

THE REGIONAL ECONOMIST

*A Quarterly Review
of Business and
Economic Conditions*

Vol. 23, No. 3

July 2015

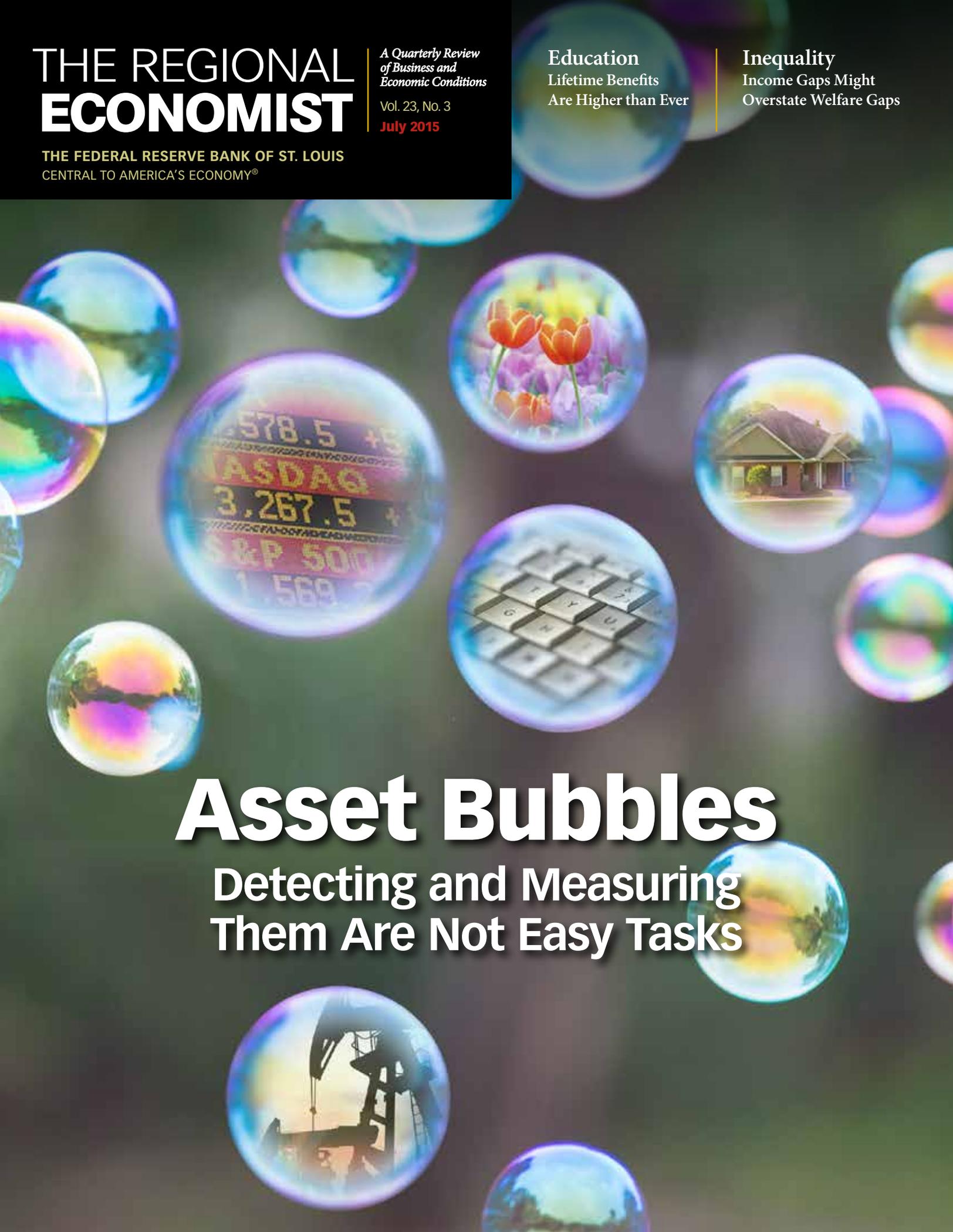
THE FEDERAL RESERVE BANK OF ST. LOUIS
CENTRAL TO AMERICA'S ECONOMY®

Education
Lifetime Benefits
Are Higher than Ever

Inequality
Income Gaps Might
Overstate Welfare Gaps

Asset Bubbles

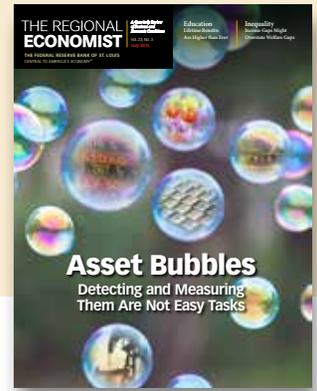
Detecting and Measuring
Them Are Not Easy Tasks



4 Asset Bubbles Are Hard To Detect and Measure

By Silvio Contessi and Usa Kerdnvnong

Market bubbles are linked to many historic financial crises, but asset price run-ups can reflect both fundamental value changes and psychological contagion. Using historic values of commonly held assets (stocks and real estate), a novel “exuberance index” offers a way to compare bubbles.



THE REGIONAL ECONOMIST

JULY 2015 | VOL. 23, NO. 3

The *Regional Economist* is published quarterly by the Research and Public Affairs divisions of the Federal Reserve Bank of St. Louis. It addresses the national, international and regional economic issues of the day, particularly as they apply to states in the Eighth Federal Reserve District. Views expressed are not necessarily those of the St. Louis Fed or of the Federal Reserve System.

Director of Research
Christopher J. Waller

Chief of Staff to the President
Cletus C. Coughlin

Deputy Director of Research
David C. Wheelock

Director of Public Affairs
Karen Branding

Editor
Subhayu Bandyopadhyay

Managing Editor
Al Stamborski

Art Director
Joni Williams

Please direct your comments to Subhayu Bandyopadhyay at 314-444-7425 or by email at subhayu.bandyopadhyay@stls.frb.org. You can also write to him at the address below. Submission of a letter to the editor gives us the right to post it to our website and/or publish it in *The Regional Economist* unless the writer states otherwise. We reserve the right to edit letters for clarity and length.

Single-copy subscriptions are free but available only to those with U.S. addresses. To subscribe, go to www.stlouisfed.org/publications. You can also write to *The Regional Economist*, Public Affairs Office, Federal Reserve Bank of St. Louis, P.O. Box 442, St. Louis, MO 63166-0442.

The Eighth Federal Reserve District includes all of Arkansas, eastern Missouri, southern Illinois and Indiana, western Kentucky and Tennessee, and northern Mississippi. The Eighth District offices are in Little Rock, Louisville, Memphis and St. Louis.



3 PRESIDENT'S MESSAGE

10 Lifetime Benefits of Education Climb



By Guillaume Vandembroucke

The level of education determines a worker's earnings to a large degree, and this simple study of cohorts of workers over the decades illustrates how the “lifetime education premium” is becoming more valuable than ever.

12 Are Oil Prices Linked to Inflation Expectations?



By Alejandro Badel and Joseph McGillicuddy

Oil prices and inflation expectations sometimes move in tandem. A close look at three types of shocks to oil prices suggests that not all shocks relate to inflation expectations in the same manner.

