

# THE REGIONAL ECONOMIST

A Quarterly Review  
of Business and  
Economic Conditions

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THE FEDERAL RESERVE BANK OF ST. LOUIS  
CENTRAL TO AMERICA'S ECONOMY®

Terrorism

The Toll It Takes  
on Developing Countries

China and the U.S.

Why Their Food Prices  
Now Move Along Similar Paths

## "Rockets and Feathers"

### Why Don't Gasoline Prices Always Move in Sync with Oil Prices?



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## Gas and Oil Prices Don't Always Move in Sync

By Michael Owyang and E. Katarina Vermann

Given that Americans still spend a considerable portion of their budget on gasoline (just under 4 percent in 2012), it's important to understand why gas prices don't always move in sync with oil prices. The latter are determined in a more-or-less centralized market, but the market for gas is often local, with prices affected by location, season and taxes, among other factors.



## THE REGIONAL ECONOMIST

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### Looking at Recessions through a Different Lens

By David G. Wiczer

Traditionally, research about recessions focused on the big picture—how the overall economy was performing. But recent economic studies have looked at the impact on specific groups. One of the interesting findings is that the highest earners are, by some measures, the most affected by recessions. Their gains during good times, however, more than make up for their recession losses.

## A Mismatch: Close to Macroeconomic Goals, Far from Normal Monetary Policy

By conventional metrics, the U.S. economy is approaching normal conditions in terms of the two main macroeconomic goals assigned to the Federal Reserve—price stability and maximum sustainable employment. The monetary policy stance of the Federal Open Market Committee (FOMC), however, has not yet begun to normalize. Current policy settings are far from normal, and the normalization process will take a long time. Therefore, normalizing may need to begin sooner rather than later if macroeconomic conditions continue to improve at the current pace.<sup>1</sup>

Over the past five years, U.S. unemployment has been high, although it has generally been improving since it reached 10 percent in October 2009. In September 2014, the unemployment rate stood at 5.9 percent, down from 7.2 percent a year earlier. Inflation was surprisingly low from the second quarter of 2013 through the first quarter of 2014, but recent readings have moved closer to the FOMC's 2 percent target. The inflation rate, as measured by the year-over-year percent change in the personal consumption expenditures price index, was 1.5 percent in August.

In recent years, the FOMC has used two main tools to achieve its dual mandate—

short-term interest rate policy (the federal funds rate) and quantitative easing (QE). The target for the federal funds rate has remained near zero since December 2008. Meanwhile, the Fed's balance sheet is still large and increasing, although the current asset purchase program (QE3) is winding down. The size of the balance sheet, at more than \$4 trillion, is roughly 25 percent of U.S. nominal gross domestic product (GDP).

The figure illustrates a measure of how far the economy's performance has been from the FOMC's macroeconomic goals since 1975 and a measure of how far the stance of monetary policy has been from normal. The former, based on inflation and unemployment, currently shows a low value that is close to precrisis levels.<sup>2</sup> The latter, based on the federal funds rate and the size of the balance sheet relative to GDP, shows the opposite. In other words, the macroeconomic goals are close to being met, whereas monetary policy settings have a long way to go before being close to normal.

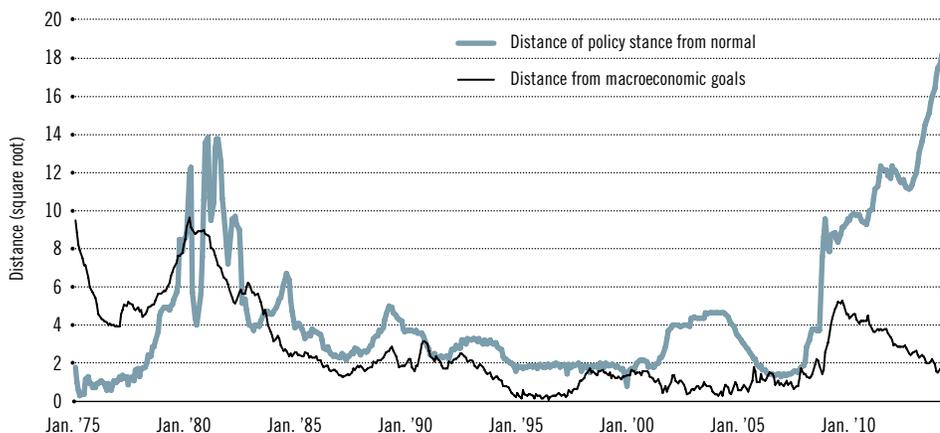
While this mismatch is not causing macroeconomic problems today, it may cause problems in the years ahead as the economy continues to expand. One risk is that inflation would return. If that does happen, the



FOMC would have to adjust policy faster and more aggressively than it usually does, as inflation tends to be difficult to get under control. The other main risk is that financial market bubbles could develop. Macroprudential policies alone are probably not sufficient to keep a bubble under control; these policies must be combined with monetary policy that is consistent with financial stability, as well as our macroeconomic goals.

Up to now, relatively low inflation and relatively weak labor markets have suggested a later start to normalizing monetary policy, but stronger-than-expected data may change this calculus in the months and quarters ahead. Over the next few years, the objective will be to execute monetary policy normalization without creating excessive inflation or substantial financial stability risks. 

**Distance from Goals vs. Distance from Normal Policy**



SOURCES: Federal Reserve Board, Bureau of Economic Analysis, Bureau of Labor Statistics and author's calculations; data obtained from FRED and Haver Analytics. NOTES: Details on the functions used to measure these distances can be found in my presentation on July 17, 2014. The figure, which is an updated version of a chart from that presentation, shows the square root of the function values from January 1975 to June 2014.

For these calculations, the normal policy stance refers to historical averages for the federal funds rate and the size of the balance sheet relative to GDP. The macroeconomic goals refer to the FOMC's inflation target and the midpoint of the central tendency of the longer-run projection for unemployment, as of the FOMC's September Summary of Economic Projections.

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

**ENDNOTES**

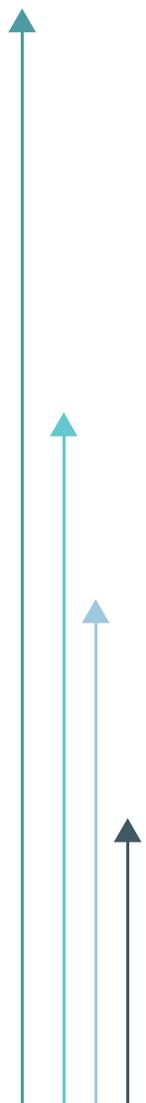
- 1 This column is based on my presentation on July 17, 2014, "Fed Goals and the Policy Stance." See <http://research.stlouisfed.org/econ/bullard/fed-goals-and-the-policy-stance>.
- 2 For a broader measure of the labor market, one could use the labor market conditions index from staff at the Federal Reserve Board. However, the results would be similar because there is a high correlation between this index and the unemployment rate. See Chung, Hess; Fallick, Bruce; Nekarda, Christopher; and Ratner, David. "Assessing the Change in Labor Market Conditions," FEDS Notes, May 22, 2014.



# and Feathers"

## Always Move in Sync with Oil Prices?

*By Michael Owyang and E. Katarina Vermann*

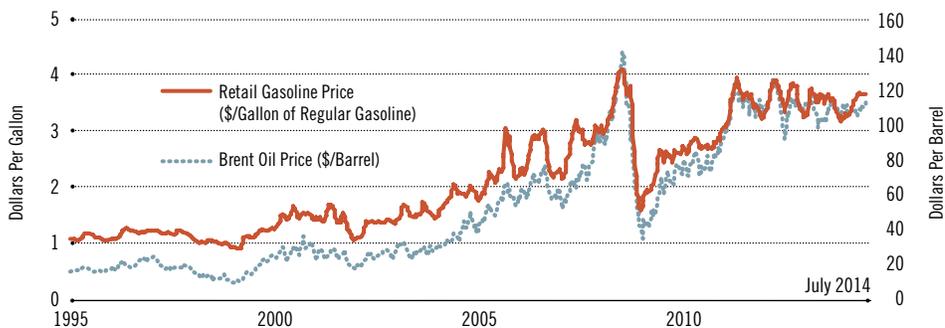


The U.S. Energy Information Administration reported last year that American consumers spent, on average, just under 4 percent of their pretax income on gasoline in 2012—nearly \$3,000 per household.<sup>1</sup> In the previous 30 years, this percentage was this high only once before—in 2008. Given the impact on the average American’s budget, it is important to understand how gasoline prices are affected by fluctuations in oil prices.

A number of economists have studied the manner in which changes in oil prices affect changes in gas prices—the so-called pass-through. The prevailing

FIGURE 1

**Oil and Gas Prices**



SOURCE: U.S. Energy Information Administration and *The Wall Street Journal*.

sentiment is that the pass-through is not symmetric: The speed at which gas prices change differs depending on whether the price of gasoline is relatively high or relatively low compared with the price of oil. Both casual and industry observers say that gas prices adjust to changes in oil prices faster when gasoline prices are relatively low compared with oil than when gasoline prices are relatively high compared with oil. This uneven pass-through can be seen when oil prices rise after being steady for some time—gasoline prices shoot up quickly. In contrast, when oil prices fall after being steady for some time, gasoline prices retreat slowly. In the gasoline industry, this phenomenon is known as “rockets and feathers.”

Although crude oil prices are determined in a more-or-less centralized market, retail gasoline prices vary by season and by location, depending on supply, demand, inventories, regulations and—in particular—taxes. The formulation for gasoline can also vary over time, across seasons and across locations, depending on environmental regulation and the average temperatures during the winter and summer. Therefore, the sensitivity of gas prices to oil prices may vary across cities and over the seasons.

We reviewed some of the academic work measuring pass-through when gasoline prices were high relative to oil prices and vice versa, and we investigated whether oil price pass-through to national gasoline prices was different in these cases. We also considered how the pass-through changes across the seasons by assessing whether gasoline prices change more rapidly during certain months of the year. Finally, we considered how the pass-through varies

across the country and whether location can alter the degree of asymmetry in gasoline’s responsiveness to oil prices.

**Asymmetric Pass-through**

Crude oil—the main component of gasoline—makes up nearly 70 percent of the pump price of regular gasoline.<sup>2</sup> Therefore, it is not surprising that the per gallon price of retail gasoline follows a similar pattern to the price of crude oil. Figure 1 shows the monthly national average price of regular unleaded gasoline per gallon in dollars (left axis) from January 1995 to July 2014, along with the price of oil per barrel in dollars (right axis). We plotted the price of Brent crude instead of the more familiar price of West Texas Intermediate (WTI) because the two series recently diverged (see sidebar) and gasoline prices—particularly, the national average—appear to have been more closely tied to Brent.

Figure 1 demonstrates the co-movement between the two series. Fluctuations in oil prices are closely mimicked in the retail gasoline market with a common upward trend in both series, suggesting that the prices of oil and gas are related in the long run. Despite this long-run relationship, the two prices can independently move around their long-run ratio in the short run. We estimate that a \$10 rise in the price of a barrel of oil is correlated with an approximately 25-cent increase in the price of a gallon of gasoline adjusted for taxes and markups, which are (relatively) constant over time. If the ratio between the adjusted price of gasoline to the crude oil price (25 cents per \$10) falls too out of line with this long-run relationship, gasoline prices will tend to adjust to return to this ratio.

