the y-axis. When looking at the percentage of payroll employment from manufacturing (yellow circles), however, there appears to be a slight positive relationship. When looking at the percentage of GSP from energy (green squares), there is no discernible relationship with Okun's coefficient. The points seem randomly scattered. The same can be said for the percentage of the working-age population in the 18-24-year-old category (blue circles), the percentage of women in the labor force (red squares) and the percentage of state personal income from state income taxes (orange squares).

When evaluating the industrial factors both alone and with the other variables, both are statistically important. We found that a 1-percentage-point increase in the percentage of GSP from energy decreases Okun's coefficient by 0.01. This decrease implies that changes in unemployment are less responsive to changes in output in energy-producing states. At the same time, we found that a 1-percentage-point increase in the percentage of payroll employment from manufacturing increases Okun's coefficient by 0.01. This increase implies that changes in unemployment are more responsive to changes in output in areas with more manufacturing workers.

A cursory examination of some of the possible causes of this variation showed that employment in manufacturing and output due to energy production are related to Okun's law, implying that Okun's coefficient may vary depending on a region's industrial composition.

The results of an evaluation of labor force and policy factors imply that the variability in the Okun's coefficients cannot be explained by the factors we chose to examine. The evidence on variation in the industrial composition variables is statistically relevant, but may be economically weak. Taken together, these results support Freeman, who claimed that there was no clear pattern between regions and their Okun's coefficients. We cannot, however, fully conclude that state-level variables do not influence how a state's unemployment rate corresponds to its output growth rate.

## Conclusion

It is important, at this point, to highlight a few caveats about Okun's law. First, while Okun's law does fit our *intuition* about economic relationships (labor markets are weaker when output is low, and vice versa), it should not necessarily be taken to be *causal*. That is, changes in the production of output appear to be, on average, related to contemporaneous changes in the unemployment rate; these changes in production do not, per se, cause changes in the unemployment rate.

Second, statistical estimates of the relationship involve defining both the natural rate of unemployment and the level of potential output. Because these values are not measured, only estimated, different studies may use alternative measures and find slightly different numerical results.

While Okun's law is often criticized for lacking a theoretical foundation, it does appear to be a robust empirical relationship that has endured over the past 50 years, including during the Great Recession. We found considerable variation in the law across states, suggesting that theories behind the relationship can be tested. A cursory examination of some of the possible causes of this variation showed that employment in manufacturing and output due to energy production are related to Okun's law, implying that Okun's coefficient may vary depending on a region's industrial composition. Ω

*Michael T. Owyang is an economist and E. Katarina Vermann is a senior research associate, both at the Federal Reserve Bank of St. Louis. For more on Owyang's work, see http://research.stlouisfed.org/econ/owyang/. Tatevik Sekhposyan is an economist at the Bank of Canada.*

ENDNOTES

1 While the relationship can be estimated in reverse to obtain how much output growth might change when observing a given change in the unemployment rate, economists Charles Plosser and G. William Schwert show in their 1979 paper that, for statistical reasons, one cannot simply use the inverse of Okun's coefficient.
2 See Freeman, p. 558.
3 Federal government spending and taxes may vary for states with different demographics. In addition, government purchases and federal government employment may vary by state.
4 See Freeman, p. 567.
5 This national estimate was based on a regression of differences in the national unemployment rate and the quarterly percent change in gross domestic product, rather than the quarterly percent change in the sum of gross state products.
6 Manufacturing is the industry thought to drive the business cycle. Thus, higher concentrations of manufacturing might lead to higher Okun coefficients. The energy sector is often counter cyclical (meaning that it sometimes booms when other sectors are contracting). So we might expect smaller coefficients for states with high energy concentration. The state's gross state product attributable to the energy sector is the average of the share of each state's gross state product attributable to oil and gas extraction from 1963 to 1996. The state's percentage of employment attributable to manufacturing is the average of the shares from 1990 to 2012.
7 The share of the working-age population under 25 is the average of the share of the 18-24 population in the 18-64 population averaged over the 1980-2012 period. The share of women in the labor force is the rate in 1999.
8 The value represents the average of the rates from 1948-2011.

REFERENCES

Ball, Laurence M.; Leigh, Daniel; and Loungani, Prakash. "Okun's Law: Fit and Fifty?" National Bureau of Economic Research Working Paper No. 18668, 2013.

Blackley, Paul R. "The Measurement and Determination of Okun's Law: Evidence from State Economies." *Journal of Macroeconomics,* 1991, Vol. 13, No. 4, pp. 641-56.

Freeman, Donald G. "Regional Tests of Okun's Law." *International Advances in Economic Research,* 2000, Vol. 6, No. 3, pp. 557-82.

Knotek II, Edward S. "How Useful Is Okun's Law?" Federal Reserve Bank of Kansas City *Economic Review,* 2008, Fourth Quarter, pp. 73-103.

Okun, Arthur M. "Potential GNP: Its Measurement and Significance." In *Proceedings of the Business and Economics Statistics Section.* Alexandria, Va.: American Statistical Association, 1962, pp. 98-103.

Owyang, Michael T.; and Sekhposyan, Tatevik. "Okun's Law over the Business Cycle: Was the Great Recession All That Different?" Federal Reserve Bank of St. Louis *Review,* September/October 2012, Vol. 94, No. 5, pp. 399-418.

Plosser, Charles I.; and Schwert, G. William. "Potential GNP: Its Measurement and Significance: A Dissenting Opinion." *Carnegie-Rochester Conference Series on Public Policy,* 1979, Vol. 10, No. 1, pp. 179-86.

# A Closer Look at the Decline in the Labor Force Participation Rate

*By Maria Canon, Peter Debbaut and Marianna Kudlyak*

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The aggregate labor force participation (LFP) rate measures the share of the civilian, noninstitutionalized population that is either employed or unemployed but looking for work. The LFP rate reached its peak of 67.1 percent in 2000 and has been declining ever since. Between the first quarter of 2008 and the first quarter of 2013, the LFP rate dropped from 65.6 percent to 63.2 percent. The decline accelerated during the Great Recession, raising the question: Does the low LFP rate in 2013 reflect negative cyclical influences, or does it reflect the trend of a long-run decline in the LFP?[1] The question is important: If a large portion of the workers who are currently out of the labor force is out because of cyclical influences, then the unemployment rate might not be fully capturing the slack in the labor market.

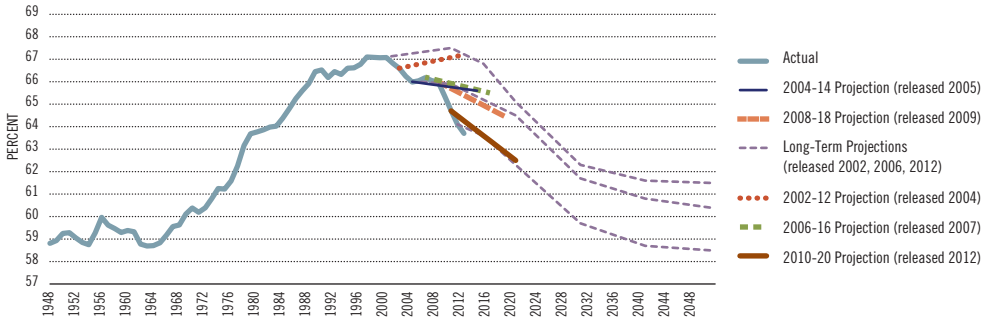
The Bureau of Labor Statistics (BLS) periodically releases its medium- and long-term projections of the labor force.[2] For this article, we reviewed the most recent BLS projections of the LFP rate and other BLS projections released since 2000. We learned that, since 2000, the BLS has been projecting a long-term decline in the aggregate LFP rate, with various possible magnitudes of the decline.

It is tempting to interpret the prerecession projections as reflecting the long-term trend in the LFP rate. However, we observed that the BLS' projections did not necessarily capture the long-term trend; rather, to a substantial degree, they were influenced by the most recent data points. Consequently, this cautions against treating the difference between the actual LFP rate in 2012 and its BLS projection released in 2007 as entirely due to the cyclical factors.

## Overview of the BLS Projections

The BLS periodically releases long-term (50-year) projections of the labor force, while it releases medium-term (10-year) projections every two years. The projections include the demographic composition of the population and the LFP rates of different demographic groups, among other statistics. The figure shows the actual annual aggregate LFP rate from 1948 to 2012, and the medium- and long-term BLS projections after 2000.

**Labor Force Participation Rates: 1948–2050**




NOTE: The actual aggregate LFP rate is the annual LFP rate for the period 1948-2012.
SOURCES: Actual LFP rate data from the Bureau of Labor Statistics/Haver Analytics; BLS projections data are from Table 3 in Toossi, 2002; Toossi, 2004; Toossi, 2005; Toossi, 2006; Toossi, 2007; Toossi, 2009; Toossi, 2012a; and from Toossi, 2012b.

The long-term projections provide projections at 10-year intervals until 2050. As can be seen from the figure, all three long-term projections—those released in 2002, 2006 and 2012—show an eventual decline in the aggregate LFP rate. For 2030, all three projections show low aggregate LFP rates, at 62.3, 61.7 and 59.7 percent, respectively. The 2012 projection continues to decline and the LFP rate is projected to reach 58.5 percent in 2050, an LFP rate lower than what it was in the early 1960s, when the rate began its steady increase.

The BLS lists the following factors as primary drivers of the decline in the LFP rate since 2000: (1) the aging of the baby boomer cohort; (2) the decline in the participation rate of those 16-24 years old; (3) the declining LFP rate of women (since its peak in 1999), and (4) the continuous decline of the LFP rate of men (since the 1940s). The main factors that keep the aggregate LFP rate from falling further are the increase of the LFP rate of those 55 and older and the strong attachment to the labor force of Hispanic and Asian people, who constitute the main share of the immigrant population.