14 Changes in Income vs. Changes in Welfare



By Juan Sánchez and Lijun Zhu

Changes in income of rich and poor households might overstate changes in welfare because the cost of goods favored by the rich is rising faster than the cost of goods consumed mainly by the poor and middle class.

16 ECONOMY AT A GLANCE

17 NATIONAL OVERVIEW

Economy Stumbles in Q1—Again

By Kevin L. Kliesen

As happened in the first quarter last year, real GDP contracted in Q1 of this year. In 2014, the weather was largely to blame. This time, four other factors are being cited, all thought to be temporary.

18 DISTRICT OVERVIEW

Low-Paying Industries Providing the Most Jobs

By Maximiliano Dvorkin and Hannah Shell

The Eighth District added about 150,000 jobs from 2010 to 2013, almost 75 percent of them in low-paying industries. Such jobs are growing at a faster rate than those in high-paying industries, the opposite of what is happening on the national level.

20 METRO PROFILE

Bowling Green, Ky., MSA: Cars, College and Caves



By Georgette Fernandez Laris and Charles S. Gascon

The Bowling Green metropolitan statistical area has shared in the relative prosperity of this part of Kentucky, thanks largely to the auto sector, tourism and Western Kentucky University. Stability in the housing market has also helped.

23 READER EXCHANGE

ONLINE EXTRA

Read more at www.stlouisfed.org/publications/re.

A Look at Impact of States' Efforts on Unauthorized Immigration

By Subhayu Bandyopadhyay, Jonathan Munemo and Santiago Pinto

Much is known about the effects of unauthorized immigration on the nation as a whole. But little research has been done so far on the impact of states' efforts to curb the influx—efforts such as the E-Verify program.

Reassessing Monetary Policy at the Zero Lower Bound

What should monetary policymakers do when the policy rate is effectively at zero? Several colleagues and I have released a working paper that we hope will contribute to the ongoing debate on this question.¹

Since the financial crisis, the main monetary policy recommendations for stimulating the economy after hitting the zero lower bound have consisted of quantitative easing and forward guidance. Quantitative easing—which refers to buying publicly issued or privately issued debt—seems to be effective according to the empirical literature but not the theoretical literature. To summarize former Fed Chairman Ben Bernanke, quantitative easing works in practice but not in theory.² Forward guidance, which has had a lot of influence at central banks around the world during the period when rates have been near zero, refers to public promises by policymakers to keep the policy rate at zero even longer than they otherwise would. Conventional theory suggests that forward guidance should lead to good outcomes for the economy, such as higher current consumption, and eventually to higher inflation.

Unfortunately, despite keeping nominal policy rates near zero for several years in the U.S. and the eurozone and for even longer in Japan, the expected consumption boom and increase in inflation have arguably not materialized. Whether these effects will happen in the future remains an open question, but because the core prediction has not yet come to pass, some researchers are rethinking monetary policy at the zero lower bound. Newer theories consider aspects of monetary policy beyond the most traditional views that have dominated thinking in the past five years.³ It is an apt time to reassess the current thinking and to explore other models.

Somewhat ironically, even though the 2007-2009 financial crisis was about problems in credit markets, leading monetary policy advice today is based on models that de-emphasize credit markets. In contrast, our paper puts heavy emphasis on the performance of the private credit market. This

market plays an important role in how the economy operates in our model, which, it is interesting to note, has considerable income inequality. In the model, households in the middle of the life cycle are peak earners, but at the beginning and end of the cycle, people are earning little. Those in the middle part save for their eventual retirement later in the life cycle, and those in the early part borrow for purchases such as houses and cars. This is a real phenomenon that accounts for a large portion of actual borrowing and lending in the economy—for instance, mortgage debt outstanding is on the order of \$13 trillion in the U.S. If this credit market did not exist, households would have to consume whatever they earned in a particular period. Therefore, in this model the credit market must work well in order to allow all the different members of society to reallocate income over their life cycle so they can consume smoothly.

Along with this emphasis on the private credit market, we assume one important credit market imperfection: Contracts between borrowers and lenders must be made in nominal terms and cannot depend on the state of the economy. This essentially means that debt contracts are insufficiently flexible when shocks hit the economy. Economists have long thought that this credit market friction may be quite important. The role of monetary policy in the model is then to fix this credit market imperfection by adjusting the price level appropriately in response to shocks. This keeps credit markets working smoothly. In addition, when the economy encounters the zero lower bound because of an exceptionally large negative shock, monetary policy can keep credit markets working well by allowing a special upward adjustment in the price level.

The upshot is that the optimal monetary policy in this model is something very close to nominal gross domestic product (GDP) targeting. With such a policy, inflation would be relatively high in periods of low



growth and relatively low in periods of high growth—an equilibrium outcome quite different from what has been observed in the U.S. in recent decades. At the zero lower bound, forward guidance would not be a good policy, and the effects of quantitative easing are unclear. Thus, the policy implication of our model at the zero lower bound is different from the two main policy recommendations in recent years.

Our paper is an academic exercise meant to provoke discussion about longer-run issues in monetary policy; it is not meant to have implications for immediate policy decisions. The results in our paper may help to inform the debate about appropriate monetary policy at the zero lower bound, and we encourage further research on the topic. 

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

ENDNOTES

- 1 See Costas Azariadis, James Bullard, Aarti Singh and Jacek Suda, "Optimal Monetary Policy at the Zero Lower Bound," Federal Reserve Bank of St. Louis Working Paper 2015-010A, May 2015, at <https://research.stlouisfed.org/wp/2015/2015-010.pdf>.
- 2 See Ben Bernanke's interview with Liaquat Ahamed on Jan. 16, 2014, "A Conversation: The Fed Yesterday, Today and Tomorrow," at www.brookings.edu/events/2014/01/16-central-banking-after-the-great-recession-bernanke.
- 3 For example, see Kevin D. Sheedy, "Debt and Incomplete Financial Markets: A Case for Nominal GDP Targeting," *Brookings Papers on Economic Activity*, Spring 2014, pp. 301-61. See also my comments on this paper on pp. 362-68 at www.brookings.edu/~media/projects/bpea/spring%202014/2014a_sheedy.pdf.



Bubbles in asset prices are nothing new in this country. In fact, they are nothing new around the world. One of the most famous is the tulip bubble in Holland in the early 1600s; at one point, rare bulbs were being traded for multiples of the average person's annual salary.

Asset Bubbles

Detecting and Measuring Them Are Not Easy Tasks

By Silvio Contessi and Usa Kerdnunvong

After the financial storm that spread from the United States in the summer of 2007 to many advanced economies by the fall of 2008, the economics profession was criticized for not being able to predict the crisis and for the profession's limited understanding of the mechanisms that generated the upheaval and allowed it to spread. Today, there is an abundance of new research that places the crisis in a historical context and links it to the development and bursting of asset bubbles—those periods of explosive behavior of prices. Hopefully, this and future research will help ward off the “this-time-is-different” syndrome (popularized by economists Carmen Reinhart and Kenneth Rogoff), that is, the mistaken idea that old rules about taking risks no longer apply once financial innovation and “reforms” occur in financial markets and the economy.