Although oil and gas prices appear to move together, the speed at which changes in the upstream price (oil) affects the downstream price (gasoline) can vary.<sup>3</sup> The adjustment process back to the long-run relationship may depend on whether gasoline prices are above or below their long-run ratio with oil prices. Economists who have studied gasoline prices have generally found that gasoline prices adjust faster when they are low relative to oil prices than when they are high relative to oil prices. According to economists Severin Borenstein, A. Colin Cameron and Richard Gilbert, two major factors cause asymmetric

pass-through: seller market power and supply chain shocks.

Seller market power implies that retail gasoline markets are not perfectly competitive: Opportunities exist for retailers to take advantage of price changes to maintain a higher overall profit. For example, Borenstein, Cameron and Gilbert noted that retailers increased gasoline prices as oil prices rose to keep a constant margin. When prices fell, retailers adjusted prices downward slower because consumers were already accustomed to the higher prices.

One factor that influences market power is market concentration: Gas stations that are physically close together have less market power than do gas stations that are farther apart. To illustrate, a 2008 study of the Southern California gasoline market by economist Jeremy A. Verlinda found that a rival gas station in “immediate proximity” reduced the difference in the size of the response of gas prices to positive vs. negative changes in oil prices. Economist Matthew Lewis suggested that asymmetric pass-through is possible because of consumers’ slow processing of gasoline price information. Since people do not tend to observe gasoline prices until they are ready to refuel their gas tanks, consumer expectations may be slow to adjust to pricing changes, allowing prices to remain relatively high.

Supply chain disruptions, such as Hurricane Katrina’s effect on refining in the Gulf of Mexico, can also affect oil price pass-through because refineries can use pricing to control their inventories. Because gasoline has a finite supply, refineries can accommodate anticipated gasoline shortages by raising prices in order to cut consumption. For example, in a 2011 study of weekly national data, economists Stanislav Radchenko and Dmitry Shapiro found that retail gasoline prices increased 0.52 percent within the first week of an anticipated increase of 1 percent in oil prices, while they fell 0.24 percent within the first week of an anticipated decrease of 1 percent in oil prices.<sup>4</sup>

We measured the asymmetric response of gasoline prices to fluctuations in the pass-through by considering separately the months in which the adjusted average national retail gasoline price to oil price ratio was either above or below 25 cents to \$10. Consistent with much of the literature,

we found a small difference in the speed at which gasoline prices were attracted to the long-run ratio depending on whether prices were above or below this ratio.

### **Pass-through during Different Seasons**

Gasoline prices vary seasonally. Anecdotal evidence suggests gasoline prices in the United States rise during the spring, up until Memorial Day weekend. After that point, they remain higher throughout the summer, typically spike again before Labor Day weekend and then retreat in the fall. For example, between 1995 and 2014, retail gasoline prices rose, on average, 0.4 percent (1 cent per gallon) during the two weeks prior to Memorial Day and 1.6 percent (3 cents per gallon) during the two weeks prior to Labor Day.

Anecdotal evidence suggests gasoline prices in the United States rise during the spring, up until Memorial Day weekend. After that point, they remain higher throughout the summer, typically spike again before Labor Day weekend and then retreat in the fall.

While much of these price changes can be attributed to increased demand from summer driving, gasoline prices may exhibit some seasonality because of a change in the cost of production due to changes in composition: The gasoline used in many areas is cheaper in the winter because it is, essentially, a different product. Average winter and summer temperatures dictate some of the changes in gasoline formulation; environmental regulation is another determinant. Some areas allow alternative ingredients in the winter that are cheaper to produce, but contribute more to pollution. During the summer, the use of these alternative ingredients is more restricted. During the summer in warmer areas, gasoline sometimes requires additives that reduce the vapor pressure and make the gasoline less volatile, as well as less susceptible to evaporation in the gas tank. Because summer gasoline is more costly to produce, the prices during the spring and summer, when these products are used, will naturally be higher.<sup>5</sup>

We examined whether the pass-through asymmetry varies over the seasons. To this

## West Texas Intermediate and Brent: Two Benchmarks for the Price of Crude Oil

In the United States, there are two main benchmark measures of crude oil prices. One is the price of West Texas Intermediate (WTI), which is a grade of crude oil that is both low in density and low in sulfur. It is often referred to as Texas sweet light crude. The low sulfur content of WTI allows more oil to be extracted from the crude. WTI crude is both sourced and refined in the United States; its price is used as a benchmark only in the United States. Futures contracts for WTI are traded on the New York and Chicago Mercantile exchanges, among other exchanges, and are settled in Cushing, Okla.

The second important benchmark price for crude oil is Brent. Brent oil was originally sourced from 15 oil fields in the North Sea but has become the international benchmark for pricing crude oil. It is much more widely used than is the price of WTI as a benchmark, especially outside of the United States. There are slight differences in the density and sulfur content between Brent and WTI, but the differences are relatively small.

Prior to 2011, the two spot oil prices moved almost in lockstep. This is perhaps not surprising because WTI and Brent crude oil are essentially the same product. Standard economic models of commodity pricing would predict that arbitrage would eliminate price differentials between the two oil prices. If the price of a commodity is higher in one market (say, market A) than another (market B), one could, in principle, buy the good in market B and resell it in market A. This would yield a profit if the two prices were different. It would also put upward pressure on the price in B and downward pressure on the price in A, making the two prices eventually converge. In practice, the two prices may not completely converge because of, for example, the cost of transporting the commodity from B to A. However, after 2011, the two spot oil prices diverged. The explanation for their divergence might lie in how—or perhaps where—the two prices are determined.

In early 2011, Cushing reached its storage capacity, causing a difference between the two spot oil prices that could not be eliminated by arbitrage. In September 2011, for example, the Brent spot price was \$27.31 per barrel higher than the WTI spot price. This differential is large considering that, prior to 2011, a typical differential was on the order of \$1.37. No arbitrage opportunity existed because of the inability to move oil from Cushing to another location in the Gulf Coast where it could be sold for prices closer to the settlement price of Brent crude. This also meant that the regional variation in gas prices increased; oil prices (and, thus, gasoline prices) near the coasts were more closely tied to Brent, while prices in the Midwest were more closely tied to WTI.

Recently, however, the difference between the two spot oil prices has declined. The decline was due, in part, to the reversal of the oil flow in the Seaway Pipeline, which normally moves oil from the Gulf Coast to Cushing. The reversal allowed oil to travel from Cushing to the Gulf Coast, where it could be sold at the Brent price. During the summer of 2013, the difference between the two spot prices had declined substantially, to about \$3.30 in July 2013. Since then, the difference peaked at \$13.93 in November 2013 and drifted back to \$3.18 in July 2014. These differences are still considerably less than \$17, the average difference from the beginning of 2011 and the end of 2012. In August 2014, the price differential was \$5.07.

end, we separated the data into observations occurring during the months of October to March and observations occurring during the months of April to September.<sup>6</sup> We calculated asymmetry for each sample, thus letting the asymmetry differ both when gas was above/below the long-run ratio and across seasons.

By splitting the sample into summer and winter months, we found more evidence of asymmetry. During the winter, the rate at which gas prices are pulled down by oil prices appeared to be higher than it was during the summer. Moreover, splitting the sample by season appeared to amplify the asymmetry, which appeared to be higher during the high-demand summer season and when the cost of gasoline production was higher.

### Pass-through across Cities

Gasoline prices differ by location for a number of reasons. Variation in taxes accounts for a substantial portion of the difference. Differences in supply can vary because of the costs of moving gasoline from the refinery to the retail location. Demand can vary because of commuting patterns, a city's population density, the quality and use of public transportation, total population, and other factors. We suggested above that production costs can cause pricing differentials; thus, variations in weather—in particular, average summer and winter temperatures—across cities can cause differences in the price of gasoline.

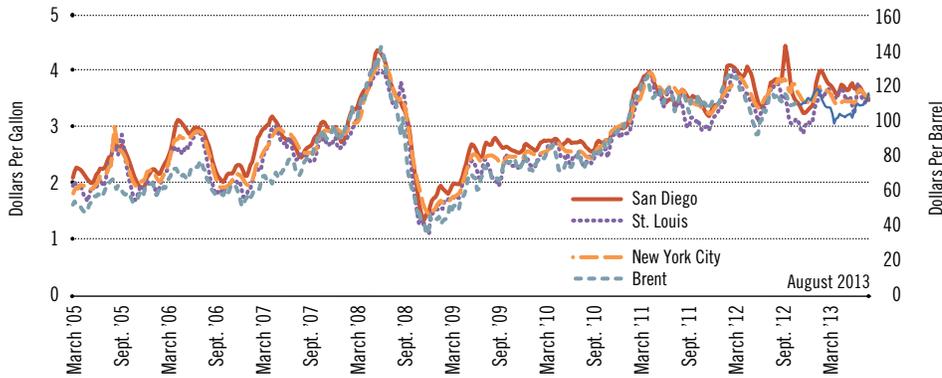
In a 2012 paper, economist Matthew Chesnes studied 27 cities and confirmed the existence of asymmetric pass-through in the gasoline market. He found that the type of fuel used in each city was important for determining the magnitude of the asymmetry: Cities selling predominantly conventional gasoline (St. Louis and Louisville, Ky., for example) were less asymmetric in adjusting to the long-run ratio than were other cities where reformulated gasoline was sold.

The sensitivity of gas prices to oil prices may also vary across cities depending on



FIGURE 2

Gas Prices across Select Cities



SOURCES: *The Wall Street Journal*, Gas Buddy and author's calculations.

market power (or concentration). In a 2008 study, economist George Deltas argued that states with higher average seller margins on gasoline (which implies fewer sellers) had more asymmetric pass-through in levels and a slower speed of adjustment to the long-run ratio.

We calculated pass-through across 162 cities using weekly pretax retail gasoline prices and the Brent oil price from 2005-2013. Because taxes are often assumed to be the principal source of the variation in gasoline prices across cities, we constructed the pretax retail price of gasoline to measure pass-through at the city level. Thus, our local retail gasoline price series excludes national, state and local gasoline-specific excise taxes, as well as local environmental regulation fees and sales taxes imposed on gasoline. Figure 2 shows the time series of pretax gasoline prices for three cities in our sample: New York, San Diego and St. Louis.<sup>7</sup> The cities were chosen to highlight the regional differences in gasoline price dynamics. As one might expect, the gasoline prices in different cities had similar fluctuations, induced, for the most part, by fluctuations in oil prices. However, there were also notable differences: Even after adjusting for taxes, San Diego and New York had higher prices than cities in the Midwest (e.g., St. Louis) possibly due to differences in proximity to Cushing, Okla., (the source for WTI crude oil) or due to differences in gasoline composition.

When we analyzed the relationship between retail gasoline prices and crude oil prices at the city level, we found two main differences. First, the long-run relationship

between gasoline and oil could vary across cities. Second, the effect of changes in oil prices on gasoline could vary across cities. As to the former, we found relatively similar long-run relationships between gasoline and oil across cities. The main difference across cities was in how gasoline prices were adjusted for different taxes in the long-run ratio. Cities exhibited a variety of degrees of asymmetry; among the most asymmetric were Anchorage, Alaska; Bakersfield, Calif.; and Colorado Springs, Colo. In addition, the responsiveness of gas prices in the various cities differed. For example, Sacramento, Calif., was about three times faster to adjust to the long-run ratio than was Boise, Idaho.

Conclusion

The market for gasoline is local, with variations in market concentration, demand, regulation and taxation. Thus, it may not be surprising that we found more asymmetry at the local level than at the national level.

What does the presence of the asymmetry mean for consumers and policymakers? Awareness of the apparent asymmetry can help consumers better forecast (and budget for) gasoline expenditures. Further study is needed to understand the origin of the asymmetry and its consequences for the overall welfare of the economy. 