The most recent medium-term projections (brown line in figure) were released in January 2012 for 2010-2020.[3] The BLS projected that the aggregate LFP rate would be 62.5 percent in 2020. This represents a 2.2-percentage-point decline from the LFP rate in 2010. The BLS projection of the 10-year change in the LFP rate between 2010 and 2020 is almost equal to the change during the previous decade, when the LFP rate declined by 2.4 percentage points (from 67.1 percent in 2000 to 64.7 percent in 2010).

The BLS-projected change in the aggregate LFP rate between 2010 and 2020 can be broken into two components: (1) the change in the age composition of the population, and (2) the change in the LFP rates of different age groups. We found that the change in the

age composition of the population accounted for most (2.18 out of 2.20 percentage points) of the decline in the aggregate LFP rate over the period. Specifically, this 2.18-percentage-point contribution to the LFP rate decline was mostly driven by a 3-percentage-point decrease in the population share of those 45-54 years old. In contrast to the 2.18-percentage-point decline in the LFP rate that resulted from changes in the age composition of the population, the change in the aggregate LFP rate due to the changes in the LFP rates of different age groups is almost zero on net. It is important to note that this value is the result of dissimilar dynamics of individual groups rather than consistent behavior of the population. For example, the largest contributions to the increase in the aggregate LFP rate are posted by those 55-64 years old (0.63 percentage points) and 65-74 years old (0.65 percentage points). Yet the increases in the LFP rates of these older workers are almost completely nullified by the decreases in the LFP rates of those 16-19 years old (–0.55 percentage points) and 20-24 years old (–0.44 percentage points).

### Differences between the 2008-2018 and 2010-2020 Medium-Term Projections

As can be seen in the figure, the medium-term projection released in 2012 for the 2010-2020 change in the aggregate LFP rate represents almost a downward shift of the earlier medium-term projection, released in 2009 for the 2008-2018 change. While the actual LFP rate declined by 1.3 percentage points between 2008 and 2010, the difference between the medium-term LFP rate projections for 2018 from the two forecasts is 1.56 percentage points.[4] A closer examination of the differences between the two projections reveals that the 2010-2020 projection shows lower LFP rates for *all* age groups. The most significant difference between the two projections is recorded for young groups. In particular, the differences in the projected LFP rates for 2018 from the two projections for 16-19, 20-24 and 25-34-year-olds are –5.62, –4.3 and –1.48 percentage points, respectively.[5] These groups also experienced the largest decline in their actual LFP rates between 2008 and 2010.

What factors caused the change in the BLS medium-term projections from 2008 to 2010? The BLS states, "The standard BLS labor force projection model is based on an extrapolation of past participation rates after a process of numerical smoothing and filtering. Such a model incorporates demographic factors, but does not directly take into account the behavioral aspects, economic factors, structural changes, and dynamic conditions of the labor market."[6] Thus, as the BLS model is an extrapolation-based model, it appears that the sharp decline in the actual LFP rate between 2008 and 2010 contributed to the downward shift of the BLS medium-term projections released after 2010.

One approach to determining the trend versus cyclical component in the current LFP rate is to treat the projections released prior to the Great Recession as a measure of the trend. (See, for example, Erceg and Levin.) It is inaccurate, however, to attribute the difference between the actual LFP rate and the projection as entirely due to the cyclical factors. Namely, the BLS' methodology may have resulted in the prerecession period's relatively high LFP rate influencing the 2007 projections to a substantial degree, while economic factors and dynamics of the labor market were not directly taken into account.

### Conclusion

The BLS projections show the LFP rate continuing its decline, reaching 62.5 percent in 2020 (using the 2010-2020 medium-term projection). Since 2000, the BLS has projected the long-term decline in the LFP rate, indicating that the high LFP rate that we saw in 2000 might be a figure of the past. In particular, the decline in women's LFP since 1999 is not expected to reverse. The BLS does not expect the large decline in the LFP rates for the youngest group, 16-24-year-olds, to reverse either. To the extent that the decline for the youngest group is due to the time spent at school, it is possible that these workers will show a higher labor force attachment once they are out of school. Ω

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ENDNOTES

1 The studies on this question include those by Hotchkiss and Rios-Avila; Bengali, Daly and Valletta; and Erceg and Levin, among others.
2 Every two years, the Bureau of Labor Statistics produces medium-term, or 10-year, labor force projections. Every several years, longer-term projections of the labor force are carried out to elicit possible future paths of labor force growth during the following 50 years.
3 See Toossi, 2012a.
4 We use a linear interpolation to obtain the projected LFP rate for 2018 from the 2010-2020 projections.
5 See also Daly, Elias, Hobijn and Jordà.
6 See Toossi, 2011, p. 27.

REFERENCES

Cochrane, John. "Job Market Doldrums." June 13, 2013. See http://johnhcochrane.blogspot.com/2013/06/job-market-doldrums.html#more.

Bengali, Leila; Daly, Mary; and Valletta, Rob. "Will Labor Force Participation Bounce Back?" Federal Reserve Bank of San Francisco *Economic Letter,* May 2013, No. 14. See www.frbsf.org/economic-research/publications/economic-letter/2013/may/will-labor-force-participation-bounce-back.

Daly, Mary; Elias, Early; Hobijn, Bart; and Jordà, Òscar. "Will the Jobless Rate Drop Take a Break?" Federal Reserve Bank of San Francisco *Economic Letter,* December 2012, No. 37. See www.frbsf.org/economic-research/publications/economic-letter/2012/december/jobless-rate-drop.

Erceg, Christopher J.; and Levin, Andrew T. "Labor Force Participation and Monetary Policy in the Wake of the Great Recession." Federal Reserve Board, April 2013. Unpublished manuscript. See www.bos.frb.org/employment2013/papers/Erceg_Levin_Session1.pdf.

Hotchkiss, Julie L.; and Rios-Avila, Fernando. "Identifying Factors behind the Decline in the Labor Force Participation Rate." *Business and Economic Research,* Macrothink Institute, 2013, Vol. 3, No. 1. See www.macrothink.org/journal/index.php/ber/article/download/3370/2921.

Toossi, Mitra. "A Century of Change: the U.S. Labor Force, 1950-2050." *Monthly Labor Review,* Bureau of Labor Statistics, May 2002, pp. 15-28.

Toossi, Mitra. "Labor Force Projections to 2012: the Graying of the U.S. Workforce." *Monthly Labor Review,* Bureau of Labor Statistics, February 2004, pp. 37-57.

Toossi, Mitra. "Labor Force Projections to 2014: Retiring Boomers." *Monthly Labor Review,* Bureau of Labor Statistics, November 2005, pp. 25-44.

Toossi, Mitra. "A New Look at Long-term Labor Force Projections to 2050." *Monthly Labor Review,* Bureau of Labor Statistics, November 2006, pp. 19-39.

Toossi, Mitra. "Labor Force Projections to 2016: More Workers in Their Golden Years." *Monthly Labor Review,* Bureau of Labor Statistics, November 2007, pp. 33-52.

Toossi, Mitra. "Labor Force Projections to 2018: Older Workers Staying More Active." *Monthly Labor Review,* Bureau of Labor Statistics, November 2009, pp. 30-51.

Toossi, Mitra. "A Behavioral Model for Projecting the Labor Force Participation Rate." *Monthly Labor Review,* Bureau of Labor Statistics, May 2011, pp. 25-42.

Toossi, Mitra. "Labor Force Projections to 2020: a More Slowly Growing Workforce." *Monthly Labor Review,* Bureau of Labor Statistics, January 2012a, pp. 43-64.

Toossi, Mitra. "Projections of the Labor Force to 2050: a Visual Essay." *Monthly Labor Review,* Bureau of Labor Statistics, October 2012b, pp. 3-16.

# Why Was the Decline in U.S. Trade Larger This Time? A Global View

*By B. Ravikumar, Lin Shao and Michael Sposi*

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The Great Recession of 2007-09 was characterized in part by a major collapse in international trade. The magnitude of the collapse in U.S. trade was substantially larger than in previous recessions.[1] Chart 1 displays the percent change in total U.S. trade (exports + imports) beginning from the peak before each of the two most recent recessions.

The 2001 recession led to an 8 percent drop in U.S. trade two quarters following the previous business cycle peak, and five quarters passed before the volume of trade returned to the prerecession levels. On the other hand, the 2007-09 recession led to a decrease in trade of more than 25 percent four quarters following the previous business cycle peak, and 11 quarters passed before trade returned to its prerecession levels.

As is well-known, overall economic activity slowed down much more in the latest recession than in the 2001 recession; so one might expect a bigger drop in trade in the 2007-09 recession relative to the 2001 recession. However, the decline in U.S. trade relative to U.S. gross domestic product (GDP) was disproportionately larger in the latest recession.

During the 2001 recession, trade relative to GDP bottomed out at about 9 percent below the prerecession level. During the latest recession, the trade-to-GDP ratio bottomed out at about 24 percent below the prerecession level. Thus, even after accounting for the bigger drop in total real GDP in the 2007-09 recession, the decline in trade was almost three times as large as that in the 2001 recession.

To understand the pattern of trade relative to GDP, it would be useful to start with a theory of international trade. Almost two centuries ago, British economist David Ricardo suggested comparative advantage as the basis of international trade.[2] He envisioned that countries would specialize in the production of final goods and then engage in trade. That is, one country might produce cloth from start to finish, and another might do the same with wine. Modern trade involves multiple stages of production in which various countries specialize in intermediate inputs at different stages of the production process. For instance, consider the production of an iPhone. A study in 2010 by Yuqing Xing and Neal Detert, researchers at the Asian Development Bank Institute, discusses various components and source countries of those components that go into producing an iPhone.[3] While it is well-known that the iPhone is assembled in China, what may be less well-known is that almost all of the intermediate inputs are produced elsewhere. The flash memory and touch screen are produced in Japan, the application processor and RAM memory are produced in Korea, the camera module and baseband are produced in Germany, and so on. China's role in the production of the iPhone is primarily importing and assembling these intermediate inputs into a final product.