In this article, we explain the difficulties of defining and anticipating asset bubbles, focusing on the two types of assets that attract the lion's share of households' wealth—stocks and real estate. We discuss the way booms and busts in asset prices relate to financial crises, as well as the difficulties economists face in identifying bubbles. We then use a novel statistical technique, developed in the aftermath of the financial crisis, to compare past asset bubbles in the U.S.

Precursors of Financial Crises

Reinhart and Rogoff jokingly compared financial crises to family dynamics by quoting Leo Tolstoy's *Anna Karenina*, "All happy families are alike; each unhappy family is unhappy in its own way."¹ Reinhart and Rogoff's extensive research on

The popular press often uses the term "bubble" to describe a situation in which the price of an asset has increased significantly in such a short period of time so as to suggest that the price is susceptible to an equally sudden collapse.

financial crises acknowledges the distinctions but identifies common factors that appear as precursors of most financial crises, as well as facts that characterize the aftermath of financial crises.²

Typically, four macroeconomic indicators in a country show common features before financial crises: 1) a slow run-up of asset prices followed by sharp contractions just before the onset of the crisis, 2) a slow-down of real gross domestic product (GDP) growth, 3) a sizable increase in government debt-to-GDP ratios, and 4) large capital inflows translating into negative current accounts. These elements can be observed in the U.S. and other advanced economies just before the crisis erupted in 2007-08.

Here, we focus on the first indicator because the exuberant behavior of asset prices occurred before the eruption of financial turmoil in several financial crises. The two main categories of assets that constitute the majority of households' wealth and for which data are available are stocks and real estate. For the U.S., there exist century-long indexes for stock prices and house prices, which have been

constructed and made available by Nobel-winning economist Robert Shiller on his website.³ The red dashed line in Figure 1 displays the S&P 500 price index; in Figure 2, the red line displays the Case-Shiller real home price index.⁴ These lines show clear episodes of run-ups and contractions. But which ones are bubbles, and which ones are normal movements of asset prices?

Defining Bubbles

The popular press often uses the term "bubble" to describe a situation in which the price of an asset has increased significantly in such a short period of time so as to suggest that the price is susceptible to an equally sudden collapse. Recent popular examples of these movements are the run-up in prices of information technology stocks in the late 1990s and the housing boom and bust in the 2000s.

Academic economists have occasionally invoked this definition, as well. For example, Charles Kindleberger and Robert Aliber defined a bubble as "an upward price movement over an extended range that then implodes."⁵ While this is an intuitive notion and resembles the run-up and contraction of asset prices, Reinhart and Rogoff are careful in describing large increases in asset prices without defining them as bubbles. More generally, economists find the definition of asset bubbles problematic because the proper identification of a bubble requires some metrics, and there is little agreement about what those metrics should be.

Shiller defined a bubble as "a situation in which news of price increases spurs investor enthusiasm, which spreads by psychological contagion from person to person, in the process amplifying stories that might justify the price increases and bringing in a larger and larger class of investors ... despite doubts about the real value of an investment."⁶

Some economists conceptualize bubbles as situations in which the price of the asset grows faster than the asset's fundamental value, a notion that is similar to Shiller's explanation. When the asset price surpasses the asset's fundamental value, the asset can be considered overvalued. The idea behind this definition is that prices serve as signals of market

conditions, derived by demand and supply: The increase in price signals a shortage of supply; eventually, supply increases, the price drops and there is a new equilibrium in price and quantity. However, in times of bubbles, prices may not serve as good signals and, thus, may not reflect market conditions or changes in the underlying value of the asset. Instead, the bubble sends out a signal that the asset is more valuable than it actually is.

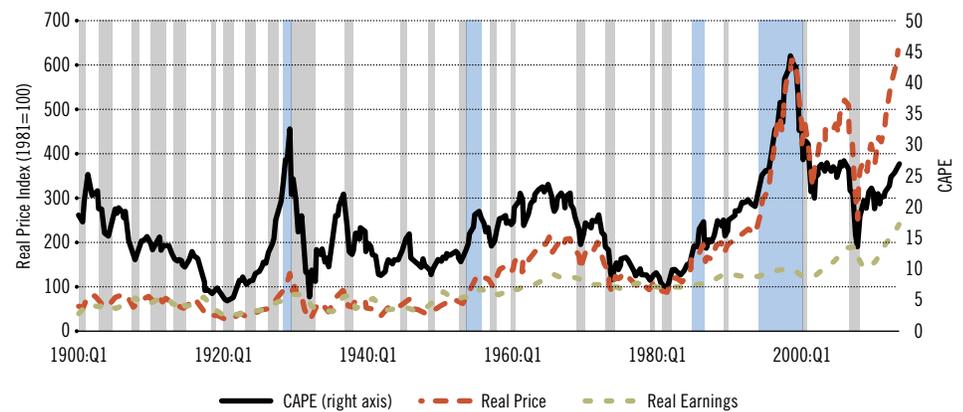
The problem with this scenario is that the fundamental value of an asset is not easy to measure. Generally, we think of the value of an asset as a stream of payments in the form of dividends to the owner over time. Thus, the fundamental value of the asset should be defined as this total expectation of this stream of payments, discounted to present value.

Accordingly, to properly evaluate the presence of a bubble, we should compare the price of an asset to a measure approximating the stream of future dividends. In the case of stock prices, this is done by comparing prices or price indexes to earnings or earnings indexes; various measures of earnings can be used, such as current earnings, the average over the previous few years of earnings, or forecasts of future earnings. In the case of real estate markets, the comparison is typically between house price indexes and indexes on the amount charged to rent a similar house.⁷

In the two charts, the green lines represent an index of S&P 500 earnings and an index of rent, both normalized to 100 in 1981 to provide a comparison with the normalized indexes for S&P 500 stock prices and home prices. In addition to these lines, we plot two black continuous lines. In the first chart, we plot Shiller's CAPE index (Cyclically Adjusted Price Earnings), i.e., the ratio of the S&P 500 index to the average inflation-adjusted earnings from the previous 10 years. In the second chart, we construct and plot a conceptually analogous index that we created and call CAPR (Cyclically Adjusted Price Rent), i.e., the ratio of a house price index to the average inflation-adjusted rents indexed from the previous 10 years.⁸

These graphs show that once we divide by a measure approximating the fundamental value of the asset and its recent

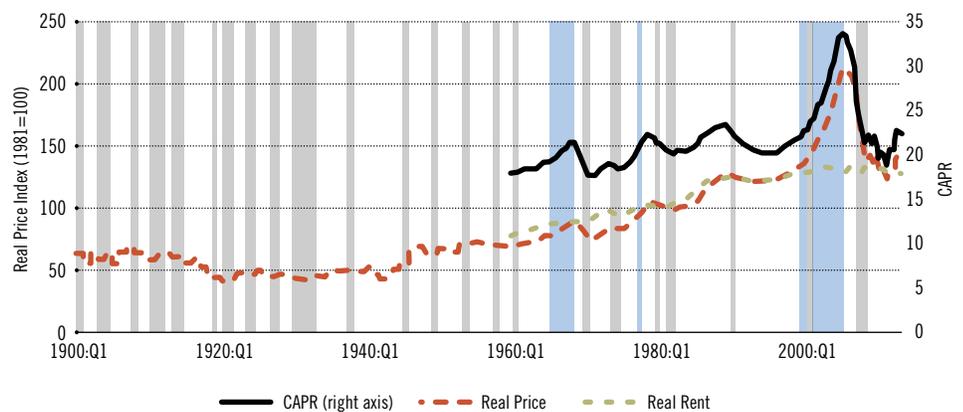
FIGURE 1
Cyclically Adjusted Price Earnings (CAPE) Ratio



SOURCES: Shiller, National Bureau of Economic Research (NBER) and Haver Analytics.