*Michael 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>.*

ENDNOTES

- <sup>1</sup> See [www.eia.gov/todayinenergy/detail.cfm?id=9831](http://www.eia.gov/todayinenergy/detail.cfm?id=9831).
- <sup>2</sup> See [www.eia.gov/petroleum/gasdiesel](http://www.eia.gov/petroleum/gasdiesel).
- <sup>3</sup> The total effect of oil price fluctuations on gasoline prices cannot vary lest the long-run relationship between the two prices breaks down.
- <sup>4</sup> The evidence for asymmetry is by no means conclusive. In two studies, one by economists Lance J. Bachmeier and James M. Griffen and the other by economist Christopher C. Douglas, no evidence was found that gasoline prices adjust back to the long-run relationship asymmetrically.
- <sup>5</sup> See <http://blog.gasbuddy.com/posts/A-crash-course-on-seasonal-gasoline/1715-401024-239.aspx> for a good summary of the differences in the composition of gasoline across the seasons.
- <sup>6</sup> These cutoffs are fairly arbitrary and may not reflect the true differences in the seasonality.
- <sup>7</sup> The St. Louis metro area includes parts of Southern Illinois. As such, taxes have been removed using a weighted average of the tax rates across the states and local municipalities.

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# Terrorism: A Threat to Foreign Direct Investment

By Subhayu Bandyopadhyay and Javed Younas



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**T**errorism around the world is a problem for foreign direct investment (FDI). For example, a multinational corporation based in the U.S. may find a location in India to be attractive for setting up a plant because of the abundance of cheap and well-trained labor there. However, if that area is also a potential location for insurgency and terrorism, the multinational will have to weigh the benefits from lower wage costs against the possibility of loss of plant, manpower

and equipment from terrorist attacks. On aggregate, a higher incidence of terrorism (as perceived by potential investors) will tend to reduce their willingness to invest in a terrorism-infested area.<sup>1</sup>

Many of the terrorism-afflicted nations are poor and lack vital resources that can be used for counterterrorism. This problem can be partly alleviated by foreign aid.

Let us consider the case of Colombia, which was notorious for drug violence and terrorism in the 1980s and 1990s. In more recent years, Colombia has seen significant declines on these fronts. The figure shows that as terrorism has fallen, FDI has risen. Without careful analysis, we cannot suggest this apparent relationship as causal; however, a link is possible. Fortunately, the literature in this area includes careful studies on the link between terrorism and FDI, studies that have employed rigorous economic theory and econometric methods. The rest of this article provides a sample of this research.

**Impact in Spain, Greece**

A 1996 study by economists Walter Enders and Todd Sandler is one of the first

to quantify the effect of terrorism on FDI. Their study investigated how transnational terrorism had affected FDI flows into Spain and Greece.<sup>2</sup> Using net annual foreign direct investment (NFDI) data from the mid-1970s through 1991, they found that terrorist incidents reduced NFDI in Spain by 13.5 percent and in Greece by 11.9 percent. The authors noted that these reductions amounted to 7.6 percent and 34.8 percent of annual gross fixed capital formation for Spain and Greece,

respectively. Clearly, this means that terrorism had a major negative effect on capital formation in these nations and, in turn, on their potential for economic growth.

### Impact on FDI from the U.S.

A large number of transnational terrorist attacks on the U.S. are conducted against U.S. interests in foreign nations. This is likely to raise the risks for U.S. corporations doing business abroad. In a 2006 study, Enders, Sandler and fellow economist Adolfo Sachsida investigated how terrorism in other nations may have affected FDI from the U.S. into these nations. They found that terrorist attacks lowered U.S. FDI by 1 percent in nations that belong to the Organization for Economic Cooperation and Development (OECD) but had no statistically significant effect in non-OECD nations. Greece and Turkey (OECD members) suffered relatively large damages, amounting to U.S. FDI reductions of 5.7 percent and 6.5 percent, respectively.

### Diversion of FDI

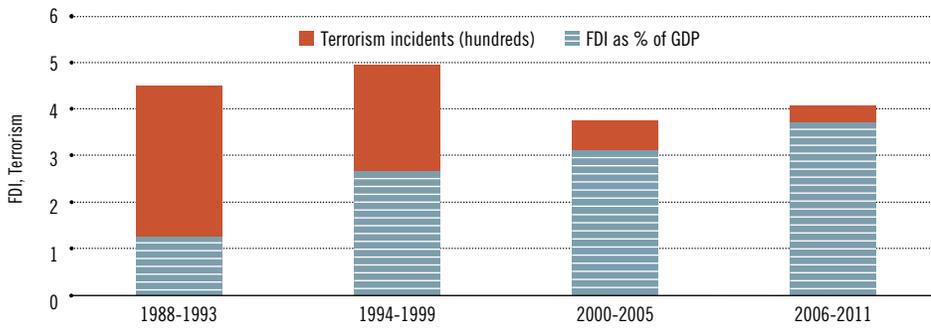
Some studies have argued that terrorist attacks usually destroy only a small fraction of the capital stock of a nation and, therefore, are unlikely to cause major economic damage. A 2008 study by economists Alberto Abadie and Javier Gardeazabal found otherwise. They showed that even when the direct damage to a nation's capital stock is not large, the eventual, overall impact may be large because, for example, fearful foreign investors divert their money to other nations. This diversion can result in a large loss of investment. Using a cross-sectional study, the economists found that a one-standard-deviation increase in the intensity of terrorism in a particular nation can reduce the net FDI position of that nation by approximately 5 percent of its GDP, a large impact.

### Threat to Developing Nations

FDI is considered to be a major source of foreign capital and technology to support economic growth in developing countries. If terrorism reduces FDI flows into these nations, their growth and development can be stymied. This poses a challenge for economists who provide policy advice to international donor agencies like U.S. Agency for International Development and the World Bank.

In their 2014 study on this issue, economists Subhayu Bandyopadhyay, Javed Younas and the aforementioned Sandler focused on 78 developing countries over the period 1984–2008. The authors found that both domestic and transnational terrorism significantly depressed FDI in developing countries. A one-standard-deviation increase in *domestic* terrorist incidents per

## Foreign Direct Investment (FDI) and Terrorism in Colombia



NOTE: Data are averaged over six-year nonoverlapping periods from 1988 to 2011, which gives us four time periods. Terrorism incidents include domestic, transnational and other acts of terrorism that cannot be unambiguously assigned to either of these two categories.

SOURCES: FDI-World Development Indicators (2013); Terrorism-Global Terrorism Database, University of Maryland, College Park.

100,000 people reduced net FDI between approximately \$324 million and \$513 million for the average sample country, whose GDP totaled \$70 billion. A one-standard-deviation increase in *transnational* terrorist incidents per 100,000 people reduced net FDI between approximately \$296 million and \$736 million at the same level of GDP. The loss of FDI, however, was much smaller when it was calculated at the median value of GDP (\$10.4 billion) in the sample.

Many of the terrorism-afflicted nations are poor and lack vital resources that can be used for counterterrorism. This problem can be partly alleviated by foreign aid. Bandyopadhyay et al. found in their study earlier this year that foreign aid can help in this regard and that the evidence suggests significant terror-mitigating effects on FDI. For example, the aforementioned lower estimate of FDI loss from domestic terrorism of \$324 million is reduced to about \$113 million for the average aid-receiving nation, while the lower estimate for transnational terrorism is reduced to about \$45 million from \$296 million.<sup>3</sup>

### As the World Shrinks

In an integrated global economy, terrorism presents policy challenges both at home and abroad. The July 2014 downing over Ukraine of a Malaysian jet carrying Dutch passengers (for the most part) was a stark reminder of this interconnectedness. Accordingly, U.S. policymakers involved with counterterrorism remain vigilant about terrorism in the U.S. and abroad. By focusing on the existing literature on FDI and terrorism, we can see that policy

efforts targeted at reducing terrorism can provide substantial economic benefits to the terrorism-afflicted nations.

The literature also points to the important role that foreign aid may play in terms of containing terrorism and boosting the growth potential of developing nations. The literature on foreign aid has increasingly focused on security concerns rather than on a recipient nation's economic need as a motive behind giving foreign aid.<sup>4</sup> Along similar lines, the aforementioned 2014 study by Bandyopadhyay et al. suggests that foreign aid may be motivated by, among other things, substantial economic benefits in terms of greater FDI flows to nations with reduced terrorism. 

*Subhayu Bandyopadhyay is an economist at the Federal Reserve Bank of St. Louis, and Javed Younas is an associate professor of economics at American University of Sharjah, United Arab Emirates. For more on Bandyopadhyay's work, see <http://research.stlouisfed.org/econ/bandyopadhyay>.*

## ENDNOTES

- 1 Among others, a 2008 paper by economists Abadie and Gardeazabal shows that a greater intensity of terrorism increases the variance of the return to investment while reducing its mean. Clearly, a lower average rate of return to investment in a nation will tend to reduce potential FDI into that nation.
- 2 When a terrorist incident in a certain country involves citizens or property of another country, it is considered to be transnational terrorism.
- 3 The Bandyopadhyay et al. analysis presents a theoretical model in which aggregate aid has unconditional aid and aid tied to counterterrorism as its two components. The theoretical analysis shows that tied aid can reduce the adverse effect of terrorism on FDI. The econometric analysis motivated by this model finds significant benefits of foreign aid in terms of reducing the damages to FDI from terrorism.
- 4 For details on security concerns as a donor motive, see the 2013 study by Bandyopadhyay and Vermann.

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# Credit to Noncorporate Businesses Remains Tight

By Juan M. Sánchez

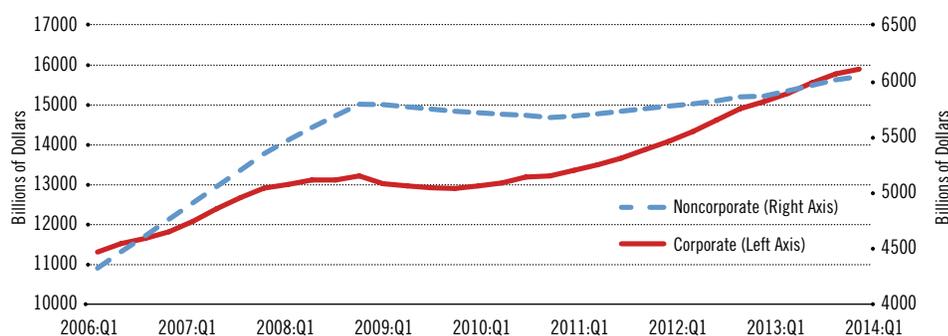
Firms use credit to finance production, working capital, investment in physical capital, and research and development. All these activities are important for the functioning of the economy. In fact, as argued in recent research, there is a strong connection between the development of credit markets and that of the economy.<sup>1</sup>

On June 5, the Board of Governors of the Federal Reserve System published the Financial Accounts of the United States for the first quarter of 2014. This article uses data from that publication to analyze the use of credit by nonfinancial businesses since the financial crisis of 2008. The main finding is that the evolution of outstanding liabilities has been very different for corporate and noncorporate businesses, with a remarkable stagnation in credit to noncorporate businesses.