Modern trade resulting from such global supply chains is, thus, determined by economic activity around the world. Put differently, the effect on U.S. trade depends not only on the economic activity in the U.S. but also on the economic activity of its trading partners. The table provides a list of the top 10 U.S. trading partners, both by imports and exports, for the years 2000 and 2008, along with their corresponding shares in U.S. trade.[4]

The top 10 origins for U.S. imports in 2000 accounted for more than 66 percent of total U.S. imports; the top 10 origins in 2008 accounted for 64 percent. The top 10 destinations for U.S. exports in 2000 accounted for about 66 percent of total U.S. exports; the top 10 destinations in 2008 accounted for almost 60 percent.

Charts 2 and 3 illustrate the economic activity of the top 10 trading partners in the 2001 and the 2007-09 recessions.[5]

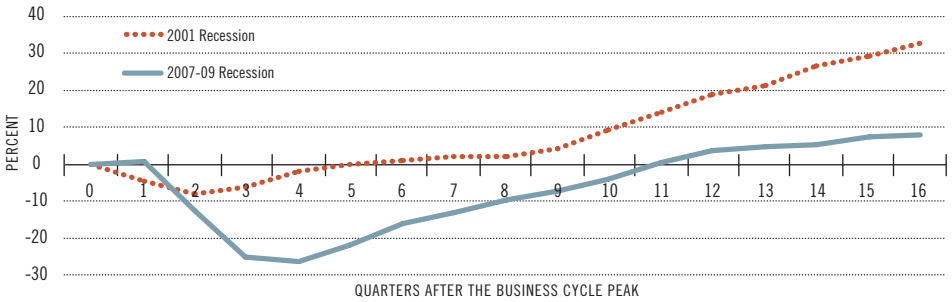
During the 2001 recession, only four of the top 10 U.S. trading partners were also in recession. The average decline in real GDP for these economies was about 1.5 percent relative to prerecession peaks. In contrast, during the 2007-09 recession, seven of the

**Top 10 Origins for U.S. Imports and Top 10 Destinations for U.S. Exports in 2000 and 2008**

| ORIGINS FOR U.S. IMPORTS | | | | DESTINATIONS FOR U.S. EXPORTS | | | |
|---|---|---|---|---|---|---|---|
| 2000 | Share (%) | 2008 | Share (%) | 2000 | Share (%) | 2008 | Share (%) |
| Canada | 17.5 | Canada | 14.7 | Canada | 17.3 | Canada | 15.0 |
| Japan | 10.9 | China | 14.5 | Mexico | 13.4 | Mexico | 9.7 |
| Mexico | 9.7 | Mexico | 8.7 | Japan | 9.0 | Japan | 6.6 |
| China | 6.1 | Japan | 6.3 | United Kingdom | 6.5 | China | 6.1 |
| Germany | 4.9 | Germany | 5.4 | Germany | 5.2 | United Kingdom | 5.4 |
| United Kingdom | 4.8 | United Kingdom | 4.7 | France | 3.6 | Germany | 5.3 |
| Korea | 3.5 | France | 2.6 | Korea | 3.6 | France | 3.2 |
| Taiwan | 3.2 | Korea | 2.5 | Taiwan | 2.9 | Korea | 3.1 |
| France | 3.2 | Saudi Arabia | 2.4 | China | 2.4 | Ireland | 2.5 |
| Italy | 2.6 | Italy | 2.2 | Italy | 2.2 | Brazil | 2.3 |

SOURCES: Organization for Economic Cooperation and Development (OECD); World Trade Organization (WTO) Trade in Value Added Database.
NOTES: Bilateral trade figures are the gross trade flows between countries. Each column is sorted from largest to smallest according to trade with the U.S. for that year.

**CHART 1**
**Percent Change in Total U.S. Trade from Business Cycle Peak**




SOURCES: OECD Quarterly National Accounts; authors' calculations. NOTES: Trade is computed as total U.S. imports plus total U.S. exports.

top 10 origins for U.S. imports were in recession, while eight of the top 10 export destinations were in recession. Real GDP in these countries declined, on average, 7.3 percent relative to prerecession peaks. Thus, the 2007-09 recession occurred "more globally" from the U.S. perspective than did the 2001 recession; the impact was significantly deeper in the trading partners of the U.S. in 2007-09 than in 2001.

Since the major trading partners of the U.S. were in a recession at the same time as the U.S. in 2007-09, foreign demand for U.S.-produced goods declined, which hurt U.S. exports. Similarly, since production fell in the major economies from which the U.S. imports, total U.S. imports declined. In contrast, in the recession of 2001 only a few of the major trading partners were simultaneously in recession, and the magnitude of the recession in those countries was substantially less severe than in 2007-09. Consequently, the effect on U.S. trade was less severe in 2001.

The magnitude of the collapse in U.S. trade in the latest recession was not merely due to the severity of the U.S. recession. Instead, two forces magnified the trade collapse. First, most of the major trading partners of the U.S. were simultaneously in recession, something that didn't occur in previous downturns. Second, countries are more linked via the global supply chain now than they were in previous recessions. Ω

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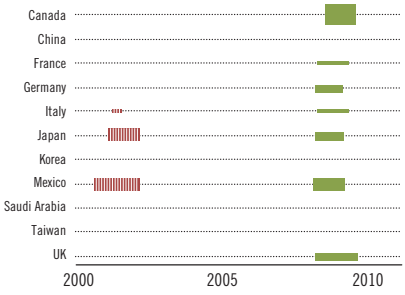
**CHART 2**
**Indicator for 2001 and 2007-09 Recessions for the Top 10 Origins for U.S. Imports**




SOURCE: OECD Quarterly National Accounts.
NOTES: A country is identified as in recession if it experiences two consecutive quarters of negative growth in total real GDP. The colored bars represent the recession periods. Red bars (with hashmarks) are approximately within the same period as the U.S. 2001 recession, and similarly the green bars correspond to the U.S. 2007-09 recession. The vertical thickness of each bar corresponds to that country's relative share of U.S. **imports**, while the horizontal length of the bar corresponds to the duration of that country's recession.

**CHART 3**
**Indicator for 2001 and 2007-09 Recessions for the Top 10 Destinations for U.S. Exports**


SOURCE: OECD Quarterly National Accounts.
NOTES: A country is identified as in recession if it experiences two consecutive quarters of negative growth in total real GDP. The colored bars represent the recession periods. Red bars (with hashmarks) are approximately within the same period as the U.S. 2001 recession, and similarly the green bars correspond to the U.S. 2007-09 recession. The vertical thickness of each bar corresponds to that country's relative share of U.S. **exports**, while the horizontal length of the bar corresponds to the duration of that country's recession.

## ENDNOTES

1 See *The Economist*.
2 See Ricardo.
3 See Xing and Detert.
4 Due to data limitation, we report only the trade shares of the top 10 trade partners of the U.S. for the years 2000 and 2008. Although the overall trade volume varies year by year, the trade shares of the top 10 trade partners are relatively stable over time. Furthermore, the trade shares do not seem to change during the recessions. For example, the trade shares of the top 10 trade partners in 2005 (prerecession) are almost identical to the ones in 2008 (in the middle of the recession).
5 A country is a top 10 trade partner of the U.S. in a year if it is either among the top 10 origins of U.S. imports or among the top 10 destinations of U.S. exports in that year.

## REFERENCES

Ricardo, David. "On the Principles of Political Economy and Taxation." London: John Murray, first edition, 1817.

*The Economist*. "The Nuts and Bolts Come Apart." March 26, 2009. See www.economist.com/node/13362027.

Xing, Yuqing; and Detert, Neal. "How the iPhone Widens the United States Trade Deficit with the People's Republic of China." Asian Development Bank Institute Working Paper Series, No. 257, December 2010.

# Higher Taxes for Top Earners: Can They Really Increase Revenue?

*By Alejandro Badel*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Are top-income households paying enough taxes?

Increasing top income-tax rates in the U.S. would result in larger government revenue, according to a 2011 academic study by Peter Diamond, winner of the Nobel Prize for economics in 2010, and by Emmanuel Saez, winner of the John Bates Clark Medal in 2009.[1] Their study argues that households in the top 1 percent of income distribution should pay a marginal tax rate in the range of 54-80 percent. Such a rate would be substantially higher than the current one, which is approximately 42.5 percent.[2]

The Diamond-Saez proposal has fueled a debate in the blogosphere, in academic circles and in Washington, D.C. One of the reasons is that top income-tax rates of this magnitude can be popular among many voters and, therefore, could become a reality in the future. Recently in France, presidential candidate Francois Hollande promised a 75 percent top income-tax rate during his campaign in order to attract left-wing voters and, according to *The Economist,* made this tax rate a centerpiece of his budget program.[3] Perhaps aided by this promise, Hollande became the first left-wing president of France since Francois Mitterrand (who served from 1981 to 1995). However, the top-tax reform was ultimately rejected by the French parliament near the end of last year.

In spite of all the discussion, few people understand the calculations behind the Diamond-Saez recommendation. This article provides a quick introduction to their calculations and concludes with a brief description of some factors that may be important for discussing their recommendation.

## The Facts behind the Calculations

First, in the U.S., a household is in the top 1 percent of the income distribution if its income is, roughly, above $400,000 per year. That means that the proposed top marginal income-tax rate would apply only to income accrued beyond $400,000. Income up to that level would be taxed at rates for lower income levels.

Second, the average household in the top 1 percent of the income distribution makes approximately $1.3 million per year. This means that on a per household basis, $900,000 (that is, $1.3 million minus $400,000) of the income would be subject to the proposed top marginal income tax.

Third, the net-of-tax rate is defined as the percentage of income earned beyond $400,000 that the household can keep after taxes. If the top income-tax rate is 42 percent, the net-of-tax rate would simply be 58 percent (that is, 100 minus 42 percent). Researchers estimate that when the net-of-tax rate falls by 1 percent, top-income households react by reducing their reported income by a fraction $e$, where $e$ is between 0.17 and 0.57 (that is, between 17 and 57 percent).

These estimates are based on information collected over a few years after a tax reform. Unfortunately, there is no direct evidence of what happens with reported incomes over a longer time horizon.