NOTE: The red and green dashed lines are real price and real earnings, respectively, and the black line is the CAPE ratio, which is the ratio of the real price and real earnings. Gray bars are recessions as dated by the NBER. Blue shades are "bubbles," or periods of explosive behavior.

FIGURE 2
Cyclically Adjusted Price Rent (CAPR) Ratio



SOURCES: Davis, Lehnert and Martin; Shiller; Lincoln Institute; NBER; and Haver Analytics.

NOTE: The red and green dashed lines are real price and real rent, respectively, for houses, and the black line is the CAPR ratio, which is the ratio of the real price to real rent. Gray bars are recessions as dated by the NBER. Blue shades are "bubbles," or periods of explosive behavior.



trend, the CAPE and CAPR ratios are a bit different from their corresponding price indexes because they now take into account the previous 10 years of earnings or rents (as proxies from the recent return to the asset). Even so, they show notable increases and contractions that may or may not be due to explosive behavior followed by busts.

Explosive Behavior

Recent developments in statistics and econometrics have built on a statistical notion of explosive behavior to create tests for detecting asset price bubbles. (We will call them “periods of explosive behavior” for reasons we explain later.) One prominent example of this approach was provided in a series of articles by econometrician Peter C.B. Phillips in collaboration with co-authors Shu-Ping Shi and Jun Yu; they developed a test based on the co-movement between the price of the asset and its fundamental value, as approximated by earnings.⁹ Intuitively, when price and fundamental value diverge too fast, we can suspect a period of explosive behavior.

In their work, the notion of explosive behavior is not exactly the same as the notion of bubbles, as the work is based on a statistical definition of explosive behavior in prices or price/earnings that does not analyze the underlying reasons why these measures increase or decrease. As we discuss later, there may be various reasons that induce movements in price ratios that are not necessarily due to unjustified behavior of prices, earnings or rents.

In particular, we used one of the statistical tests they developed to identify periods of explosive behavior of the CAPE and the CAPR indexes.¹⁰ We used the entire Shiller CAPE series for stocks (January 1881-December 2014) and data from the Lincoln Institute series for house prices (1960:Q1-2014:Q1). Because we need price ratios and not just price indexes (to correct price movements by changes in the recent average returns of the asset), the length of the CAPR is unfortunately shorter than that of the CAPE.

The test detects four periods of explosive behavior for the CAPE that are consistent with research by Phillips and co-authors, as well as our knowledge

of bubbly periods in modern American history: 1928:Q4-1929:Q3 (four quarters), 1954:Q3-1956:Q2 (eight quarters), 1986:Q1-1987:Q3 (seven quarters) and 1995:Q3-2001:Q3 (25 quarters). For our shorter CAPR series, the test also stamps three periods of explosive behavior for the CAPR: 1965:Q3-1968:Q4 (14 quarters), 1977:Q4-1978:Q1 (two quarters) and 2000:Q2-2006:Q1 (24 quarters). These periods of explosive behavior are represented by light-blue-shaded areas in the graphs. (The gray shaded areas represent recessions as identified by the National Bureau of Economic Research.)

A Historical Perspective

To compare these episodes over time, we adapted a measure of severity of the financial crises that was developed by Reinhart and Rogoff and constructed a measure of the magnitude of the historical asset price run-ups and contractions for the period of explosive behavior just identified.¹¹ Reinhart and Rogoff collected data on real GDP per capita for several countries and identified large contractions of this measure. Three features characterized this contraction: (1) the time it takes real GDP per capita to return to the previous peak level (duration), (2) the percentage drop of real GDP from peak to the lowest trough (depth), and (3) the existence of double or even triple dips characterizing the contraction and recovery of real GDP per capita. They then constructed a severity index, which is the sum of depth and duration.

We constructed a related measure but one that is based on the period of explosive behavior. We measured the duration of this period as the number of quarters between the beginning date detected by the statistical test we used and the end date in which the level of CAPE or CAPR returned to the pre-explosive behavior period. The size is the percentage increase in the value of the price index between the beginning of the episode and the highest peak reached before the end of the episode. The sum of duration and size is then a measure of the magnitude of the episode, reported in the last column of the table. We call this measure “the exuberance index.” In the index, a higher reading indicates more exuberance, and vice versa.



Exuberance Index

Market	Interval of the Episode	Size	Duration	Exuberance Index
Housing	1965:Q3-1968:Q4	10.72	18	28.72
	1977:Q4-1978:Q1	8.75	19	27.75
	2000:Q2-2006:Q1	50.78	35	85.78
Stock	1928:Q4-1929:Q3	28.70	5	33.70
	1954:Q3-1956:Q2	34.93	13	47.93
	1986:Q1-1987:Q3	34.02	8	42.02
	1995:Q3-2001:Q3	84.57	29	113.57

SOURCE: Authors' calculations.

NOTE: Size is the percentage increase in the value of the price index between the beginning of the episode and the highest peak reached before the end of the episode. Duration is the number of quarters between a bubble's beginning date as detected by the statistical test we used and the end date in which the level of CAPE or CAPR returned to the pre-explosive period. (The explosive periods mentioned on Page 8 do not include any time after bursting of the bubble.) The exuberance index is the sum of size and duration.

The measure shows that the housing boom and bust of the 2000s was the most severe episode for real estate in the country in the 1960-2014 period, while the technology boom and bust of 1995-2001 was the most severe in the 1890-2014 period for stock prices. The index we constructed increases with price increases and duration. The period before the Great Depression is characterized by a large increase in the stock price index that was relatively short-lived, compared with the technology boom. Therefore, the combination of size and duration places the exuberance of the 1920s only fourth historically for stocks.

Bubbles or Not?

Are these periods of explosive behavior in price/earnings and price/rents necessarily bubbles? The short answer is “no,” and it relates to the difficulties in measuring fundamentals properly. Economic theory suggests that price/earnings and price/rent ratios can change even if we are not in the presence of the irrational behavior of investors.

It is perhaps easier to see why in the context of housing markets. The ratio of price to rent could be considered as an equilibrium quantity capturing the relative cost of buying vs. renting; this ratio should be relatively stable over the years if nothing fundamental changes in the economy. What determines this equilibrium level? The price of a house is not the only determinant of the cost of owning it; so, rising house prices do not necessarily indicate that homeownership has become more expensive relative to renting, but may indicate that something has changed in the fundamental value of the

house. Supply conditions in the real estate market, expected appreciation rates, taxes, maintenance costs and mortgage features also affect the volatility of price/rent ratios. As studied in the real estate economics literature, the sensitivity of house prices to changes in fundamentals is larger when interest rates are low and in locations where expected price growth is high; so, fast price increases (relative to rent) do not necessarily signal the presence of a bubble even when they appear as “exuberant.” The correct measure to use, as a comparison for rents, is the imputed annual rental cost of owning a home, a variant of what economists call the “user cost,” which is particularly difficult to measure.