Figure 1 displays the value of outstanding liabilities of corporate and noncorporate businesses. Since their previous peak (during the financial crisis), liabilities of corporate businesses increased about 20 percent, while liabilities of noncorporate businesses increased only 4 percent. These patterns may be important to understand the strength of the recovery if we take into account the well-established connection between the functioning of credit markets and that of the aggregate economy. Recent research shows that disturbances in financial markets may be an important cause of business-cycle fluctuations.<sup>2</sup>

Corporations are distinguished from noncorporations in two critical ways: (i) the financial sources to which they have access (corporations can issue shares in the stock market and can borrow and lend by issuing bonds, while noncorporations can't do either) and (ii) the ownership and control structure

**FIGURE 1**  
**Total Liabilities of Nonfinancial Businesses**



SOURCE: Financial Accounts of the United States, published by the Board of Governors of the Federal Reserve System.

(a corporation is owned by shareholders but is typically run by a separate group of managers, while noncorporations are typically owned by one or two individuals who also perform as managers).<sup>3</sup> The first element is important to understand the differences in the type of liabilities available for these two groups of firms.

The main components of liabilities for both corporate and noncorporate businesses are credit instruments (e.g., commercial paper, corporate bonds, depository institution loans and mortgages). They represent about 60 percent and 70 percent of the liabilities of corporations and noncorporations, respectively. The rest are trade payables, which are liabilities owed to suppliers for purchases or services rendered; tax payables, which are taxes that a company owes as of the balance sheet date; and others.

Figure 2 displays the evolution of credit market instruments. The difference between corporations and noncorporations is quite striking. Since the financial crisis, corporations increased the value of outstanding credit market instruments by 27 percent,

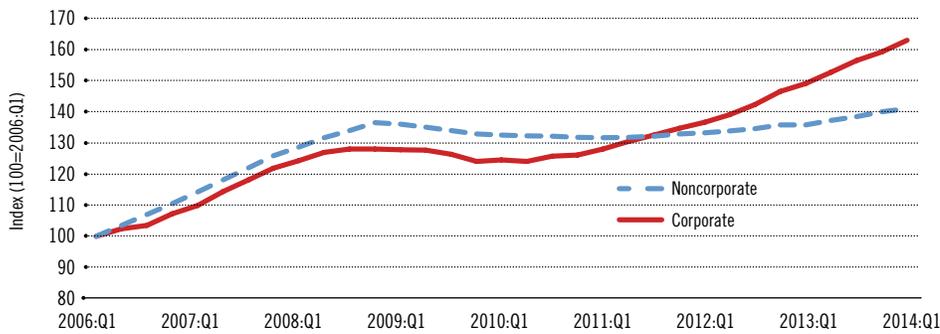
while the same variable increased by only 3 percent for noncorporations.

To understand the evolution of credit market instruments, consider their composition, as shown in Figure 3. For noncorporate businesses, most of the debt is composed of mortgages (69 percent) and loans from depository institutions (27 percent). In contrast, 68 percent of the credit market liabilities of corporations are corporate bonds, which are not available to noncorporate businesses.

The table displays the growth of loans from depository institutions, mortgages and corporate bonds. Recall that the first two are the most important credit instruments used by noncorporate businesses, while the last one is available only for corporations. The trend in loans from depository institutions and in mortgages since the financial crisis is very sluggish for both types of businesses. Actually, for these two instruments, growth was negative for corporate businesses and slightly positive for noncorporate businesses. The key difference is that noncorporate businesses rely on these instruments, while these instruments are much less important for

FIGURE 2

Value of Outstanding Credit Market Instruments

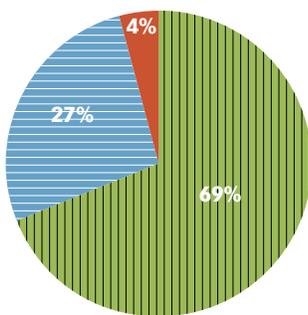


SOURCE: Financial Accounts of the United States, published by the Board of Governors of the Federal Reserve System.

FIGURE 3

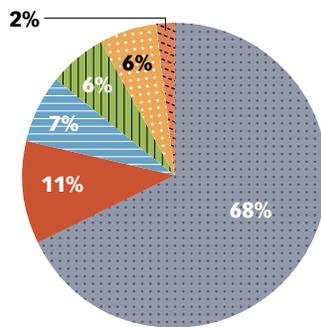
Components of Credit Market Liabilities, by Instruments, 2013

For Nonfinancial Noncorporate Business



Mortgages  
Depository institution loans  
Other loans and advances

For Nonfinancial Corporate Business



Corporate bonds  
Municipal securities  
Commercial paper  
Mortgages  
Depository institution loans  
Other loans and advances

SOURCE: Financial Accounts of the United States, published by the Board of Governors of the Federal Reserve System.

Growth Rates of Key Credit Instruments since 2008:Q4, Annualized

	Corporate	Noncorporate
Depository institution loans	-3.3%	1.5%
Mortgages	-7.3%	0.2%
Corporate bonds	10.3%	n.a.

SOURCE: Financial Accounts of the United States, published by the Board of Governors of the Federal Reserve System.

corporations, as shown in Figure 3. Actually, the strong recovery of credit for corporations is due to the fast growth of corporate bonds; their growth has increased at an average annual rate of 10 percent since 2008:Q4.

Overall, credit to noncorporate businesses remains tight. This phenomenon is mostly accounted for by the sluggish recovery of loans from depository institutions and mortgages, which are very important for this type of business. Tight credit may be affecting the day-to-day operations of noncorporate

businesses since credit is important for growth. Future research should focus on trying to find out the reasons for the weak recovery of lending by banks and other depository institutions. 

Juan M. Sánchez is an economist at the Federal Reserve Bank of St. Louis. For more on his work, see <http://research.stlouisfed.org/econ/sanchez>. Lijun Zhu, a technical research associate at the Bank, provided research assistance.

ENDNOTES

- 1 See, for example, Greenwood, Sánchez and Wang.
- 2 See Shourideh and Zetlin-Jones.
- 3 See Magill and Quinzii, Chapter 6, Section 31, for a thorough discussion.

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## Food Prices and Inflation in China and the U.S. Are Following Similar Paths

By Maria A. Arias and Yi Wen



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Inflation, as measured by growth in the consumer price index (CPI), has been relatively stable during the past two years in both the U.S. and China. Both countries also shared a period of price volatility in the years before and after the Great Recession—a time when commodity prices were fluctuating around the globe. Before 2000, however, prices in China and the U.S. did not always behave similarly. (See Figure 1.)

Food prices, an important component in the CPI, can help explain the relationship between the two countries' overall price co-movements. Fluctuations in food prices in China started to become more strongly correlated to those in the U.S. after China joined the World Trade Organization (WTO) in 2001. Between 1994 and 2001, the correlation<sup>1</sup> was 41 percent; between 2002 and 2013, it rose to 62 percent. (See Figure 2 and the table.)

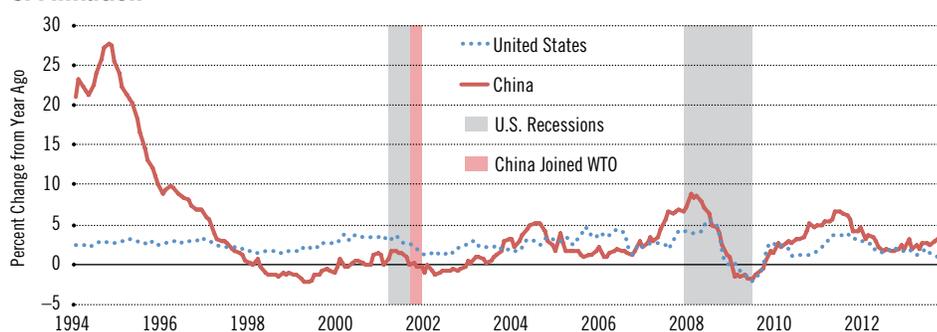
But what drives the co-movement in food prices of the two countries? Are there explanations other than this co-movement for the increased synchronization of inflation in China and the U.S.? Let's look at some possible answers to these questions.

### World Food and Commodity Prices

Some people think that prices in general and food prices in particular are highly correlated in the U.S. and China because both sets of prices are affected by some worldwide factors, such as movements in world food prices. Data show that this is true for China, but not for the U.S.

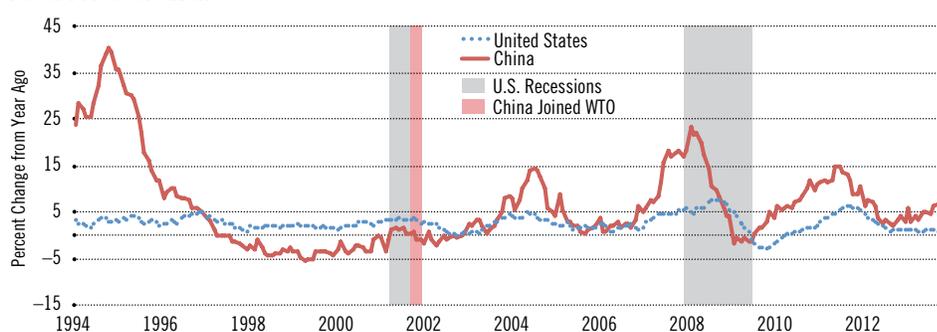
China's food prices were strongly correlated with world food prices between 2002 and 2013 (80 percent correlation), while U.S. food prices during the same period were not that highly correlated to world food prices

**FIGURE 1**  
**CPI Inflation**



SOURCES: Organization for Economic Cooperation and Development, Federal Reserve Economic Data (FRED).

**FIGURE 2**  
**Food Price Growth**



SOURCES: Organization for Economic Cooperation and Development, Federal Reserve Economic Data (FRED).

(34 percent). Similarly, Chinese food prices were strongly and significantly correlated with the S&P Goldman Sachs Commodity Index between 2002 and 2013 (49 percent), while the correlation between U.S. food prices and the S&P GSCI was low (10 percent) and not statistically significant.

### Exchange Rates and Money Supply

Looking at food prices from a monetary standpoint, another likely explanation could be related to currency exchange rates. China has a targeted floating exchange rate with

the dollar; so, higher money supply in the U.S. should lead to higher money supply in China. If this were true, CPI inflation in China and the U.S. should fluctuate in similar patterns.<sup>2</sup>

The data are not conclusive regarding this explanation. The correlation between CPI inflation in the U.S. and China more than doubled, from 24 percent between 1994 and 2001 to 57 percent between 2002 and 2013. But the correlation between M1 money supply in the U.S. and China is negative, and it weakened from -59 percent between 1994

and 2001 to -28 percent between 2002 and 2013. Moreover, there has not been any significant shift in monetary and exchange rate policy toward closer policy coordination. If anything, China has relaxed the yuan's link to the U.S. dollar in recent years.

### Agricultural Trade Volumes

Given that the price correlations are markedly stronger after China joined the WTO, and since the other two possible explanations are not very conclusive, the structural change can likely be explained by the strong increase in trade, particularly agricultural trade, between China and the U.S. From 1991 until 2001, when China joined the WTO, agricultural exports from the U.S. to China grew 168 percent and agricultural imports grew 146 percent. During the 10 years after China joined the WTO, agricultural exports from the U.S. to China and imports from China to the U.S. grew 874 percent and 388 percent, respectively. (See Figure 3.)

In 2013 alone, about 18 percent of total U.S. agricultural exports went to China (\$25.9 billion), including \$13.4 billion in soybeans, \$4.7 billion in grain and feed cereal, \$3.7 billion in livestock and animal products, and \$2.2 billion in cotton. However, only about 4 percent of U.S. agricultural imports in 2013 came from China (\$4.4 billion), including \$1.7 billion in fruit and vegetable products, \$0.6 billion in livestock and animal products, and \$0.5 billion in grain and feed cereal, in addition to \$2.7 billion of fish (which is considered a nonagricultural commodity).