The reaction of reported income to higher taxes is called the "short-run behavioral response" of the household, and it occurs partly because higher taxes lead high-income persons to work fewer hours per year. Technically, $e$ is called the elasticity of reported income with respect to the net-of-tax rate.

With these facts in hand, suppose that the government is considering increasing the top income-tax rate from its current level, say, by 1 percentage point. Diamond and Saez take into account two effects of this increase on government tax revenue. The first effect increases revenue, and the second decreases revenue.

First, tax revenue is going to increase because top-income households are taxed more heavily. Keeping everything else constant, the increase in the revenue extracted from each top-income household would be exactly equal to 1 percent of $900,000, that is, $9,000 per household.

Second, Diamond and Saez consider the short-run behavioral response. As the tax rate is increased by 1 percentage point, the net-of-tax rate decreases by a certain percentage, and households react to this by decreasing their income. This reduction causes a fall in government revenue simply because less than $900,000 would be effectively taxed per household. This reduction is known as the "deadweight loss" from taxation. Diamond and Saez use the estimated behavioral responses that we cite above in order to calculate the magnitude of the reduction in income by top-income households when tax rates go up.

Whether increasing taxes would lead to more revenue will depend on which of the two effects is stronger. If the first effect is stronger, the government can increase revenue by increasing taxes. If the deadweight loss is stronger, then the government could raise more revenue by decreasing taxes. Intuitively, the first effect is stronger when the tax rate is low, while at high tax rates the behavioral response dominates.[4] Therefore, government revenue would increase at low

tax rates and decrease at high tax rates. This leads to a bell-shaped plot known as the Laffer Curve, which relates tax rates to government revenue. A formula for the Laffer Curve considered by Diamond and Saez is given in the box below.

Panels A and B plot the income of the average top-income household and the Laffer Curve considered by Diamond and Saez for two values of $e$.[5] The blue dotted line in each panel of the figure shows how the income of the average top-income household falls as the tax rate increases. Panel A has a lower value of $e$, which implies that the behavioral response is smaller; so, income falls more slowly than in Panel B, where the value of $e$ is higher. The red solid line shows the Laffer Curve, which simply plots revenue ($R$, from the formula in the box) as a function of the tax rate ($t$ in the box). As expected, tax revenue increases when the tax rate is low and decreases when the tax rate is high.

### Laffer Curve Formula

Given the view about the short-run behavioral response cited above, government revenue per top-income household follows the following formula:

$$R = [y_{taxfree}(1-t)^e - y_{top}]t$$

Where $R$ is government revenue, $y_{taxfree}$ is the income that the average top-income household would earn if the top income-tax rate was zero, $t$ is the top income-tax rate, $e$ is the elasticity that measures the behavioral response and $y_{top}$ is the minimum income needed to be part of the top 1 percent. The first term in the brackets ($y_{taxfree}(1-t)^e$) is the income of the average top-income household, while the full term in brackets is the income that is subject to the top income-tax rate.

Visually, the reader can verify that with a behavioral response of $e$=0.17, the top of the Laffer Curve is reached when the top-income tax is about 80 percent. With a behavioral response of $e$=0.57 instead of $e$=0.17, meaning that the household reduces its reported income more dramatically when taxes go up, the tax rate that maximizes government revenue is about 55 percent.

In summary, we have explained how Diamond and Saez make their case for higher top-income tax rates in the U.S. Using current tax rates, facts about U.S. income distribution and estimates of the response of households to tax changes, Diamond and Saez have produced an argument in favor of the idea that the revenue-increasing effect of increasing the top income-tax rate is greater than the associated deadweight loss. Given the clarity of their argument, their calculation can be used as a starting point for asking crucial questions about tax policy in the U.S. For example:

(i) The behavioral response used by Diamond and Saez is measured only over a few years after a tax reform. Can the behavioral response be larger over longer periods of time? This can happen, for example, if bright young people reduce their schooling today anticipating that they will be heavily taxed if they become top-income earners tomorrow.

(ii) Diamond and Saez assume that the number of households with income above $400,000 per year remains fixed after the tax reform. How many households would drop out of the top-income bracket (either through migrating to another country or simply by making less than $400,000) in response to the reform?

(iii) In the Diamond-Saez calculation, only households in the top 1 percent are affected by the reform. Are there households outside of the top 1 percent indirectly affected by the reform? One case in which this happens is when high-income persons have positive externalities on the rest of society. For example, consider the way in which the invention of smartphones has created new markets for software applications and music files. These ideas may have been lost if these inventors had been discouraged by very high tax rates on those making top incomes. Ω

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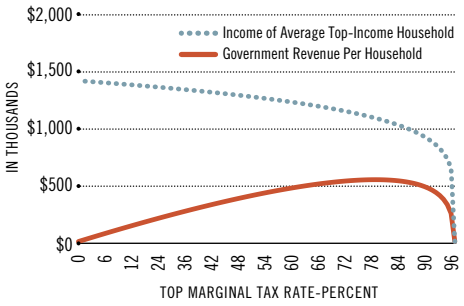
*Brian P. Greaney, a research associate at the Bank, provided assistance.*

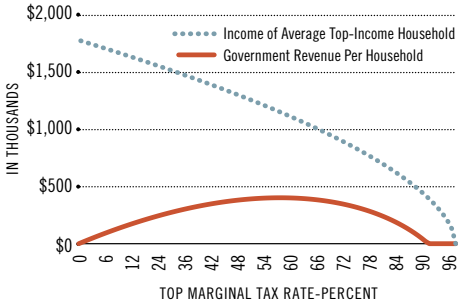
**PANEL A**

**Income and Laffer Curve with $e$=0.17**




**PANEL B**

**Income and Laffer Curve with $e$=0.57**




SOURCES: Author's calculations.

NOTES: The blue dotted line in each panel of the figure shows how the income of the average top-income household falls as the tax rate increases. In both figures, the income has been set to be $1.3 million when the tax rate is at 42.5 percent, which is the top tax rate now in the U.S. If the tax rate rises to, say, 80 percent, income in Panel A falls to approximately $1.2 million, while in Panel B it falls to about $700,000. The larger fall in Panel B reflects the fact that the behavioral response has been set higher (57 percent) in Panel B than in Panel A (17 percent). The solid line in each panel shows how government revenue per top-income household changes as the tax rate changes. This line is, thus, the Laffer Curve for top incomes. Again, at the U.S. tax rate of 42.5 percent, revenue is the same in both panels at approximately $380,000. (This follows because at that tax rate, taxable income and tax rates are the same across the two panels.)

## ENDNOTES

1 See Diamond and Saez.

2 Diamond and Saez show that if one combines federal and state income taxes, along with other taxes (such as Medicare and sales taxes), the marginal tax rate currently paid by a top-income household in the U.S. is approximately 42.5 percent.

3 See Yaitsky.

4 Clearly, if the tax rate is 0 percent, the government will raise more revenue by increasing the tax rate. Also, if the tax rate is 100 percent, no one would work; so, revenue would be zero, and the government would raise more revenue by reducing the tax rate. Therefore, the revenue-maximizing tax rate should be somewhere between 0 and 100 percent.

5 In each of the plots, we pick the value of $y_{taxfree}$ so that the income of the average top-income households is $1.3 million when the top-income tax rate is 42.5 percent, as it is in the United States. We also fix the value of $y_{top}$=$400,000, as in the United States.

## REFERENCES

Diamond, Peter; and Saez, Emmanuel. "The Case for a Progressive Tax: From Basic Research to Policy Recommendations." *Journal of Economic Perspectives,* Vol. 25, No. 4, Fall 2011, pp. 165-190.

Yaitsky, Eduard. "French Taxation: À Bas les Riches!" *The Economist,* Jan. 5, 2013.

METRO PROFILE

# Transportation and Health Care Are Pockets of Strength in Memphis' Slow Recovery

*By James D. Eubanks and Charles S. Gascon*

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The Memphis metropolitan statistical area (MSA), which includes parts of Tennessee, Mississippi and Arkansas, is the second largest MSA in both Tennessee and the Federal Reserve's Eighth District. As of July 2013, the Memphis MSA had a population of 1,341,690 and a labor force of 623,277. In 2011, the most recent year for which data are available, per capita personal income was $38,622, roughly 6.5 percent less than the national average.

Since the early 19th century, Memphis has served as an important transportation and distribution center. Memphis' safe location, high on the bluffs above the flood-prone Mississippi River, made the city a natural center for storing and shipping agricultural commodities, as well as a logical terminal for roads and railways. By the early 20th century, Memphis had grown into a leading world market for several commodities, including cotton and hardwood lumber. Today, the city is a vital logistics and distribution hub and a center for cutting-edge medical research and treatment.

However, Memphis may be best-known for its cultural exports that developed from the fusion of diverse musical traditions into new, distinct styles. Memphis, "home of the blues and birthplace of rock 'n' roll," produced American music icons such as B.B. King, Elvis Presley, Jerry Lee Lewis and Johnny Cash.

The Memphis metro population has grown at a moderate pace for several decades, although the distribution of population within the MSA has changed. Between 2002 and 2012, Memphis' population grew 8.7 percent, slower than both Tennessee's growth (11.4 percent) and the nation's (9.1 percent). While the population is heavily concentrated in Shelby County, Tenn., the past decade has seen rapid growth in outlying counties. DeSoto County, Miss., the second-largest county in the MSA, grew 40 percent—10 times Shelby County's rate. Two other counties bordering Shelby County are also responsible for much of the growth in the MSA during the same period: Fayette County and Tipton County, both in Tennessee, grew 24.6 and 16.3 percent, respectively.

## Economic Drivers

Three Fortune 500 companies have headquarters in Memphis: FedEx, International Paper and AutoZone. Delivery services giant FedEx, with 31,000 local employees and $42.7 billion in revenue, is the largest employer in the area. International Paper, the world's largest paper- and forest-products company, employs 2,200 in Memphis. AutoZone, a retailer and distributor of auto parts and accessories, employs 1,300 locally.