Similarly, in the stock market, price/earnings are affected by the risk-free rate in the economy, the equity premium and the growth rate of earnings, all of which can change over time and, therefore, can affect the price/dividend ratio independently of the presence of a bubble.

These considerations do not affect the validity of the statistical approach to detect episodes of explosive behavior—an approach that is now available and very helpful for monitoring various markets. However, these considerations warn us to be careful when we interpret the findings that we abstract from an economic model.¹² 

Silvio Contessi was an economist at the Federal Reserve Bank of St. Louis at the time this article was written. He is now a senior lecturer at the Monash Business School in Melbourne, Australia. Usa Kerdnunvong is a research associate at the Federal Reserve Bank of St. Louis.

ENDNOTES

- 1 See Reinhart and Rogoff (November 2014).
- 2 This article focuses on the precursors to such crises, not the aftermath. However, in a nutshell, the aftermaths of financial crises share deep and lasting depressed asset prices, output and employment, as well as an increase in public debt.
- 3 See www.econ.yale.edu/~shiller/data.htm.
- 4 In order to obtain this series (real price indexes normalized to 100 in 1981), we spliced the Case-Shiller data with the quarterly data provided by the Lincoln Institute at the 1960 data point. In the graph for real estate, the frequency of the real price index data is annual before 1953, monthly during 1953-1960 and quarterly after 1960.
- 5 See Kindleberger and Aliber.
- 6 See Shiller.
- 7 Researchers also compare price indexes to measures of income.
- 8 The CAPR ratio is calculated using the real price divided by the average of the real rent over the past 10 years, when available. We used nominal price and rent data from the Lincoln Institute, constructed by Davis, Lehnert and Martin. We converted the nominal price and rent series to real using the consumer price index (CPI) to be consistent with Shiller's stock market data.
- 9 See Phillips, Shi and Yu.
- 10 We used Philip et al.'s GSADF 95 percent test to date-stamp the bubbles and include only periods of explosive behavior that are longer than a half-year.
- 11 See Reinhart and Rogoff (May 2014).
- 12 For an application of this procedure to housing markets in an international context, see www.dallasfed.org/institute/houseprice.

REFERENCES

- Davis, Morris A.; Lehnert, Andreas; and Martin, Robert F. “The Rent-Price Ratio for the Aggregate Stock of Owner-Occupied Housing.” *Review of Income and Wealth*, 2008, Vol. 54, No. 2, pp. 279-84.
- Kindleberger, Charles P.; and Aliber, Robert Z. *Manias, Panics, and Crashes: A History of Financial Crises*. Hoboken, N.J.: John Wiley & Sons, 1996.
- Phillips, Peter C.B.; Shi, Shu-Ping; and Yu, Jun. “Testing for Multiple Bubbles: Historical Episodes of Exuberance and Collapse in the S&P 500.” *International Economic Review*, forthcoming.
- Reinhart, Carmen M.; and Rogoff, Kenneth S. “Recovery from Financial Crises: Evidence from 100 Episodes.” *American Economic Review*, May 2014, Vol. 104, No. 5, pp. 50-55.
- Reinhart, Carmen M.; and Rogoff, Kenneth S. “This Time Is Different: A Panoramic View of Eight Centuries of Financial Crises.” *Annals of Economics and Finance*, November 2014, Vol. 15, No. 2, pp. 1,065-188.
- Shiller, Robert J. *Irrational Exuberance*. First Edition. Princeton, N.J.: Princeton University Press, 2000.

Lifetime Benefits of an Education Have Never Been So High

By Guillaume Vandenbroucke



© THINKSTOCK/WAVEBREAKMEDIA LTD

Education in the United States has experienced three major transformations. The first occurred in primary education. Already by the late 19th century, no less than 80 percent of Americans between the ages of 5 and 13 were enrolled in grades K-8. The second was the so-called “high school” movement. Between 1910 and 1940, the percentage of Americans between the ages of 14 and 17 who were enrolled in high school rose from below 20 percent to close to 70 percent. Finally, there was higher education. This last movement gained momentum in the 1950s. The percentage of Americans between the ages of 18 and 24 who were enrolled in higher-education institutions rose from less than 20 percent in the 1950s to more than 50 percent nowadays.¹

To discover the reasons behind this trend in educational attainment, economists rely on the comparisons between the costs and benefits of purchasing an education.² In this article, I present a simple measure of the financial benefits of an education and do not discuss its cost. The measure that I present can be called a “lifetime education premium.” This means two things: First, it is an attempt to measure the difference, i.e., the premium, between the earnings of people with different educational attainment. Second, it is about lifetime earnings, not just earnings at a particular age.

This latter point is key. To see why, consider a simple, and intentionally extreme, example. Suppose that some workers have a high school education and that their labor earnings are \$60,000 per year during this year and the next. Others have a college degree, and their earnings are \$100,000 this year and \$120,000 in the next year. What is the college premium? This year, it is 66 percent ($100/60 - 1 = 0.66$), i.e., a college-educated

worker receives labor earnings 66 percent higher than that of a high school-educated worker. Next year, however, the college premium is 100 percent ($120/60 - 1 = 1$), i.e., a college-educated worker receives double the earnings of a high school-educated worker.

So, the college premium changes throughout the lives of workers. Why? In this example, as in the data, the “culprit” is the fact that earnings of college- and high school-educated workers do not grow at the same rate: They grow faster for college-educated workers.

Building Estimates of Lifetime Income

Consider a white man who was 30 years old in 1940 and who did not have a high school education.³ Data from the U.S. Census Bureau can be used to compute that, on average, such person’s labor earnings for the year, if he was employed and working, were \$14,982 (in 2010 dollars). Consider now a white man who was 40 years old in 1950, still without a high school education. His earnings were \$26,140. The 30-year-old of 1940 is the 40-year-old in 1950. Thus, by this procedure, we are constructing the sequence of earnings received by a particular cohort of individuals. We can identify them by the year of their 30th birthday.⁴ In this case, we are studying the 1940 cohort. We can keep using census data until we have collected the labor earnings of the 1940 cohort at ages 30, 40, 50 and 60. Then, we can do the same for the 1950, 1960, 1970 and the 1980 cohorts. The table shows the cohort structure. It is clear that the 1980 cohort is the last one for which we can construct earnings at age 60 using census data.

Using the earnings collected for each cohort and each year, it is possible to estimate the

The Age of Cohorts

Cohort/Year	1940	1950	1960	1970	1980	1990	2000	2010
1940 Cohort	30	40	50	60				
1950 Cohort		30	40	50	60			
1960 Cohort			30	40	50	60		
1970 Cohort				30	40	50	60	
1980 Cohort					30	40	50	60

present value of future earnings for each cohort and for three education groups: no high school, high school and college.⁵ A present value calculation acknowledges that a current dollar is not quite the same thing as a future dollar, i.e., one that is available only in the future. Adding them would be the same as adding apples and oranges.⁶ The present value of future labor earnings of a worker can also be interpreted as the value of his or her human capital.