Soybean trade is particularly interesting. International prices for soybeans are highly correlated with food prices around the world. The correlations strengthened after 2002 for China, the U.S. and the entire world.<sup>3</sup> (See the table.) Since the early 2000s, soybeans have accounted for 40 to 60 percent of U.S. agricultural exports to China, peaking at 70 percent in 2009. Soybeans drove most of the surge in agricultural trade between both countries after 2002.

### Intersecting Needs

Agricultural trade between China and the U.S.—the two largest economies in the world—is substantial and has been increasing rapidly and steadily, making not only

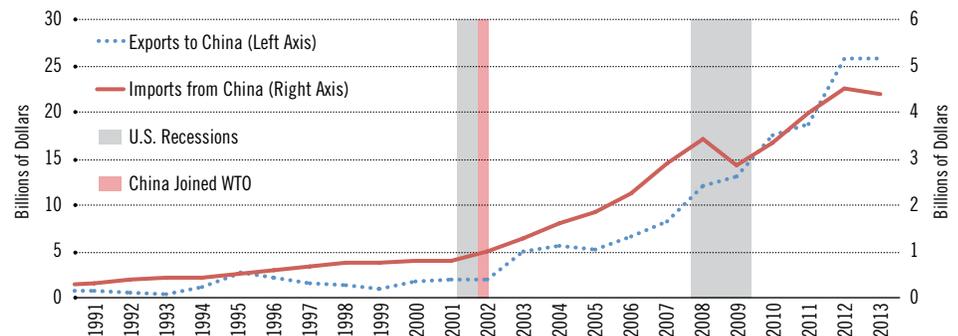
China's food prices sensitive to those in the U.S., but also vice versa. Urbanization and higher incomes have helped shift Chinese people toward more protein-based diets, thus fueling demand for feed cereal and livestock and putting upward pressure on U.S. agricultural products. The heavy reliance by Americans on consumer goods from China may also make the U.S. cost of living sensitive to that in China, and Chinese production costs, especially wages, have been rising rapidly in recent years. Such developments can only imply stronger cross-country correlations in food prices and CPI inflation between the two countries. <sup>1</sup>

*Yi Wen is an economist and Maria A. Arias is a research associate, both at the Federal Reserve Bank of St. Louis. For more on Wen's work, see <http://research.stlouisfed.org/econ/wen>.*

### ENDNOTES

- Correlation is a measure of the statistical relationship between two random variables. If they are perfectly synchronized in movements, the correlation is 1; if they have no relationship or similarities at all, then the correlation is 0.
- If the money supply in the U.S. increases, there is more money chasing the same amount of goods, putting upward pressure on U.S. prices. Therefore, China's money supply has to increase in order to maintain the same exchange rate level, which should also lead to higher prices in China. Throughout this article, we use M1 money stock as a measure of the money supply; M1 includes notes and coins in circulation, traveler's checks, demand deposits and checkable deposits.
- Even though U.S. food prices are not as highly correlated with international soybean prices, the correlation strengthened in the period after 2002.

**FIGURE 3**  
**Agricultural Trade between China and the U.S.**



SOURCES: U.S. Census Bureau, U.S. Department of Agriculture Foreign Agricultural Service.

### Selected Correlations

	Food Prices in U.S. and China	CPI in U.S. and China	International Soybean Prices		
			U.S. Food Prices	China Food Prices	World Food Prices
1994-2001	0.41	0.24	0.25	0.14	0.45
2002-2013	0.62	0.57	0.38	0.65	0.76

SOURCES: Organization for Economic Cooperation and Development, International Monetary Fund, Food and Agriculture Organization of the United Nations, Federal Reserve Economic Data (FRED) and Haver Analytics.

NOTE: The first two columns in the table show the correlation in food price fluctuations, as well as that of CPI inflation, in both countries (columns) during the respective periods (rows). Likewise, the right-hand side of the table shows the correlation between international soybean prices and food prices in each of the three regions during the respective periods. (See endnote 1 for an explanation of correlation.)

## Manufacturing Shares the Stage with Service Sectors in Jackson, Tenn.

By James D. Eubanks and Charles S. Gascon



PHOTO COURTESY OF WEST TENNESSEE HEALTHCARE

West Tennessee Healthcare employs more than 5,000.

In western Tennessee, the area around Jackson has leveraged its manufacturing base to evolve into a center for services in the largely rural stretch between Memphis and Nashville.

Jackson experienced a manufacturing boom in the 1990s that set the stage for economic growth in the following decade and beyond. From 1990 to 2000, manufacturing employment in the two largest counties in the area—Chester and Madison—increased by more than a third, even as manufacturing employment nationwide fell slightly. Both population and nonfarm payrolls in Jackson grew faster than the national average during this period.

Jackson's road and rail connections, as well as its low rates of unionization and numerous state and local incentives, made it an attractive location for manufacturers; Jackson's position on Interstate 40 between Memphis and Nashville gives local companies access to the logistics and distribution network in Memphis and the growing markets and industrial base of the Nashville area. While manufacturing is still vital to Jackson's economy, in recent years the city has emerged as the center for services in this otherwise rural area.

The Jackson metropolitan statistical area (MSA), which now includes Chester, Crockett and Madison counties, has a population of about 130,650 people and a labor force of

about 63,190. Between 2000 and 2013, the population of the MSA increased 7 percent, slower than the growth rates in both Tennessee (13.9 percent) and the nation (15.6 percent). Chester County, home to 13.3 percent of the MSA's population, grew the fastest (11.6 percent), followed by Madison County (7.2 percent), where the majority of the Jackson-area population resides. Crockett County registered growth of just 0.3 percent.

The borders of Jackson's MSA are in flux. Last year, the U.S. Office of Management and Budget added Crockett County to the area based on its increasing economic ties to Jackson. However, the Bureau of Labor Statistics (BLS) has yet to make the change, still considering the MSA to be made up of just Chester and Madison counties. Unless otherwise indicated in this article, the use of Jackson refers to the three-county area.

In 2013, Jackson's gross metropolitan product was \$5.77 billion, about 8.5 percent of the size of the nearby Memphis economy and 5.7 percent of the size of the Nashville economy. Per capita personal income in Jackson grew 41.4 percent to \$36,721 between 2002 and 2012, faster than the

37.6 percent growth rate for the nation. Although per capita personal income in Jackson is 16 percent lower than the national average, the cost of living is 18 percent lower.

In Madison County, 23.8 percent of those 25 and older hold a bachelor's degree or higher. In Chester and Crockett counties, 15.4 and 12.3 percent hold a bachelor's degree or higher, respectively. The average for the U.S. is 28.5 percent.

### Economic Drivers

In 2000, manufacturing was the largest sector (by employment) in Madison and Chester counties, employing more than 20 percent of workers.<sup>1</sup> Today, manufacturing is the third-largest sector by employment in this area and makes up 13.3 percent of total employment. (Still, the percentage is higher than the nation's 8.7 percent.) Manufacturers Delta Faucet, Kellogg, Pinnacle Foods, and Stanley Black and Decker are among the 10 largest employers in Madison County. The area continues to attract investment in manufacturing: The Jackson Chamber of Commerce reports that there was more than \$1 billion in industrial investment between 2003 and 2013.

The education and health services sector has become increasingly important to the local economy. In late 2009, this sector surpassed manufacturing to become the largest private sector by employment in Madison and Chester counties. The majority of employees in this sector work in health care and social services. Jackson's health care providers have grown to serve the entire region between Memphis and Nashville: The Jackson chamber reports that more than 60 percent of the patients at Jackson's largest hospital are not from Madison County, where Jackson is the county seat. The largest employer by far in Madison County is West Tennessee Healthcare, which employs more than 5,000. Other top-10 employers in Madison County include Union University and the Regional Hospital of Jackson.

Although the rising importance of education and health care reflects Jackson's emergence as the hub for services in the area, it is also part of a national trend. Between 2003 and 2013, the sector grew 28 percent in Jackson's two largest counties and 25.6 percent nationwide. The sector accounts for about the same share of employment in the area (15.9 percent) as in the U.S. (15.5 percent).

Meanwhile, the public sector has been an important source of employment in Jackson for decades. Government became the largest sector by employment in Madison and Chester counties in late 2003, largely because of declines in manufact-

uring employment rather than increases in government employment. At the start of the recession in late 2007, government employment was 12,300; in March 2014, it was 12,700. The majority of government employees in the area work for local government. Three of the 10 largest employers in Madison County are in the public sector: the city of Jackson, Madison County government and the Jackson-Madison County School System. The Tennessee Supreme Court's courthouse for West Tennessee is also located in Jackson.

### Current Conditions

At 7.8 percent in July 2014, the unemployment rate in the three-county MSA is higher than the nation's (6.2) and Tennessee's (7.1). However, the rate has fallen more quickly in Jackson than in the nation as a result of both increasing employment and a declining labor force. Between May 2013 and May 2014, Jackson's rate declined from 8.9 percent to 7.0 percent, while the U.S. rate declined from 7.5 percent to 6.3 percent. The unemployment rate in Jackson increased during the summer as the labor force grew faster than employment.

Nonfarm payrolls in Jackson's two largest counties grew much more quickly than the national average from October 2010 to February 2013. Most jobs added during this time were in the professional and business services sector. The education and health services sector also steadily added jobs during this time, as did the wholesale trade sector. Later

## MSA Snapshot

### Jackson, Tenn.

Population	130,645
Labor Force	63,190
Unemployment Rate	7.8%
Personal Income (per capita)	\$36,721
Gross Metropolitan Product	\$5.77 billion

### LARGEST LOCAL EMPLOYERS

1. West Tennessee Healthcare	5,368
2. Jackson-Madison County School System	2,019
3. Delta Faucet	880
4. Union University	835
5. Kellogg	735

### NONFARM EMPLOYMENT BY SECTOR

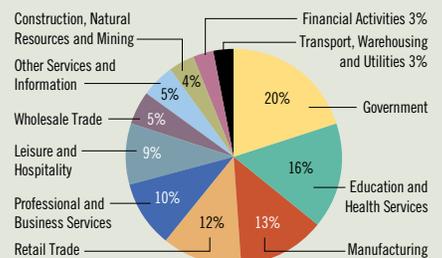


PHOTO COURTESY OF DELTA FAUCET

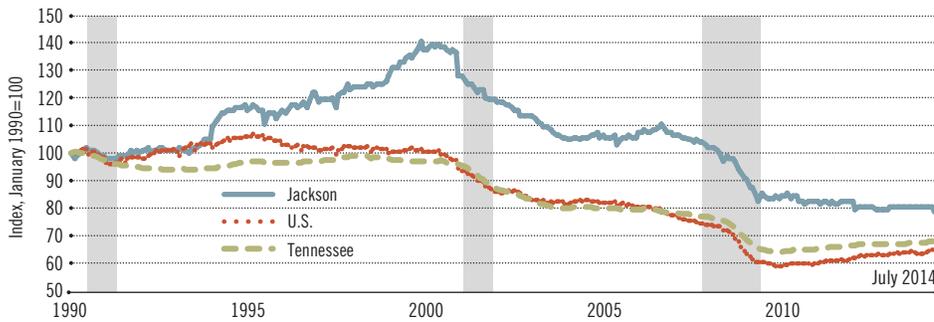
For a long time, manufacturing drove the economy of the Jackson area, thanks to the area's road and rail connections, low rates of unionization, and numerous state and local incentives. The sector is still important, what with major employers such as Delta Faucet, Kellogg, Pinnacle Foods, and Stanley Black and Decker, and productivity is still rising. However, employment in this sector is declining.