Distribution is vital to Memphis. The city relies more heavily on the transportation and utilities industries than most other cities do. The 31,000 employees at FedEx, as well as the 33,000 other local employees in the transportation and utilities industry, make up 10.7 percent of employment in Memphis, compared with just 2.5 percent nationally. The city is also an important link in the national and international distribution network. Memphis International Airport is the largest cargo airport by volume in the U.S. and the second-largest in the world,[1] while the Port of Memphis is among the

busiest river ports in the country.[2]

The education and health-services industry provides another significant source of economic activity in the city. Methodist Le Bonheur Healthcare and Baptist Memorial Health Care Corp. are among the top local employers, with 9,250 and 7,286 area employees, respectively. Nationally recognized St. Jude Children's Research Hospital has 3,471 local employees. The significant health-services presence in the city, along with the local school districts and the University of Memphis, has made the education and health-services industry the second-largest by employment in the MSA, at 14.5 percent.

### Current Conditions

While some areas—such as education, health, and professional and business services—have displayed strong growth in recent years, others have experienced weak growth or decline. Memphis has lagged behind much of the nation in the economic recovery. From the second quarter of 2012 to the second quarter of 2013, nonfarm payrolls in Memphis grew 0.9 percent, compared with 1.6 percent nationally. The unemployment rate in Memphis has consistently hovered above the national rate for the past decade, despite slower labor force growth in Memphis than in the U.S. overall. As of July 2013, unemployment stood at 9.4 percent in Memphis.

The slow recovery of housing has been a drag on the local economy. After years of flat or declining growth, housing prices, as measured by the Federal Housing Finance Agency, rose 1.4 percent in the second quarter of 2013 from one year earlier, compared with an increase of 4.0 percent nationally.

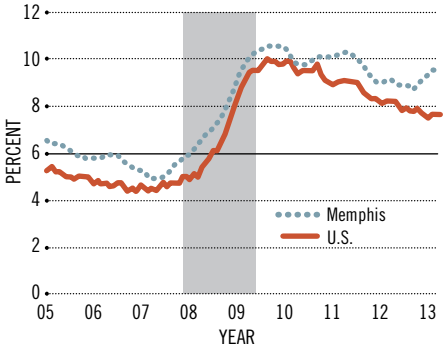
A large stock of foreclosed homes continues to weigh down the Memphis housing market. In June, 10.3 homes per 10,000 were foreclosed locally, compared with 5.0 per 10,000 in the nation as a whole. In Memphis, 31.0 percent of single-family homes had mortgages in negative equity during the second quarter of 2013, compared with 23.8 percent nationally. The slow recovery in housing prices, combined with the large fraction of homes in negative equity, has suppressed local consumer demand and will likely continue to hamper Memphis' economic performance.

The struggle of the trade, transportation and utilities industries to recover from damage inflicted during the recession has also contributed to Memphis' anemic growth. Retail trade makes up 39 percent of the sector, while wholesale trade and transportation/utilities make up 21 percent and 40 percent, respectively.

Employment in retail trade has been responsible for much of the slow growth. Retail-trade employment has shown negative year-over-year growth rates for much of the past five years, even as employment in this sector has increased nationwide. Growth rates in wholesale trade employment have been largely in line with national growth rates, while transportation and utilities employment in Memphis grew more than twice as fast as in the nation as a whole for

FIGURE 1

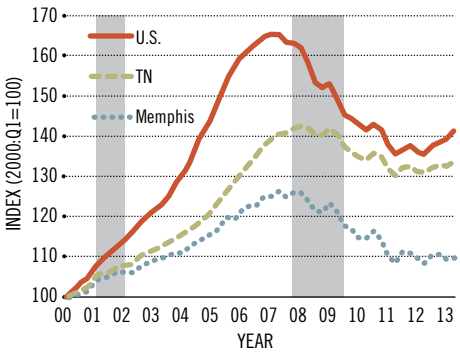
**Unemployment Rate**




NOTE: Shaded areas indicate U.S. recessions. Data are from the Bureau of Labor Statistics and are easily accessible in the St. Louis Fed's economic database, FRED, using these series IDs: Memphis (MPHUR) and U.S. (UNRATE).

FIGURE 2

**FHFA Housing Price Index**



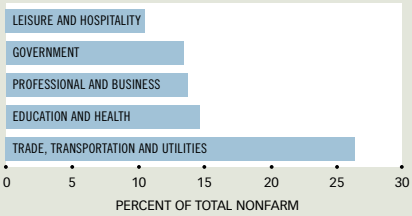

NOTE: Shaded areas indicate U.S. recessions. Data are from the Federal Housing Finance Agency and are easily accessible in the St. Louis Fed's economic database, FRED, using these series IDs: Memphis (ATNHPIUS32820Q), TN (TNSTHPI) and US (USSTHPI).

## MSA Snapshot

**Memphis, Tenn.-Miss.-Ark.**

| | |
|---|---|
| Population | 1,341,690 |
| Labor Force | 623,277 |
| Unemployment Rate | 9.4% |
| Personal Income (per capita) | $38,622 |

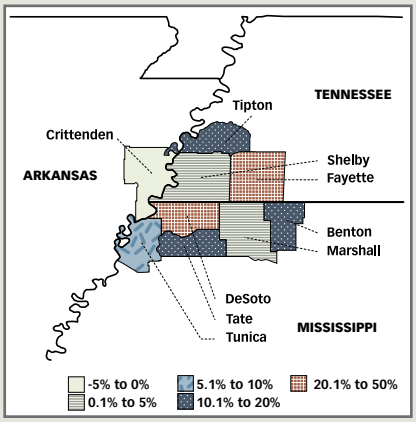
**LARGEST SECTORS BY EMPLOYMENT**




**LARGEST LOCAL EMPLOYERS**

1. FedEx
2. Shelby County Schools
3. U.S. Government
4. Tennessee Government
5. Methodist Le Bonheur Healthcare

**POPULATION GROWTH BY COUNTY 2002-12**



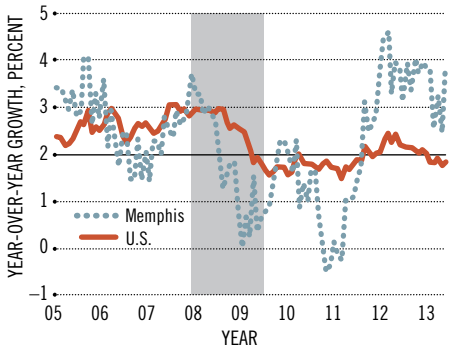

NOTES: Population and employment are from the Census Bureau and Bureau of Labor Statistics and are easily accessible in the St. Louis Fed's economic database, FRED (Federal Reserve Economic Data). For the first two panels and map, see these FRED series (IDs in parentheses): Population (MPHPOP); Labor Force (MPHLF); Unemployment Rate (MPHUR); Personal Income (MPHPCPI); Leisure and Hospitality (MPHLEIH); Government (MPHGOVT); Professional and Business (MPHPBSV); Education and Health (MPHEDUH); and Trade, Transportation and Utilities (MPHTRAD). Data for the employers panel are as of December 2012 and come from the *Memphis Business Journal Book of Lists.*

For your convenience, key data that pertain to the Eighth District have been aggregated on a special web page at https://research.stlouisfed.org/regecon/.

To see all that FRED® (Federal Reserve Economic data) offers, go to http://research.stlouisfed.org/fred2/.

**FIGURE 3**

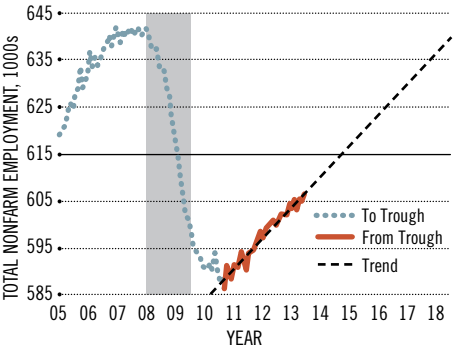
**Education and Health Employment**




NOTE: Shaded areas indicate U.S. recessions. Data are from the Bureau of Labor Statistics and are easily accessible in the St. Louis Fed's economic database, FRED, using these series IDs: Memphis (MPHEDUH) and US (USEHS).

**FIGURE 4**

**Memphis Employment Trend Projection**




NOTE: Shaded areas indicate U.S. recessions. Data are from the Bureau of Labor Statistics and are easily accessible in the St. Louis Fed's economic database, FRED, using this series ID: Memphis (MPHNA).

most of 2011 and continues to grow despite having since dropped below the national rate. In July 2013, total trade, transportation and utilities employment in Memphis stood at 15,000 fewer jobs than at its prerecession peak in mid-2007, a decrease of 8.5 percent.

A crucial component of the Memphis transportation industry suffered a setback when Delta Airlines dropped Memphis International Airport as a hub in September. Delta had been paring back service to Memphis ever since the airline inherited the hub in its merger with Northwest Airlines in 2008. While the loss of hub status may reduce the airport's prestige, it is less clear how deeply it will affect the local economy. Delta cut 230 local customer-service and cargo jobs and reduced daily flights to about 60 from a high of 147 in April 2012.

The education and health-services industry has been a bright spot in the local economy. Year-over-year growth in local education and health-services employment has outpaced the national rate for the past two years. In 2012, industry employment grew 3.8 percent in Memphis, compared with 2.0 percent nationally. The industry added 3,300 jobs, representing more than half of the total increase in Memphis payroll employment over the period.

Education occupations, particularly secondary-education teachers and post-secondary administrators, saw the greatest growth. Meanwhile, health services added large numbers of jobs—personal care aides, technicians and paramedics. Two of Memphis' largest health-services employers, Methodist Le Bonheur and Baptist Memorial, have announced expansions to existing campuses and the creation of new facilities.

Despite steady growth in a few major industries, the differing conditions across sectors have resulted in a mixed outlook for the Memphis economy.

Memphis' transportation system offers rides on a vintage trolley along the Mississippi River, through Civic Center Plaza (as seen here) and around historic downtown. © KEVIN MANNING

## Memphis Revitalization

Developers have recently concluded that market conditions are right to begin projects in areas of Memphis that have long languished. While downtown still struggles with vacant office space, the residential market is heating up. Downtown apartments have a 95 percent occupancy rate, and new residential projects, including the renovation of abandoned historic buildings, have been announced.