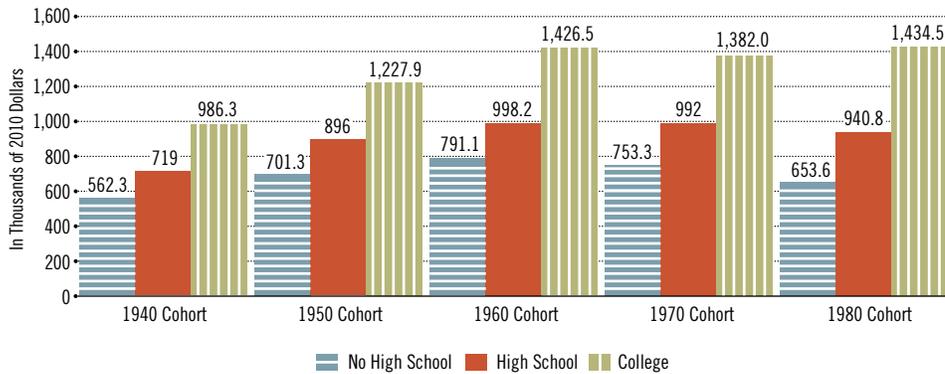
Figure 1 reports the results of these present value calculations for white men. I used an interest rate of 4 percent for all cohorts.⁷ This is a simplification since interest rates are not constant but, instead, vary from year to year. One must keep in mind, therefore, that the numbers presented here are approximations.

That said, take the 1940 cohort, for example: The present value of future labor earnings at age 30 for a white man without a high school education in 1940 was \$562,300 (2010 dollars). For a high school-educated white man, the same calculation yields \$719,000, and, for a college-educated white man, it is \$986,300.

Figure 1 reveals interesting patterns, in particular that the present value of future earnings of the 1970 cohort is less than that of the previous cohort for all education groups. This is the result of the 1970 cohort’s experiencing in the middle of its work life the

FIGURE 1

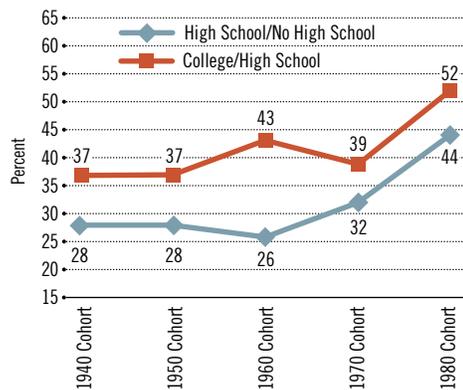
The Present Value of Future Earnings of White Men at Age 30



SOURCE: Calculations made using census data from Integrated Public Use Microdata Series (IPUMS).

FIGURE 2

Education Premiums for White Men by Cohort



SOURCE: Calculations made using census data from IPUMS.

severe recession of the mid-1970s and early 1980s, associated with the oil price shock. Even though the present value of future earnings of college-educated workers was on the rise again for the 1980 cohort, it was not the case for the two other education groups.

The Education Premiums

It is possible, using Figure 1, to compute two education premiums. Let us call the first one the “high school premium” and define it as the ratio between the lifetime income of a high school-educated worker and that of a worker not having completed high school. For the 1940 cohort of white men, this ratio is $719.0/562.3 - 1 = 0.28$. Therefore, the high school premium is 28 percent, meaning, on average, that high school-educated white men of the 1940 cohort received 28 percent more lifetime earnings than did those without a high school education. The second

premium is the college premium. Here, it is $986.3/719.0 - 1 = 0.37$: College-educated white men of the 1940 cohort earned 37 percent more than high school-educated white men over the course of their work lives. Repeating the same observation for each cohort yields the results in Figure 2.

The overall pattern in Figure 2 is that of increasing premiums to education in the sense that the most recent cohorts are those for which obtaining an education pays the most. This is true for both the college and the high school premiums. This pattern explains, in part, the secular increase in educational attainment in the United States.

The rise of the high school and the college premiums displayed in Figure 2 is also interesting because it has implication for inequality. In fact, each premium is a measure of inequality on its own: the inequality of lifetime earnings between workers with different levels of educational attainment.

Conclusion

Understanding education choices is important since education determines, to a large extent, a worker’s earnings. But measuring the benefits of an education is not that easy. I presented a simple measure of the benefits of purchasing an education for a sequence of cohorts and showed that these benefits have been on the rise for the last cohort. In fact, the lifetime financial benefits of an education have never been so high. ⁹

Guillaume Vandenbergue is an economist at the Federal Reserve Bank of St. Louis. For more on his work, see <http://research.stlouisfed.org/econ/vandenbergue>.

ENDNOTES

- 1 The source of these figures is the U.S. Department of Education.
- 2 I use the term “purchasing” on purpose. There is no such thing as a free education, even for one enrolled in a public institution. At the very least, the time spent in school cannot be used to work for a living. In this sense, education is “purchased,” and its price comprises the foregone earnings that it entails.
- 3 I considered only white employed men because the education and earnings of women and/or nonwhite people may involve issues of discrimination that are beyond the scope of this economic analysis.
- 4 It is customary to identify a cohort by the year of its birth, but it is not necessary to do so. For the purpose of the discussion here, it is more convenient to adopt the convention that what we call the “1940 cohort” is made of people who reached their 30th birthday in 1940.
- 5 I refer to a person as a “no high school” worker if his or her highest educational attainment is grade 11. I use “high school” to refer to workers who completed high school and up to three years of college, and, finally, I use “college” for those who completed at least four years of college.
- 6 Computing the present value of a future dollar involves choosing an interest rate. When the annual rate of interest is 4 percent, for example, the value today (the present value) of \$104 in one year is \$100. This is because having \$100 today is the same as having \$104 in one year: The dollars can be invested for one year at the rate of 4 percent.
- 7 The one-year Treasury rate fluctuated around 4 percent between the 1950s and the 1990s.

REFERENCES

Goldin, Claudia; and Katz, Lawrence. *The Race between Education and Technology*. Cambridge, Mass.: The Belknap Press of Harvard University Press, 2008.

Guvener, Fatih; and Kuruscu, Burhanettin. “A Quantitative Analysis of the Evolution of the U.S. Wage Distribution: 1970-2000,” in Daron Acemoglu, Kenneth Rogoff and Michael Woodford, eds., *NBER Macroeconomics Annual*. Chicago: The University of Chicago Press, 2009, pp. 227-76.

Heckman, James J.; Lochner, Lance; and Taber, Christopher. “Explaining Rising Wage Inequality: Explorations with a Dynamic General Equilibrium Model of Labor Earnings with Heterogeneous Agents.” *Review of Economic Dynamics*, 1998, Vol. 1, No. 1, pp. 1-58.

Restuccia, Diego; and Vandenbergue, Guillaume. “The Evolution of Education: A Macroeconomic Analysis.” *International Economic Review*, 2013, Vol. 54, No. 3, pp. 915-36.

Oil Prices and Inflation Expectations: Is There a Link?

By Alejandro Badel and Joseph McGillicuddy



© THINKSTOCK/ISTOCK

Between January 2011 and June 2014, Brent crude oil prices fluctuated around an average price level of \$110 per barrel. Between June 2014 and January 2015, oil prices dropped precipitously, stabilizing at about \$55 per barrel. This pattern was accompanied by a reduction in breakeven inflation expectations, which, in the case of the five-year forward rate, dropped from 2 percent at the end of June 2014 to 1.30 percent at the beginning of January 2015.¹

The correlation of breakeven inflation expectations with oil prices is higher in more recent subperiods. This has been accompanied by a tighter synchronization of all sources of oil price movements and inflation expectations.