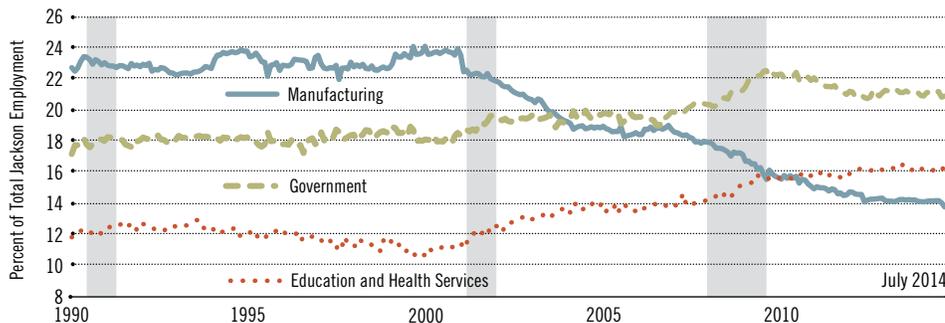
PHOTO COURTESY OF TENNESSEE COURTS

Today, more people in the area work in service sectors than in manufacturing. The government sector is No. 1 in employment, largely because of declines in manufacturing employment rather than increases in government workers. The majority of these employees work for local government, including the city of Jackson, Madison County and the Jackson-Madison County School System. The private sector that employs the most is education and health services.

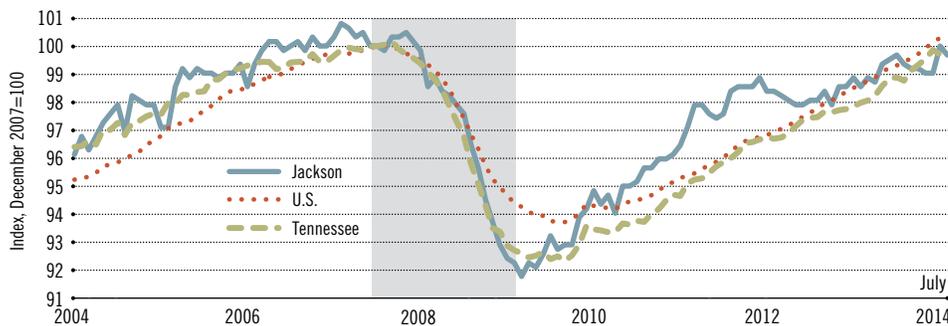
**FIGURE 1**  
**Manufacturing Employment**



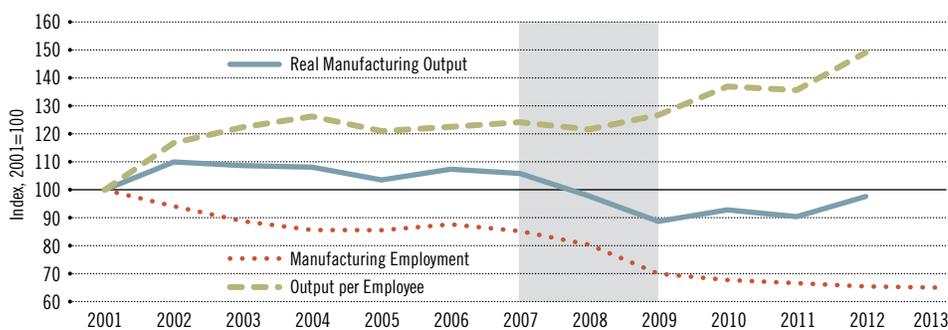
**FIGURE 2**  
**Jackson Employment Shares**



**FIGURE 3**  
**Nonfarm Payrolls**



**FIGURE 4**  
**Jackson Manufacturing Productivity**



NOTE: Real manufacturing output is the dollar value of manufacturing output in inflation-adjusted terms. Output per employee is real manufacturing output divided by the number of employees in manufacturing.

To see these charts with the latest data, as well as to see other data on the Jackson MSA, check out our data dashboard at <http://research.stlouisfed.org/dashboard/872>. In each of the four charts above, the gray bars represent recessions. The Bureau of Labor Statistics was a source for data in all four charts; in addition, Figure 4 used data from the Bureau of Economic Analysis. Employment data from the BLS Establishment Survey do not cover Crockett County.

in 2013, nonfarm payroll growth slowed to the national rate and has since dropped below that rate. Total employment has not quite recovered to its prerecession peak: In July 2014, total nonfarm employment was 0.3 percent below its level in December 2007.

Manufacturing employment in Chester and Madison counties has declined in year-over-year terms for the past six years. This mirrors the national trend. The declines in manufacturing employment could partly be a result of increases in efficiency: Jackson's manufacturing output in real terms in 2012 was only 2.4 percent below its level in 2001, when manufacturing employment in Jackson was near its peak. Although manufacturing employment has decreased significantly, Jackson continues to attract industrial businesses. According to figures from the Jackson chamber, new investment from existing industry in 2012 was above its 2003-2012 average. Two manufacturing companies have recently announced plans to expand or open new facilities in Jackson. Still, total business investment, which includes investment by newly recruited companies, has fallen over the past decade.

The education and health services sector experienced sustained growth between 2010 and 2012, but this growth has since slowed considerably. West Tennessee Healthcare has announced plans to cut positions, offer early retirement packages to hundreds of employees and reduce paid time off.

### Going Forward

The diversification of Jackson's economy since 2000 has positioned it for moderate growth over the next 10 years, with the majority of employment growth likely to come from service industries.

Employment in Jackson's second-largest sector, education and health services, is expected to continue to grow nationally. The Bureau of Labor Statistics projects education services employment to grow by 1.9 percent and health care and social assistance employment to grow by 2.6 percent from 2012 to 2022. Over the past decade, Jackson's growth in these sectors has been consistently higher than national growth. If this trend continues, these sectors will provide many of the new jobs in Jackson over the next 10 years.



PHOTO COURTESY OF UNION UNIVERSITY

Education and health services is the private sector that employs the most people in the area these days. This sector is expected to provide many of the new jobs in Jackson in the next 10 years. Among the leading employers in this sector is Union University, a private university founded in 1823.

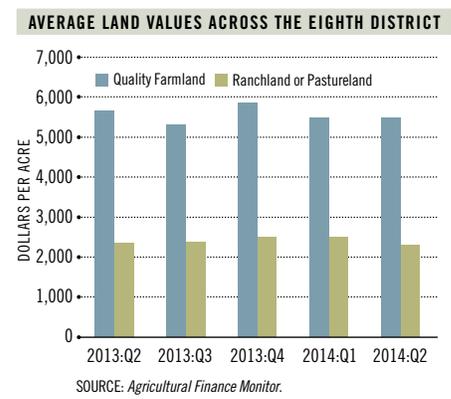
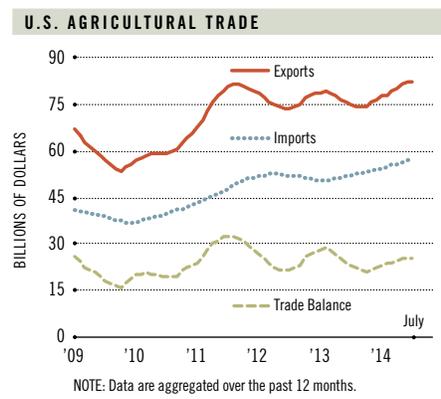
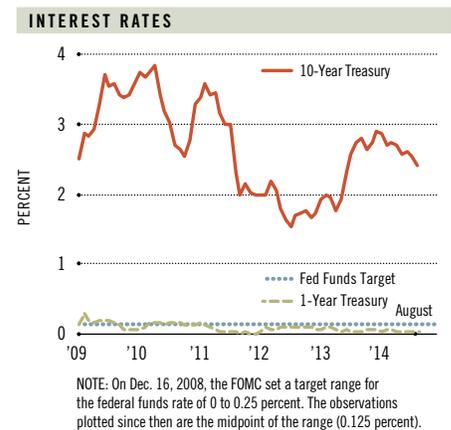
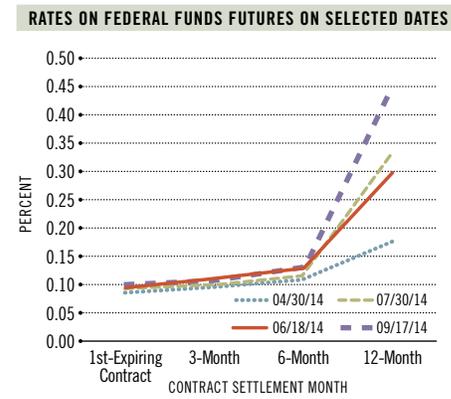
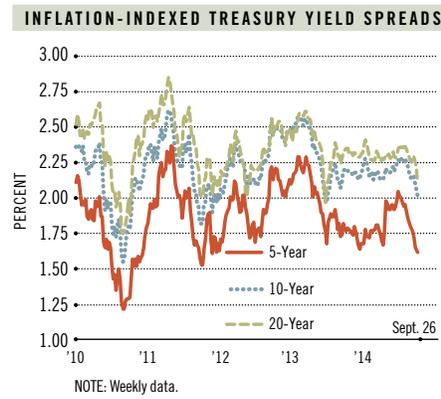
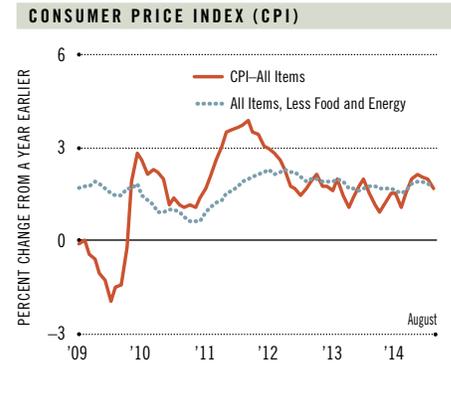
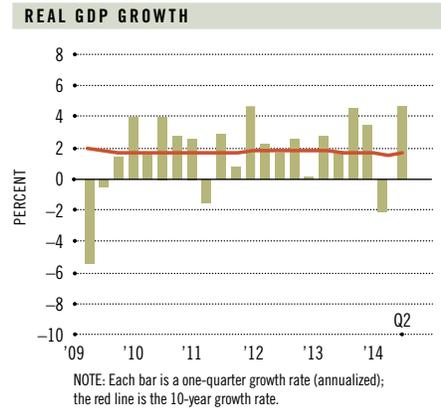
Employment in Jackson's third-largest sector, manufacturing, will likely remain relatively stable over the next decade. Manufacturing output may continue to grow, but productivity gains will allow manufacturers to produce more goods with fewer employees. The BLS predicts manufacturing employment nationwide will decline by 0.5 percent between 2012 and 2022, an improvement over the 2.4 percent decline in the previous 10 years. Jackson's rapid manufacturing growth bucked national and state trends during the '90s, but since 2000, developments in manufacturing employment in Jackson have mirrored the state and national trends. <sup>1</sup>

*Charles S. Gascon is a regional economist, and James D. Eubanks is a research associate, both at the Federal Reserve Bank of St. Louis. For more on Gascon's work, see <http://research.stlouisfed.org/econ/gascon>.*

ENDNOTE

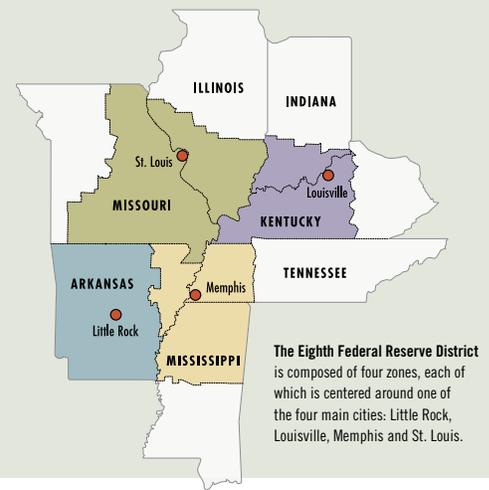
<sup>1</sup> Employment data for the Jackson MSA come from the Establishment Survey of the Bureau of Labor Statistics and, therefore, do not include Crockett County.