Developers are also promoting the rejuvenation of Overton Square, a landmark in midtown Memphis. The area has re-emerged in recent years as an arts and theater district. After a decades-long decline, new boutiques, restaurants and fitness studios are moving in to fill the long-empty storefronts; with a half-dozen new leases in recent months, the property is nearing full occupancy. The city has invested $16 million in a parking structure to handle the increased flow of shoppers and theatergoers.

In the end, Memphis faces many obstacles along the road to economic recovery. Even with recent positive developments, persistently high unemployment, coupled with slow growth in most industries and a sluggish housing market, suggests a long road ahead. If employment growth continues along its current path, Memphis will not hit its 2006 peak level of employment again until about 2019. However, if trends continue, education, health, and professional and business services will remain a source of economic strength. Although the city has a long recovery ahead, strong growth in key industries and urban-renewal projects provide reasons for optimism. Ω

*Charles S. Gascon is a regional economist, and James D. Eubanks is a research analyst, both at the Federal Reserve Bank of St. Louis.*

ENDNOTES

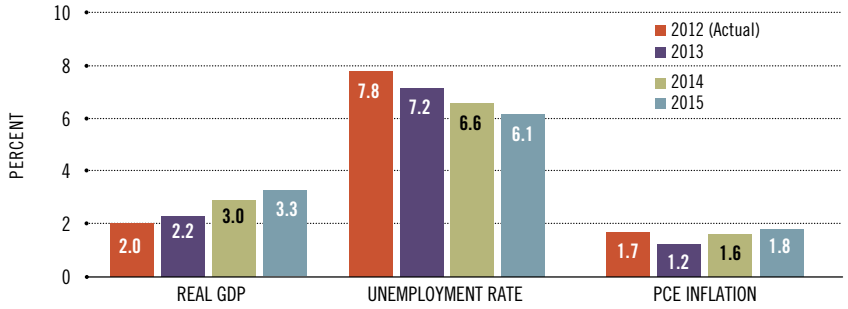
1 2012 North American (ACI-NA) Top 50 Airports. Airports Council International—North America. See www.aci-na.org/content/airport-traffic-reports.

2 U.S. Port Rankings by Cargo Tonnage (2011). Port Industry Statistics. American Association of Port Authorities. See www.aapa-ports.org.

# Economic Recovery: Slow and Steady, or Full Steam Ahead?

*By Kevin L. Kliesen*

**FOMC September 2013 Economic Projections for 2013-2015**




SOURCES: Board of Governors of the Federal Reserve System.

NOTES: Projections are the midpoints of the central tendencies. The actual and projected unemployment rates are for the fourth quarter. The growth of gross domestic product (GDP) and personal consumption expenditures (PCE) is the percentage change from the fourth quarter of the previous year to the fourth quarter of the indicated year.

Despite healthy job gains and rising consumer optimism, the pace of economic activity remained rather modest over the first half of 2013. After increasing at a 1.1 percent annual rate in the first quarter, U.S. real gross domestic product (GDP) increased at a 2.5 percent annual rate in the second quarter. The consensus of the Federal Open Market Committee (FOMC) and private forecasters (Survey of Professional Forecasters) is that real GDP growth will remain moderate over the second half of this year. Growth is then expected to accelerate next year and in 2015. (See chart.) In response, the unemployment rate is projected to fall to about 6 percent by the end of 2015. However, for the foreseeable future, inflation is expected to stay close to 2 percent, the target rate of the FOMC. While heartening, the consensus forecasts have been too optimistic during this expansion. Should we expect the economy to finally speed ahead like a hare or continue to plod forward like a tortoise?

## The Case for the Hare

The consensus forecast is built on three pillars. The first pillar is exceptionally accommodative monetary policy. The FOMC has eased policy through its large-scale asset purchase program and its "forward guidance" communication policy, stipulating that it expects its interest rate target to remain low for an extended period of time. These policies have helped lower long-term interest rates, like mortgage rates, and, arguably, have helped raise home prices and stock prices. Low-interest rates have probably also helped to boost auto sales, which are nearing their prerecession levels. This pillar, though, is sturdy only as long as inflation is expected to remain near the FOMC's target. Forecasts, surveys of consumers and financial market measures show no erosion in longer-term inflation expectations.

The second pillar stems from the spillover effects generated by the rebound in housing and the rise in household wealth. Increases in house prices lead to increases in household wealth (as do stock prices), some of which is spent. The upturn in home sales has boosted purchases of household durable goods, like appliances, refrigerators and furniture.

The third pillar reflects the unwinding of the economic and policy uncertainties that have worried financial markets and the business community. In this vein, European financial markets have stabilized, and there are signs that Europe's recession is winding down. Japan's economy is on the mend. In China, fears of a hard landing are diminishing. An improving global economy should boost U.S. exports. On the home front, the volume of home foreclosures is dwindling, and debates over tax policy that helped elevate uncertainty have receded. All of these factors should provide firms with a powerful incentive to increase their capital outlays and expand their workforces further.

## The Case for the Tortoise

The case for continued modest real GDP growth—what might be called the "new normal"—is straightforward: Persistently one-sided forecast errors (too optimistic) may reflect an evolving change in the underlying growth of the U.S. economy ("potential growth") that forecasters are missing. Prior to the recession, the consensus of forecasters was that the economy's long-term growth potential was about 3 percent per year and that the natural unemployment rate was about 4.5 percent.[1] But the current business expansion is now in its fifth year, and real GDP growth has averaged only about 2.25 percent, with an unemployment rate of about 7.5 percent. Is this the best we can expect for the foreseeable future?

One hallmark of the "new normal" hypothesis has been extraordinarily tepid labor productivity growth. For the past three years, such growth has averaged only about 0.75 percent. The difficulty for economists is determining whether the productivity slowdown is temporary or longer-lasting (productivity can be highly volatile); if the latter, what's causing it? Possible explanations include scarring effects from the recession and financial crisis, which have permanently lowered the employment-to-population ratio; more business regulations that have increased the cost of labor and capital to firms; and an aging population. If these impediments are significant, the economy's "new normal" real GDP growth might be 2 to 2.5 percent, with perhaps a natural rate of unemployment of about 6 percent. Thus, attempts to push the unemployment rate below this rate will likely lead to higher inflation rates. However, as mentioned earlier, forecasters and financial markets do not appear worried about this outcome. As the economic theorists would say, the Fed's 2 percent inflation target seems to be anchoring the economy's inflation rate. Ω

*Kevin L. Kliesen is an economist at the Federal Reserve Bank of St. Louis. Lowell R. Ricketts, a senior research associate at the Bank, provided research assistance. See http://research.stlouisfed.org/econ/kliesen/ for more on Kliesen's work.*

ENDNOTE

[1] These estimates were reported in the February and August 2008 issues of the Survey of Professional Forecasters.


**The Eighth Federal Reserve District** is composed of four zones, each of which is centered around one of the four main cities: Little Rock, Louisville, Memphis and St. Louis.

# Student-Loan Debt in the District: Reasons behind the Recent Increase

*By Charles S. Gascon and Bryan Noeth*

The aggregate value of outstanding debt from student loans in the U.S. has grown to about $1 trillion and is now greater than both credit card debt ($670 billion) and auto debt ($810 billion). This amounts to about $3,185 per capita.[1] Recent trends suggest that college-loan balances will continue to expand at a rapid pace. Over the past decade, the college tuition and fees component of the consumer price index increased by 6.4 percent per year, while the broader index increased by only 2.4 percent per year. Over the same period, college enrollment increased by 37 percent,[2] and, according to the Project on Student Debt, about two out of every three college graduates had student-loan debt, with an average balance of about $27,000.[3]

Large student-loan balances may have long-term economic consequences, as new graduates saddled with debt may struggle to make payments, fail to save for down payments on a home or be unable to get a loan to buy a car. On the other hand, the lifetime return on investment (ROI) for higher education tends to be significant, typically measured as higher income and lower levels of unemployment. As long as an ROI for education exists, families may see a benefit in taking on debt to pay for college.[4] However, college graduation and a higher-paying job are not guaranteed; as a result, the long-term economic impact of the growing debt for *attending* college is somewhat unclear.

In this article, we look at the growth in student-loan debt in the states that constitute the Federal Reserve's Eighth District.[5] We examine possible factors that may explain why the amount of student-loan debt has expanded, and we consider how differences in tuition growth and college-enrollment growth may cause variation across states.[6]

The table's three columns under "Debt Growth" indicate growth in debt per capita of individuals aged 25-34 in each of the Eighth District states, as well as in the United States, between 2005 and 2013.[7] Between these two years, average debt per capita in the U.S. grew by 140 percent, to $9,894 as of the first quarter of 2013. On average, the increases in student debt since 2005 were larger for Eighth District states than for the nation. In Kentucky, debt per capita more than tripled, while Missouri experienced the slowest growth, at 120 percent. Debt balances are roughly 25 percent of per capita income in the corresponding states, ranging from $8,430 in Arkansas to $11,236 in Illinois.