Since then, the five-year breakeven inflation rate has increased steadily, reaching 1.72 percent by the end of April.

Figure 1 displays the five-year forward breakeven inflation expectations measure and the log of the real price of crude oil.² The figure suggests the existence of two distinct trends. First, up to the financial crisis in 2008, we observe a gradual increase in oil prices without large changes in breakeven inflation expectations. Second, since the financial crisis, the two series seem to move in tandem. In fact, the correlation of the two series up to December 2007 was 0.54, while it was 0.75 afterward.³ Also, the figure suggests a break in the mean level of inflation expectations, which falls from about 2.28 percent before the financial crisis to roughly 1.79 percent afterward. It is interesting to note that the correlation between the two variables from January 2003 to April 2015 is only 0.13. The contrast between this low

correlation and the high correlation found in the two subperiods discussed above is likely explained by the break in the mean of inflation expectations.

In the remainder of this article, we make an initial attempt to uncover the sources of the correlation between breakeven inflation expectations and oil prices. We do so in two steps. First, we revisit a method to break up oil price movements into three components. Second, we evaluate the correlation of each

of these components with breakeven inflation rates.

Changes in Oil Prices

We replicated a leading analysis of the shocks affecting oil prices found in a 2009 paper by economist Lutz Kilian. Changes in oil prices are broken down into three sources: (1) “supply shocks,” which are unpredictable changes in crude oil production, (2) “aggregate demand shocks,” which are unpredictable changes in real economic activity that cannot be explained by crude oil supply shocks, and (3) “oil-specific demand shocks,” which are innovations to the real price of oil that cannot be explained by oil supply shocks or aggregate demand shocks.

The oil-specific demand shock can be interpreted as the change in the demand for oil driven by precautionary motives. According to Kilian, concerns over

unexpected growth of demand and/or unexpected declines in supply can lead to higher demand for oil inventories, which can serve as insurance. Mechanically, however, this shock is calculated as a remainder—innovations to oil prices that cannot be explained by changes in global economic activity or changes in oil production. Details of the data and the methodology are provided in Badel and McGillicuddy.

Figure 2 displays the cumulative contribution of each of the shocks and initial conditions to the cumulative change in the natural log of oil prices starting in January 2003.

Inflation and Oil Price Correlation

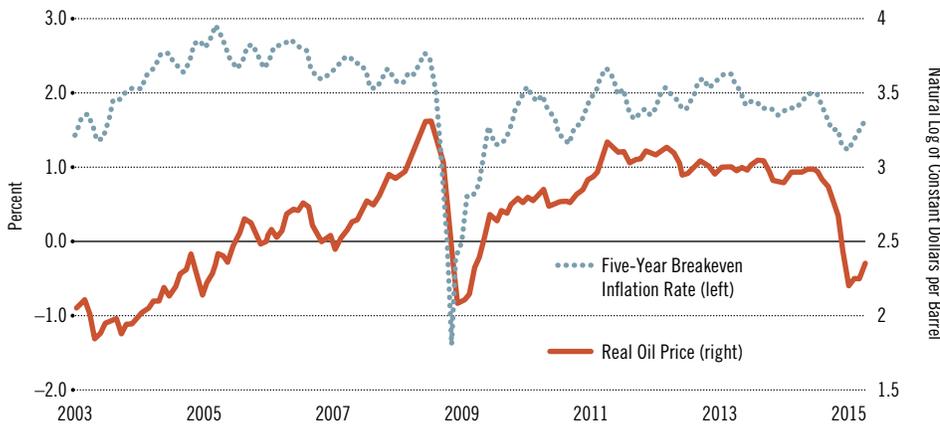
We calculated the correlation between breakeven inflation expectations and each of the components of log oil prices displayed in Figure 2. The “All” column of the table displays the correlation between breakeven inflation expectations and log oil-price changes since 2003 (i.e., the sum of all components in Figure 2). The next three columns break up this correlation into separate components corresponding to each shock.

The “All” column shows that the correlation of breakeven inflation expectations with oil prices is higher in more recent subperiods. This has been accompanied by a tighter synchronization of all sources of oil price movements and inflation expectations. The “Supply” and “Aggregate Demand” columns show how the correlation for both supply factors and aggregate demand factors is positive in the 2014-2015 period but not in all previous subperiods.

We draw two conclusions: First, Figure 1 shows that the average level of inflation expectations seems to have decreased after

FIGURE 1

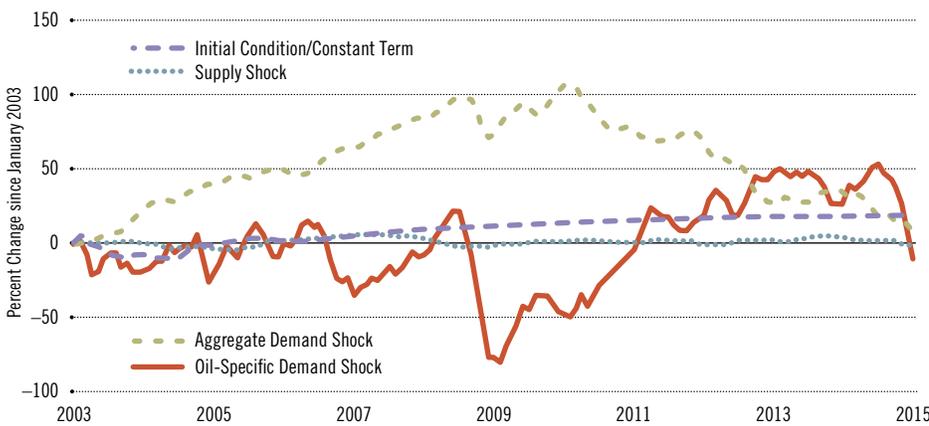
Inflation Expectations and Real Oil Prices (January 2003-April 2015)



SOURCES: FRED (Federal Reserve Economic Data), U.S. Energy Information Administration, authors' calculations.

FIGURE 2

Decomposition of Oil Price Changes



NOTE: We re-estimated Kilian's model with data from January 1973 to January 2015. See details in Badel and McGillicuddy.

Correlation with Breakeven Inflation Expectations

Years	All	Supply	Aggregate Demand	Oil-Specific Demand
2003-2007	0.543	-0.105	0.542	0.256
2008-2015	0.798	0.396	-0.142	0.618
2014-2015	0.924	0.783	0.646	0.879

SOURCE: Authors' calculations.

the financial crisis. The fact that the correlation between inflation expectations and oil price was low when measured over the full 2003-2015 period but high in the three subperiods identified in the table suggests that the level shift in inflation expectations after the financial crisis is unrelated to oil price shocks.

Second, only the correlation of oil-specific demand shocks and inflation expectations is large and positive across all subperiods considered in the table. This contrasts with

the behavior of the other two correlations. Further, this correlation has increased in recent subperiods. The table, thus, suggests the need to further investigate the nature of oil-specific demand shocks.⁴

Alejandro Badel is an economist, and Joseph McGillicuddy is a research associate, both at the Federal Reserve Bank of St. Louis. For more on Badel's work, see <https://research.stlouisfed.org/econ/badel>.