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](http://www.stlouisfed.org/economyataglance).



# Buying Power of Minimum Wage Varies across and within States

By Charles S. Gascon



In his 2014 State of the Union address, President Obama called on Congress to raise the federal minimum wage to \$10.10 from \$7.25. Soon after, states and cities began to act on their own. Connecticut became the first state to respond by increasing its minimum wage to \$10.10, which will take effect in 2017. In Seattle, city lawmakers passed a \$15 minimum wage bill, also to go into effect in 2017.

Although only 4.3 percent of all hourly paid workers earned the federal minimum wage or less<sup>1</sup> in 2013<sup>2</sup>, raising the minimum wage seems to be a topic that garners a lot of interest from citizens in every income bracket. The debate about the effects of the minimum wage is ongoing; lawmakers consider the impact that a change in the minimum wage will have on businesses, unemployment, worker productivity and the financial well-being of those employees who receive the minimum wage. Although there are many facets of this debate, this article will focus on how the varying cost of living across and within states affects the buying power of workers earning the minimum wage.

From 1998 to 2007, the federal minimum wage remained fixed at \$5.15. During this period, many states thought they would be better off—either because of the cost of living or for political ideological reasons—with a higher minimum wage. By 2007, there were 29 states with a minimum wage above the federal limit.<sup>3</sup> In subsequent years, the federal minimum wage increased incrementally—to \$7.25 from \$5.15 by the end of 2009—and surpassed many of the state minimums that had previously risen above it.

The federal minimum wage has been unchanged since the end of 2009. States have again begun to raise their minimums above

the federal limit. In 2012, there were 18 states with minimum wages above the federal rate, up from 12 in 2009. The states with minimum wages at least a dollar greater than the federal minimum wage in 2012 were Washington (\$9.04), Oregon (\$8.80), Vermont (\$8.46), and Connecticut, Illinois and Nevada (\$8.25).<sup>4</sup>

## Cost-of-Living Differences across States

One of the motivations to have differing minimum wages is to adjust for cost of living, which varies widely throughout the country. The Bureau of Economic Analysis (BEA) developed regional price parities (RPPs), which measure differences in the price levels of goods and services across state and metropolitan areas. The national price level is indexed to 100, and the individual state and metro-area RPPs are expressed as a percentage of the national price level. In 2012, Hawaii had the highest cost of living with an RPP of 117.2, meaning the cost of living in Hawaii was 17.2 percent higher than the national average. Hawaii was followed by New York, New Jersey and California as states with the highest cost of living. The state with the lowest cost of living was Mississippi, with an RPP of 86.4, meaning the cost of living in Mississippi was 13.6 percent less than the national average. Mississippi was followed by Arkansas, Alabama and Missouri as states with the lowest cost of living.<sup>5</sup>

Adjusting each state's minimum wage using its RPP is a measure of the "real" minimum wage, or the minimum wage after accounting for cost of living. The states with the highest RPP-adjusted minimum wages, or real minimum wages, were Oregon (\$8.91), Washington (\$8.76), Ohio (\$8.63), Nevada (\$8.40) and Mississippi (\$8.39). Mississippi, notably,

had the lowest possible minimum wage (the federal minimum wage) but still had the fifth-highest real minimum wage because of the low cost of living. The states with the lowest real minimum wages were Hawaii (\$6.19), New York (\$6.28) and New Jersey (\$6.35), all of which had minimum wages equal to the federal minimum in 2012. Other notable differences appear in Connecticut, which was tied for the fourth-highest minimum wage but had a below-average real minimum wage, and California, which was tied for the seventh-highest minimum wage but had the seventh-lowest real minimum wage. If the target for each state was to have a real minimum wage equal to the federal minimum wage of \$7.25, then Mississippi would set the minimum wage at \$6.26, while Hawaii would set the minimum wage at \$8.50.

## Cost-of-Living Differences within States

Although most minimum wages are set at the state level, cost-of-living discrepancies also occur within states, skewing the purchasing power of workers within a state. For example, the RPP of the Chicago and Danville metropolitan statistical areas (MSAs), the highest- and lowest-cost-of-living MSAs in Illinois, were 106.6 and 79.4, respectively. Given Illinois' minimum wage of \$8.25, the purchasing power of a Chicago minimum-wage earner is \$7.74, while the purchasing power of a Danville minimum-wage earner is \$10.39. Chicago would need to set its minimum wage to \$11.08 if it wanted its minimum-wage earners to have the same purchasing power as the minimum-wage workers in Danville. In California, which had an \$8 minimum wage in 2012, the highest-cost-of-living MSA, San Jose-Sunnyvale-Santa Clara, had a real

minimum wage of \$6.56, while the lowest-cost-of-living MSA, El Centro, had a real minimum wage of \$8.68.

In order to address the cost-of-living variances within states, some cities have set their own minimum wages. In 2013, San Jose's new minimum wage law came into effect, raising the city's minimum wage to \$10 an hour, \$2 above the state minimum. This translated to a real minimum wage of \$8.20,<sup>6</sup> still 48 cents below the real minimum wage of El Centro. Although minimum-wage increases like these compensate for cost-of-living differences, there are some concerns that varying minimum wages within a state could have adverse effects. Recently, Oklahoma created a state law forbidding cities from raising their minimum wage above the state minimum out of fear that it would cause businesses to flock to cities with lower minimum wages and harm communities elsewhere.

### The Eighth District

Turning to the seven states that make up the Eighth District, Illinois was the only state with a minimum wage above the federal minimum in 2012. However, due to the low cost of living, the states within the Eighth District rank in the upper half in terms of real minimum wage: Mississippi—\$8.39, fifth in the country; Arkansas—\$8.28, seventh; Missouri—\$8.23, eighth; Illinois—\$8.20, 11th; Kentucky—\$8.16, 13th; Tennessee—\$7.99, 20th; and Indiana—\$7.96, 22nd.

The largest MSAs of the Eighth District also have real minimum wages considerably higher than the federal minimum wage. In 2012, the real minimum wages of the four largest MSAs in the district were St. Louis (\$8.16), Louisville (\$7.98), Little Rock (\$7.96) and Memphis (\$7.87). The MSA in the Eighth District with the highest real minimum wage was Carbondale-Marion, Ill., at \$9.81. This is due to both the high minimum wage in Illinois and the relatively low cost of living in southern Illinois. The lowest real minimum wage in the district was in Columbia, Mo., at \$7.86, still 61 cents above the federal minimum wage.

### Revisiting Seattle and Connecticut

Using RPPs, we can estimate what the real minimum wages of Connecticut and

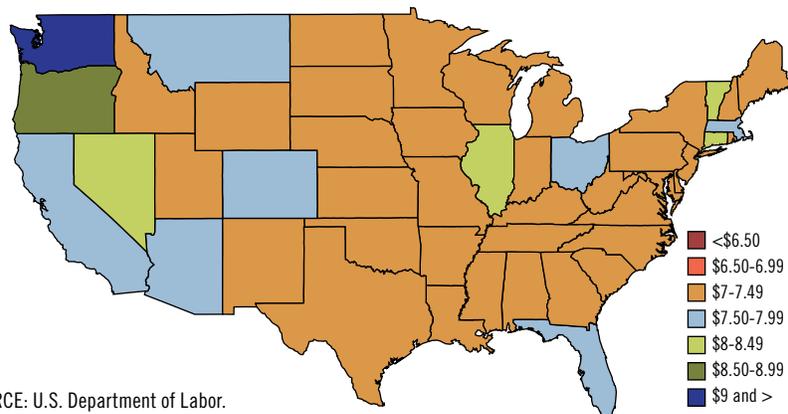
Seattle will be in 2017, the year their new laws are fully enacted. After factoring in inflation and cost of living, the Seattle real minimum wage will be about \$12.72, while the Connecticut real minimum wage will be about \$8.37.<sup>7</sup> Many more states and cities have crafted new minimum-wage legislation, and it will be interesting to see how these new minimum wages, along with changes in cost of living, affect the real minimum-wage picture going forward. 

*Charles S. Gascon is a regional economist at the Federal Reserve Bank of St. Louis. For more on his work, see <http://research.stlouisfed.org/econ/gascon>. Quinn Leventhal, a research intern at the Bank, provided research assistance.*

### ENDNOTES

- 1 Although minimum wage laws apply to almost everyone, they do not apply to tipped employees, full-time students or employees of enterprises that have annual gross volume of sales or business below \$500,000.
- 2 See [www.bls.gov/cps/minwage2013.pdf](http://www.bls.gov/cps/minwage2013.pdf).
- 3 Minimum-wage law is structured so that if the federal, state or municipal minimum wages differ, then the worker receives the largest of the conflicting minimum wages.
- 4 If a state sets a lower minimum wage for small businesses, I ignored that lower minimum wage and used the higher one since the majority of minimum-wage workers are employed by medium or large businesses.
- 5 The regional price parity numbers for 2013 were not available at the time this article was written; so, the 2012 numbers were used.
- 6 Using 2012's Regional Price Parity number.
- 7 For inflation, I used the 5-year expected inflation rate for the nation as of July 23, 2014. Let  $i$ =inflation,  $MW$ =2017 minimum wage,  $RPP$ =2012 RPP and  $RMW$ =real minimum wage in 2017 in 2012 dollars.  
Then,  $RMW = \frac{MW}{i^5} * \frac{100}{RPP}$

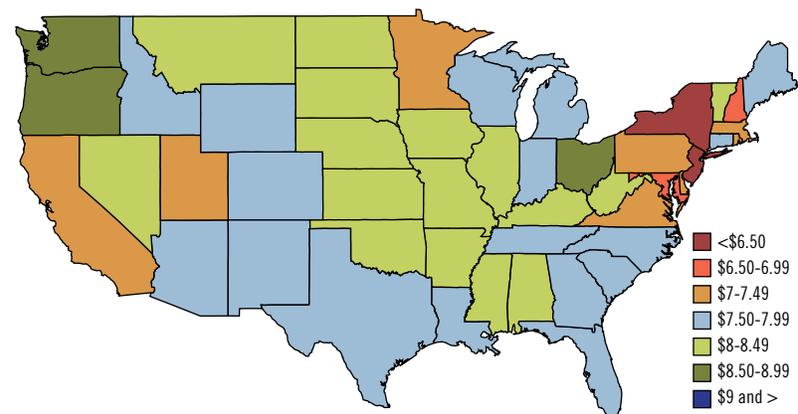
### 2012 Actual Minimum Wage



SOURCE: U.S. Department of Labor.

NOTE: The actual minimum wage is what the law called for in that state as of 2012. The real minimum wage accounts for the cost of living in a state, given that it's often higher or lower than a national average. The real wage shows the buying power of the minimum wage in that state. The real wage is calculated using regional price parities (RPPs). These measure differences in the price levels of goods and services across states. Although not shown on these maps, RPPs are also available for metropolitan areas. The minimum wages (actual, real) in Alaska (\$7.75, \$7.24) and Hawaii (\$7.25, \$6.19) are not shown in the maps.