## The Margins

To better understand this rapid growth in student debt and the variation across states, we break the growth down along two lines (or margins): the extensive margin and the intensive margin. The extensive margin measures the effect of more people taking on debt, due to factors such as higher levels of college enrollment. The intensive margin assumes the same number of borrowers and

**Student-Loan, College-Enrollment and Tuition Growth**

| | | DEBT GROWTH | | | ENROLLMENT GROWTH | | | TUITION GROWTH | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Average Debt per Borrower | Percent Change in Debt per Capita | Percent Change in Debt per Borrower | Percentage Point Change in Borrowers | Percent Change Public Two-year | Percent Change Public Four-year | Percent Change Private Four-year | Percent Change Public Two-year | Percent Change Public Four-year | Percent Change Private Four-year |
| Arkansas | $24,676 | 186.9 | 57.0 | 15.5 | 32.1 | 21.1 | 9.1 | 33.4 | 34.3 | 35.9 |
| Illinois | 30,340 | 143.8 | 47.5 | 14.6 | 12.4 | 5.8 | 18.0 | 39.0 | 46.4 | 34.3 |
| Indiana | 25,260 | 191.6 | 55.6 | 19.0 | 71.1 | 10.5 | 4.9 | 29.2 | 32.8 | 33.2 |
| Kentucky | 25,216 | 211.4 | 66.6 | 17.3 | 23.9 | 10.3 | 18.2 | 34.1 | 47.1 | 35.9 |
| Mississippi | 25,762 | 176.7 | 58.3 | 15.0 | 25.1 | 8.3 | 18.0 | 31.7 | 35.1 | 24.4 |
| Missouri | 26,401 | 119.9 | 45.3 | 13.0 | 29.3 | 13.4 | 8.5 | 25.5 | 25.0 | 30.7 |
| Tennessee | 26,793 | 175.9 | 59.2 | 14.1 | 30.0 | 12.2 | 23.0 | 40.5 | 43.9 | 31.7 |
| **United States** | **27,342** | **140.3** | **49.2** | **13.7** | **20.6** | **14.1** | **12.7** | — | — | — |

SOURCES: Debt growth data come from Federal Reserve Bank of New York Consumer Credit Panel/Equifax based on authors' calculations and span 2005:Q1 to 2013:Q1 for those aged 25-34. Tuition data from College Board where growth rates are from the 2004-2005 school year to the 2012-2013 school year. Enrollment data come from IPEDS database and span 2005 to 2010. Dates differ due to data availability. Numbers shaded in yellow are the highest in the column; those shaded in blue are the lowest.

measures the effect of people borrowing more money, which can be due to factors such as higher education costs.

Several other factors may cause student-debt balances to rise.[8] Along the extensive margin—the number of borrowers with debt—there was a significant increase across all of the District's states in the share of those 24-35 who have student debt. This may be driven by a variety of factors, including population growth, more students going to college and a higher percentage of enrollees taking on debt. The nation overall witnessed a 13.7-percentage-point increase from the first quarter of 2005 to the first quarter of 2013. (See the third column under "Debt Growth.") With the exception of Missouri, all states witnessed larger percentage-point increases than the U.S. overall during the same time period. Indiana had the largest—an increase of 19 percentage points of those who had student debt on their credit reports.

A large proportion of the increase may be attributed to changes in enrollment (reported under the "Enrollment Growth" heading of the table). Enrollment has been on the rise in the Eighth District, as well as in the nation, according to the Integrated Postsecondary Education Data System (IPEDS), which is compiled by the National Center for Education Statistics (NCES). Between 2005 and 2010, U.S. enrollment at four-year public and private, nonprofit institutions increased by 14.1 percent and 12.7 percent, respectively. Enrollment growth in public two-year colleges was considerably higher, at 20.6 percent.

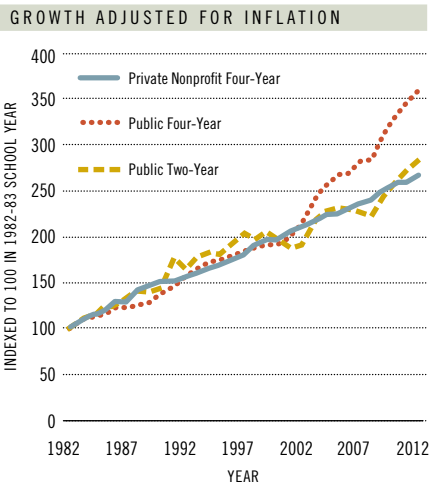
The states that make up the Eighth District also experienced significant increases. For public four-year colleges, Arkansas had the largest increase in enrollment (21.1 percent), and Illinois had the smallest increase (5.8 percent). As for enrollment at private, nonprofit four-year institutions, Tennessee reported the largest increase in enrollment (23 percent), and Indiana had the smallest (4.9 percent). At public two-year schools, Indiana had enrollment growth of 71.1 percent—higher than any other District state or the national average.

On the intensive margin, debt per borrower of those aged 25-34 has gone up in all of the District's states. With the exception of Missouri and Illinois, these states have seen larger increases in debt per borrower than the nation overall. (See the second column under "Debt Growth.") However, the debt per borrower in each of the states, except Illinois, was less than the national average. When comparing debt per borrower to debt per capita, the national debt per capita grew at almost three times the national debt per borrower. This suggests that the majority of debt growth (in nominal terms) is stemming from the extensive margin (or from more people borrowing), rather than from borrowers taking on more debt.

While additional borrowing can be driven by many factors, such as lower incomes or the loss of home equity, higher tuition rates are commonly cited. The chart shows the real (adjusted for inflation) growth in U.S. enrollment-weighted tuition and fees since 1982. Tuition growth has outpaced the rate of inflation by a significant amount over that time period for both public and private institutions; tuition costs have gone up particularly fast at public four-year institutions since 2002. While the debt data in our sample do not identify the state where a borrower attended school, data from the Digest of Education Statistics indicate that 81 percent of students in our sample of states remain in-state for their college education. This indicates that we may expect to see some relationship between tuition growth and amount borrowed.

The right three columns of the table include the enrollment-weighted tuition growth between the 2004-2005 school year and the 2012-2013 school year for various classifications of college institutions. Missouri had the smallest increase—25 percent—in public four-year tuition, according to College Board data. Kentucky had the largest increase at 47.1 percent. On an absolute level (not reported), Mississippi had the lowest tuition levels for both public four-year and private four-year nonprofit universities. The data suggest a positive relationship between the growth in debt per borrower and tuition growth. Kentucky had the fastest debt growth per borrower at 66.6 percent, as well as the fastest growth in public and private four-year tuition rates. On the other hand, Missouri had the slowest debt growth per borrower at 45.3 percent, as well as the slowest growth in public two- and four-year tuition rates. This evidence is not conclusive, but does suggest that differences in growth in the public-tuition rate can explain some of the differences in student-debt growth across states in the Eighth District.

**U.S. Tuition Changes since 1982**




SOURCES: Trends In College Pricing (2012) based on The College Board, Annual Survey of Colleges; NCES, IPEDS.

Changes in the composition of enrollment also interact with tuition to explain the disparities in debt growth per borrower. If a larger proportion of new students are attending private schools, this may have the effect of increasing the average debt per borrower. Holding enrollment constant, an increase in the relative number of students going to more-expensive schools will increase the total amount of tuition paid. This, of course, assumes that financing patterns are similar between public and private university students, which may not be the case.

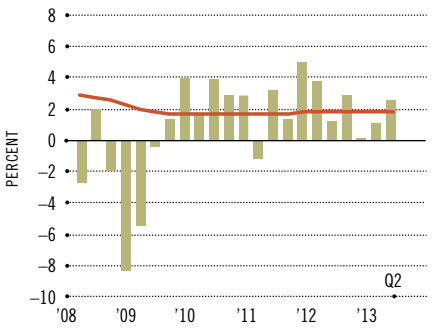
## Other Factors Affecting Student-Debt Levels

Other reasons abound for increases along both margins. For example, decreased access to other forms of credit may be driving some of the student-debt increases. With the collapse of other forms of debt, college students and their families may be substituting student loans for other forms of debt. Additionally, tough economic times and high rates of unemployment among young adults have pushed many borrowers into varying degrees of forbearance, deferment and delinquency. Since previous vintages of loans are not being paid back as quickly, this can have the effect of increasing the aggregate balance of loans.

*continued on Page 22*

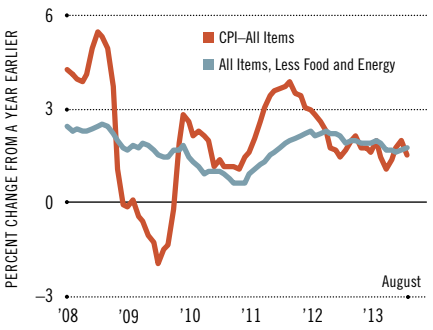
Eleven more charts are available on the web version of this issue. Among the areas they cover are agriculture, commercial banking, housing permits, income and jobs. Much of the data are specific to the Eighth District. To see these charts, go to www.stlouisfed.org/economyataglance.

### REAL GDP GROWTH

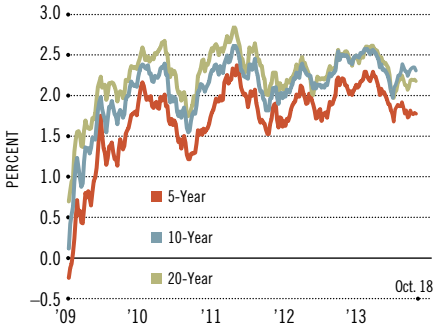



NOTE: Each bar is a one-quarter growth rate (annualized); the red line is the 10-year growth rate.

### CONSUMER PRICE INDEX (CPI)

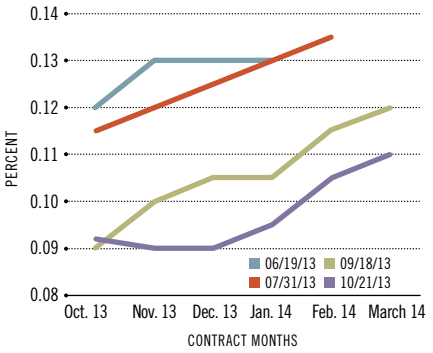



### INFLATION-INDEXED TREASURY YIELD SPREADS

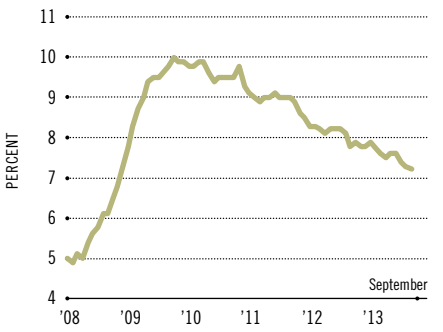



NOTE: Weekly data.

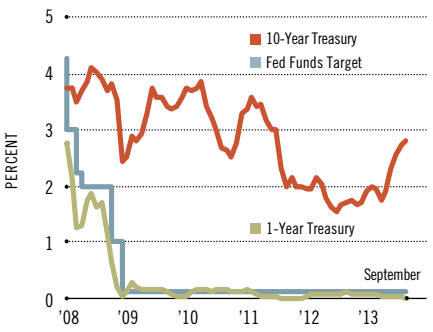
### RATES ON FEDERAL FUNDS FUTURES ON SELECTED DATES




### CIVILIAN UNEMPLOYMENT RATE

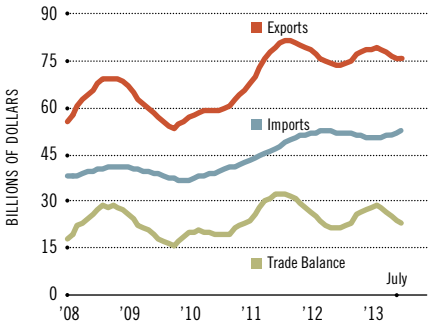



### INTEREST RATES



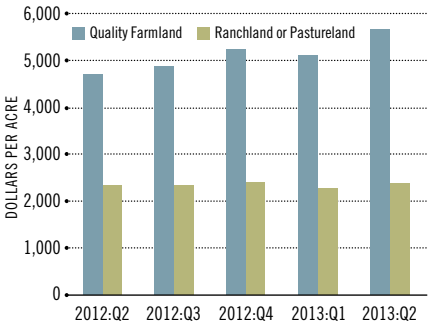

NOTE: On Dec. 16, 2008, the FOMC set a target range for the federal funds rate of 0 to 0.25 percent. The observations plotted since then are the midpoint of the range (0.125 percent).

### U.S. AGRICULTURAL TRADE




NOTE: Data are aggregated over the past 12 months.

### AVERAGE LAND VALUES ACROSS THE EIGHTH DISTRICT




SOURCE: Agricultural Finance Monitor.

*continued from Page 21*

## Conclusion

Student debt has been increasing in the Eighth District as a whole. We have documented a few of the factors that have been driving these increases, as well as the heterogeneity across the District's states in terms of tuition and enrollment dynamics. Further disentangling what has altered these factors requires thoughtful analysis. Tuition and enrollment are likely driven by factors such as the college-wage premium, availability of alternatives, state funding and access to credit. Grasping the interplay among these factors should lead to better-informed policy decisions in the future. Ω

*Charles S. Gascon is a regional economist and Bryan Noeth is a policy analyst, both at the Federal Reserve Bank of St. Louis.*

### ENDNOTES

1 For every person (16 and older) in the U.S. Be aware that some figures later in this article are per borrower; they are marked as such.
2 From 2000-2011. See http://nces.ed.gov/programs/digest/d12/tables/dt12_223.asp.
3 The Project on Student Debt. See http://projecton studentdebt.org/files/pub/classof2011.pdf.
4 See Canon and Gascon for more on the returns to higher education and the associated risks.
5 Throughout the article, we report results at the state level, not just the portion of the state located in the Eighth District.
6 Among our sample of states, about 81 percent of students attend college in their home state; so, conclusions linking residents' debt growth to state education statistics hinge on the assumption that students are being educated in their home state.
7 The per capita estimates are based on only those individuals with a credit report.
8 Cross-dataset comparisons are incompatible in several ways. The Equifax data are based on the current location of the individual, which may or may not be in the same state as the institution he or she attended. Conversely, the IPEDS and College Board data are by the location of the reporting institution.

### REFERENCES

Canon, Maria; and Gascon, Charles. "College Degrees: Why Aren't More People Making the Investment?" The Federal Reserve Bank of St. Louis' *The Regional Economist,* Vol. 20, No. 2, April 2012, pp. 4-9.

College Board, "Trends in College Pricing." 2012. College Board Advocacy and Policy Center. See http://trends.collegeboard.org/sites/default/files/college-pricing-2012-full-report-121203.pdf.

Federal Reserve Bank of New York, "Quarterly Report on Household Debt and Credit." May 2013. See www.newyorkfed.org/research/national_economy/householdcredit/DistrictReport_Q12013.pdf.

National Center for Education Statistics, "Digest of Education Statistics 2011." Table 232. See http://nces.ed.gov/programs/digest/d11.

## FORUM ON DEBT FROM STUDENT LOANS

Recent Federal Reserve data show that debts from student loans have nearly doubled in recent years, rising from roughly $550 billion in 2007 to about $1 trillion today. Delinquencies on student loans now rank higher than on all other forms of debt. In addition to weighing down family balance sheets, recent research shows that these loans may also lead to significant losses of wealth later in life, suppress business startups, postpone family formation and slow economic growth.

Encouragingly, innovative reforms are under way nationwide to make college more affordable, restructure student aid and provide promising alternatives to financing higher education beyond student loans. To provide insight, a student-loan forum—**Generation Debt: The Promise, Perils and Future of Student Loans**—will be held Nov. 18 at the St. Louis Fed. Speakers include Rohit Chopra of the Consumer Financial Protection Bureau and Sandy Baum, a national expert on reforming student loans and higher education. The latest research and data on student loans will be presented, and new ideas and programs for financing higher education will be discussed.

The cost to attend is $50 ($15 for students). **Registration is required by Nov. 13.** This event is sponsored by the Center for Household Financial Stability at the Federal Reserve Bank of St. Louis. To register, go to www.stlouisfed.org/community_development/events/?id=506.

## SAVE THE DATE FOR SYMPOSIUM ON HOUSEHOLD BALANCE SHEETS

May 8 and 9 are the dates for the second research symposium on household balance sheets organized by the St. Louis Fed's Center for Household Financial Stability, the Center for Social Development at Washington University in St. Louis and the Research division of the St. Louis Fed. The theme for next year's symposium is **Realizing the American Dream for Younger Americans**, a reference to those 40 and younger.

Registration will start in late winter. See www.stlouisfed.org/household-financial-stability/events/index.cfm?id=507. A call for papers has been sent out.

The first symposium was held in February. The theme was **Restoring Household Financial Stability after the Great Recession: Why Household Balance Sheets Matter.** To view presentations and videos from that event, go to www.stlouisfed.org/household-financial-stability/events/20130205/agenda.cfm.

## ASK AN ECONOMIST

**David Wiczer** is an economist at the St. Louis Fed. He loves running, listening to music and going to concerts on the off chance that, one day, he'll be able to say, "I saw them when they were just starting." His research interests include macro and labor economics, especially occupational choice and inequality. For more on his work, see http://research.stlouisfed.org/econ/wiczer.

Wiczer on a frozen lake in Minnesota. He received his Ph.D. in economics from the University of Minnesota.

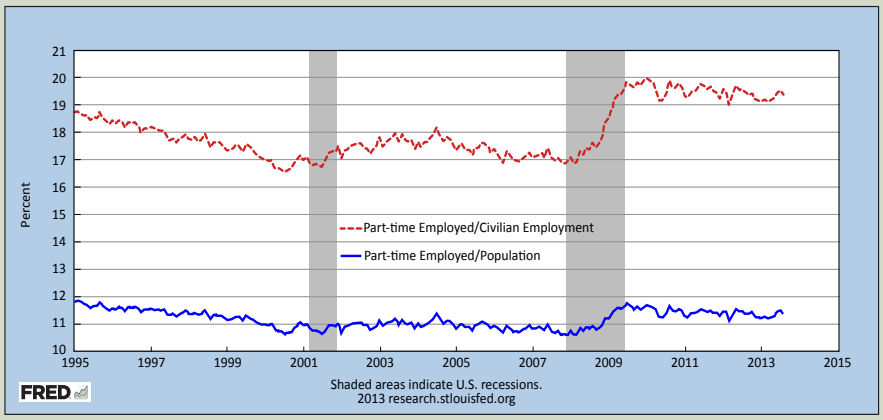
### *Q: Why has part-time employment grown recently?*

**A:** Part-time employment usually increases during a recession. But such employment tends to fall when the recession is over, and that hasn't happened following the recent downturn. The figure below illustrates two ways in which this phenomenon can be measured: part-time employment as a fraction of *total population* and part-time employment as a fraction of *employment*. Let's look at the latter more closely. In December 2007, when the recession began, 16.9 percent of those working usually worked part time. By the time the recession ended, in June 2009, that share had risen to 19.6 percent. Even though the overall employment situation has improved, the share of part-time employment has stayed persistently high, with the latest reading (in August 2013) of 19.4 percent.

One explanation for this increase is that job creation in the expansion has been very asymmetric. The industries and occupations where most of the growth has happened have more part-time workers. This explanation is related to what economists call "job polarization." Since the 1970s, a large part of the job growth has been in either low-end occupations or high-end occupations, and these low-end occupations often have more part-time work.

Another explanation for the increase in part-time work stems from the propensity for people in some age groups to be employed part-time. Those who are younger than 25 or older than 55 tend to be more cyclical in their labor force participation. In recessions, they leave the labor force at a higher rate, and in expansions they enter it again. These people will often work part-time jobs.

Some people have pointed to the Affordable Care Act as another cause for this increase. The claim is that employers are creating part-time jobs so as to remain under the 50 full-time worker cutoff for the employer mandate. So far, there are no data suggesting that this is true. There are countries in Europe where higher fixed costs of employing people have created a two-tier labor market. However, it is too early to make a definitive statement regarding this possibility in the U.S.



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**NEXT ISSUE**


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## Lessons from Japan's Lost Decade

In the years just before and after 1990, Japan's housing bubble burst and, subsequently, its stock market collapsed. What followed was a decade of economic stagnation and deflation. Some even say it was a "Lost Two Decades," not just a "Lost Decade." Prime Minister Shinzo Abe, who took office in December 2012, has promoted quantitative easing, increased public works spending and a devaluation of the yen to get his country's economy growing again. Are his policies succeeding? What can the U.S. learn from Japan's experiences? Find out in the January issue of *The Regional Economist.*

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