### 2012 Real Minimum Wage



SOURCES: U.S. Bureau of Economic Analysis, Department of Labor and author's calculations.

# Optimism Prevails as GDP Snaps Back from Q1 Decline

By Kevin L. Kliesen

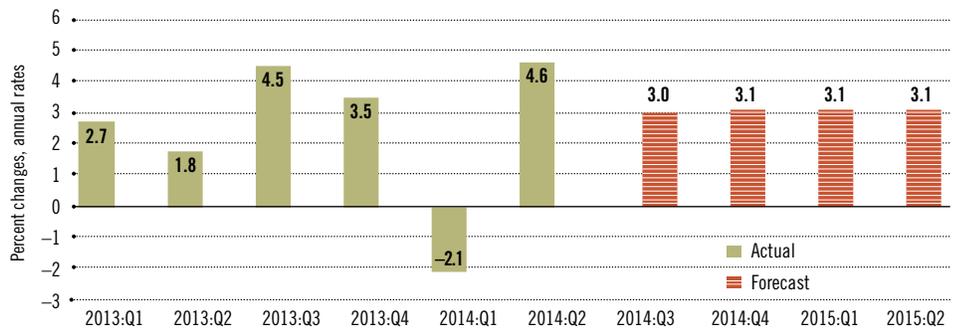
The U.S. economy rebounded smartly in the second quarter, following an unexpected decline in the first quarter. Increasingly, it appears that the first-quarter decline in real gross domestic product (GDP) reflected temporary disturbances rather than a longer-lasting erosion of economic activity. Although persistently weak growth in labor productivity remains a blight on the longer-term outlook, other developments suggest that the economy is building some healthy momentum over the second half of 2014 that should carry forward into 2015. Importantly, inflation continues to be low and stable.

## Momentum Restored

According to the third estimate published by the Bureau of Economic Analysis, U.S. real GDP increased at a 4.6 percent annual rate in the second quarter of 2014. This increase more than offset the 2.1 percent rate of decline in the first quarter of this year; Q2 growth also was more than 1 percentage point stronger than the consensus of professional forecasters. The second-quarter rebound reflected solid growth in real consumer outlays, a significant pickup in the pace of capital expenditures by businesses, brisk growth of real residential fixed investment and the largest increase in exports since late 2010. Although inventory investment (goods produced but not sold) contributed 1.4 percentage points to second-quarter real GDP growth, this buildup followed two consecutive quarters of falling inventories of about equal magnitude, on net.

Undoubtedly, some of the rebound in the second quarter reflected a snapback in activity that occurred in the aftermath of the weather-related slowdown in the first quarter (in addition to other temporary factors). However, given that real GDP had registered a 4 percent rate of growth over the second half of 2013, it is conceivable that only a relatively small portion of the rebound in activity in the second quarter of 2014 reflected a weather-related snapback.

Real GDP Growth: Actual and Forecast



NOTE: Actual GDP data as of Sept. 26, 2014. Forecast is from the Survey of Professional Forecasters, Federal Reserve Bank of Philadelphia, Aug. 15, 2014.

If so, third-quarter data flows and forecasts should point to healthy growth over the second half of 2014. Professional forecasters see real GDP growth averaging 3 percent over the second half of 2014 and most of 2015. What accounts for this optimism?

First, consumer and business optimism is improving. The Conference Board's consumer confidence measure in August 2014 rose to its highest level during this expansion; sales of new autos, an indicator of consumer willingness to spend on big-ticket items, are on pace to be the highest since 2006. Also, corporate profits and earnings are healthy, and financial market conditions reveal few signs of impending distress. Accordingly, surveys and forecasts point to solid growth of real consumer outlays and business capital spending over the second half of this year.

Second, other than the weakness in labor productivity, labor market conditions have been vibrant, helping to underpin the improving outlook for the consumer and businesses. Average monthly job gains thus far in 2014 have exceeded 200,000, the unemployment rate is on pace to end the year below 6 percent and the number of job openings reported by private-sector employers in July 2014 was at its highest level in over seven years.

Third, housing activity is on the upswing after struggling over the second half of 2013. In July, total home sales (new plus existing) were at their highest level since October 2013. Housing should also continue to benefit from strong job growth and the expectation of relatively low mortgage interest rates over the near term.

As always, there are cross currents in the data and risks to the outlook that are difficult to quantify. First, real consumer outlays fell

unexpectedly in July. Although real consumption spending rebounded sharply in August, a pullback by consumers in the fourth quarter would cause forecasters to temper their near-term expectations for growth.

Second, economic activity appears to be weakening in Europe and Japan, which are important U.S. trading partners. Third, a further escalation of hostilities in the Middle East and Eastern Europe would undoubtedly harm business confidence and financial market sentiment. As the 2011 European banking and sovereign debt crisis showed, this development could impair global economic conditions.

## Inflation Remains Moderate

After posting larger-than-expected gains over the first half of 2014, inflation pressures appear poised to moderate over the second half of the year. Notably, increases in food and energy prices have moderated. Expectations of a record U.S. corn and soybean harvest have reduced commodity prices. Likewise, oil prices have trended lower since mid-June, pushing retail gasoline prices in late August to their lowest levels since February. Finally, inflation and inflation expectations remain relatively low and stable. Stable inflation expectations help to reduce uncertainty among businesses and financial market participants, and these expectations afford the Federal Reserve some flexibility in its implementation of monetary policy over the short term. 

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.

ASK AN ECONOMIST



**Christian Zimmermann** is an economist and assistant vice president at the Federal Reserve Bank of St. Louis, where he started working in 2011 after a career in academia. While his research touches on an eclectic set of issues in macroeconomics, he is also involved in the economic information offerings of the St. Louis Fed, such as the FRED and RePEc families of websites. He loves traveling to deserted places, such as Iceland (above).

For more on his research, see <http://research.stlouisfed.org/econ/zimmermann>.

**Q:** *Does having children lower the productivity of professionals at work?*

**A:** The research that I have conducted with Matthias Krapf and Heinrich Ursprung indicates that children do lead to lower productivity by their parents at work when the children are young. However, mothers and fathers make up for this lost productivity elsewhere during their careers—either before they have children or after the children are old enough to take care of themselves.

It's important to know that this research was conducted on academic economists only. We used family status data from a survey of 10,000 research economists matched to their publication records through the RePEc platform (Research Papers in Economics). This is unique in that no other study has managed to get that large of a sample of highly qualified workers, as the vast majority of the economists registered with RePEc hold Ph.D.s.

Researchers are a suitable profession for this sort of study because well-established and generally accepted measures of productivity are available, whereas for most other highly skilled professionals, such as managers, engineers and surgeons, comparable productivity measures are not available or recorded.

REFERENCES

Krapf, Matthias; Ursprung, Heinrich W.; and Zimmermann, Christian. "Parenthood and Productivity of Highly Skilled Labor: Evidence from the Groves of Academe," Federal Reserve Bank of St. Louis Working Paper 2014-001A. See <http://research.stlouisfed.org/wp/more/2014-001>.

PUBLIC IS INVITED TO CONSUMER-DEBT DISCUSSIONS

Researchers from the St. Louis Fed will give two presentations for the public this fall on the topic of consumer debt. The presentations are part of the discussion series that the Bank started in 2011 called *Dialogue with the Fed: Beyond Today's Financial Headlines*. The series was started to give the public a chance to hear St. Louis Fed economists and other experts discuss key economic and financial issues of the day; those in attendance always have the opportunity to ask questions and comment.

The consumer-debt presentation, **Household Debt in America: A Look across Generations over Time**, will be Nov. 5 in St. Louis at the Bank's headquarters and Nov. 19 in Memphis, Tenn., at the Bank's branch there. The latter will be a *Diálogo con la Fed* because the material will be customized for a Hispanic-American audience; the presentation will be in English, but the Q&A portion will be conducted in both English and Spanish. Speaking at both events will be Carlos Garriga, an officer and economist in the Research division; speaking in St. Louis only will be Don Schlagenhauf, the chief economist in the Bank's Center for Household Financial Stability; and Bryan Noeth, policy analyst, also in the center.

There is no cost to attend these events. Registration is required. For details, see [www.stlouisfed.org/dialogue-with-the-fed](http://www.stlouisfed.org/dialogue-with-the-fed).

SAVE THE DATE FOR CONFERENCE ON COMMUNITY DEVELOPMENT

A Federal Reserve conference devoted to research on community development will take place April 2 and 3 in Washington, D.C. As in the past, this ninth biennial conference aims to bridge any gaps among research, policy and practice on key issues facing the economy.

The theme is "Economic Mobility: Research and Ideas on Strengthening Families, Communities and the Economy." Original research papers are being sought. They will be presented in a dialogue with both policymakers and practitioners, the goal being to advance understanding of how people and communities get ahead, the impediments that stand in the way, the role played by such factors as inequality, and the progress—or lack thereof—made over time.

For more information, see [www.stlouisfed.org/economicmobility2015](http://www.stlouisfed.org/economicmobility2015).

LETTER TO THE EDITOR

This is in response to "Is Involuntary Part-time Employment Different after the Great Recession?" This article appeared in the July 2014 issue of *The Regional Economist*, available at [www.stlouisfed.org/publications/re](http://www.stlouisfed.org/publications/re) under "Past Issues."

Dear Editor:

First, this is an informative article, and I will share it as I think it is important for people to understand this trend and how it might prospectively impact monetary policy. While it is likely difficult to quantify, I think Obamacare, and its namesake's penchant for creating uncertainty by frequently amending it with executive order, is directly impacting the decision of companies to add part-time workers instead of committing to full-time employees. Without being able to project the cost of benefits related to full-time employment, employers would rather add more part-time employees or invest in capital upgrades. So long as the 30 hour per week threshold is maintained in the law, the higher proportion of PTER (part time for economic reasons) workers will become a structural issue and investment will shift more toward technology and efficiency upgrades. Additionally, I think this is directly responsible for near-zero real-wage growth.

In closing, when laws make full-time human capital more expensive, businesses' demand for it will decrease. Additionally, the uncertainty created by frequent amendment to the law by executive order exacerbates the problem and makes it much more difficult for businesses to forecast labor cost with any confidence. This is bad policy that should be fixed.

**Jason Marshall** of Louisville, Ky., a portfolio manager for mortgage-backed securities

We welcome letters to the editor, as well as questions for "Ask an Economist." You can submit them online at [www.stlouisfed.org/re/letter](http://www.stlouisfed.org/re/letter) or mail them to Subhayu Bandyopadhyay, editor, *The Regional Economist*, Federal Reserve Bank of St. Louis, P.O. Box 442, St. Louis, MO 63166-0442.



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## What's Your Role in the Economy? Find Out in Our New Museum

The Federal Reserve Bank of St. Louis opened its doors this fall to the *Inside the Economy*™ Museum. Through nearly 100 exhibits, games, sculptures and videos, the museum helps visitors better understand how the economy works, and their role in it, in a fun and interactive way.

The museum covers topics such as banking, inflation, markets, the global economy, barter, trade and money. Walk-in visitors are welcome, and groups of 11 or more can register on the museum website. The museum is an ideal location for a class field trip for students in middle school through college.

The *Inside the Economy* Museum is located inside the St. Louis Fed at Broadway and Locust Street in downtown St. Louis. Admission is free. For hours and other information, go to [stlouisfed.org/economymuseum](http://stlouisfed.org/economymuseum).