ENDNOTES

- ¹ Breakeven inflation expectations are defined as the difference between the yield provided by nominal government debt and the yield provided by inflation-indexed debt with the same time to maturity. For example, the U.S. five-year breakeven inflation rate is calculated as the yield on five-year nominal Treasury bonds less the yield on five-year Treasury Inflation-Protected Securities.
- ² U.S. refiner acquisition cost of imported crude oil, deflated by U.S. CPI.
- ³ Correlation, here referring to the correlation coefficient, is a measure of the linear relationship between two variables and takes on a value between -1 and 1. A positive value indicates that the two variables tend to move together, while a negative value indicates that they tend to move in opposite directions. The farther away the value is from 0, the stronger the relationship, with +/-1 representing a perfect correlation, meaning if there is a change in one variable, the other is changed in a fixed proportion.
- ⁴ See Baumeister and Kilian for a four-variable model with explicit treatment of oil inventories.

REFERENCES

Badel, Alejandro; and McGillicuddy, Joseph. "Oil Prices: Is Supply or Demand behind the Slump?" *On the Economy* (blog), Federal Reserve Bank of St. Louis, Jan. 13, 2015. See www.stlouisfed.org/on-the-economy/2015/january/oil-prices-is-supply-or-demand-behind-the-slump.

Baumeister, Christiane; and Kilian, Lutz. "Understanding the Decline in the Price of Oil since June 2014." Working Paper Series, No. 501, Center for Financial Studies, Jan. 24, 2015. See <http://econstor.eu/bitstream/10419/106822/1/816879087.pdf>.

Kilian, Lutz. "Not All Oil Price Shocks Are Alike: Disentangling Demand and Supply Shocks in the Crude Oil Market." *American Economic Review*, June 2009, Vol. 99, No. 3, pp. 1,053-69. See <http://pubs.aeaweb.org/doi/pdfplus/10.1257/aer.99.3.1053>.

Changes in Income Gaps Might Overstate Changes in Welfare Gaps

By Juan Sánchez and Lijun Zhu



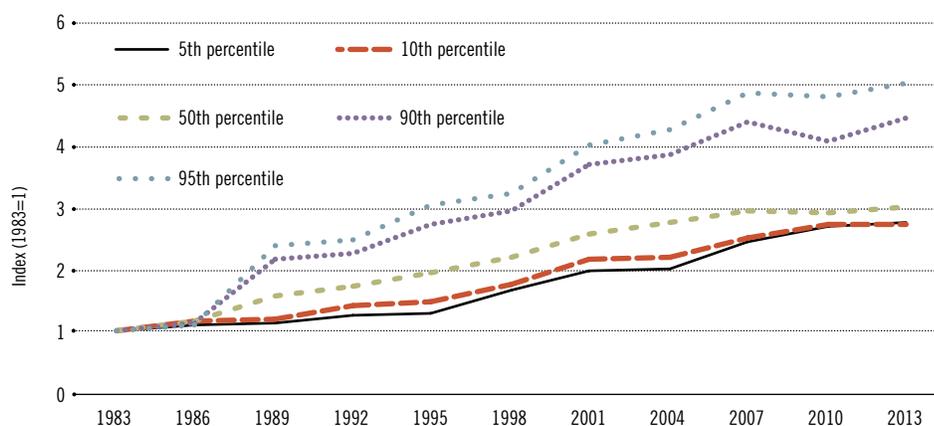
© THINKSTOCK/ISTOCK

Discussions about changes in income among the poor, middle class and rich have become popular, especially after Thomas Piketty's recent publication of *Capital in the Twenty-First Century*. What these discussions sometimes leave out is that income must be adjusted by the relevant prices before it can be used to evaluate welfare.¹ This article argues that the evolution of income by households of different income levels since the early 1980s may overstate differences in the evolution of welfare because the cost of goods consumed predominantly by the rich rose faster than the cost of goods consumed predominantly by the poor and middle class.

Figure 1 shows that income rose faster for richer than poorer households over the past three decades. We used data from the Federal Reserve's Survey of Consumer Finances (SCF) and plotted the income paths for the 5th, 10th, 50th, 90th and 95th percentiles of household income (lowest to highest). The household in the 95th percentile in 2013 was five times richer than its 1983 counterpart,² while the median household (50th percentile) and the 5th-percentile household saw an increase of about three times.

This pattern is robust to demographic changes. To control for potential bias caused by change in age distribution (for example, baby boomers are aging during this period, and older households usually have more income than younger households), we also looked at the income of those households whose heads were between 35 and 55. We found that income inequality for those middle-aged households evolved in a quite similar way as for the whole population, as shown in Figure 1. We also looked at labor earnings separately from income since the

FIGURE 1
Household Income by Income Percentiles



SOURCES: Survey of Consumer Finances, authors' calculation.

latter includes, in addition to labor earnings, income from such things as unemployment insurance, food stamps, self-employment, and investments in stocks, bonds and real estate. When we performed the same exercise just for labor earnings, we found only slightly different patterns from what can be seen in Figure 1: The 95th, 50th and 5th percentiles of the household wage distribution increased by six, three and four times, respectively.

The pattern in Figure 1 is also very similar to that seen when other data sources for household income are used, sources such as the Current Population Survey (CPS). The only difference with CPS is in the top of the income distribution (95th percentile), where the increase is smaller (4.5 times), probably due to top-coding.³

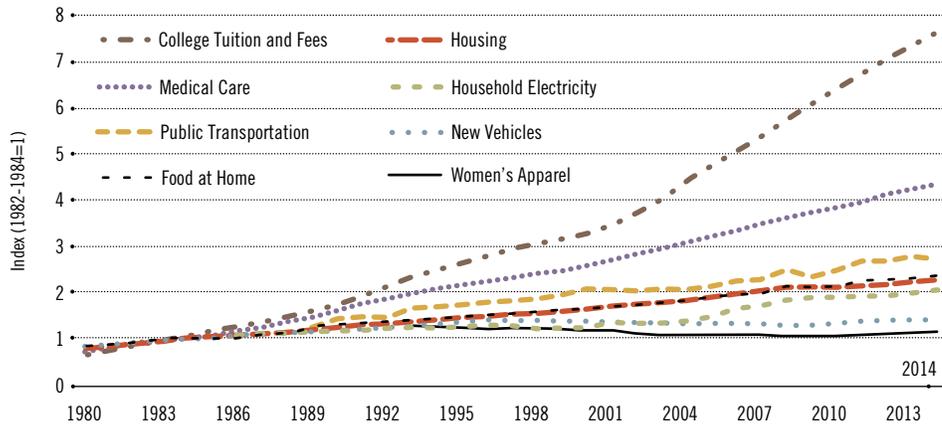
After characterizing the change in household income, the next step is usually to adjust the change in income by changes in consumption prices. For instance, if the

income of a given group is three times higher now than in 1983, but consumption prices are also three times higher, most would likely agree that their welfare did not improve. But which are the relevant prices?

We argue that the relevant prices are the prices of the goods actually purchased by those households. Importantly, households of different income levels consume different goods. Imagine that a household had an increase in income and that it increased expenditures on all goods. How much would the expenditures in each particular good increase? That could be measured by the expenditure elasticity estimated in a study soon to be published by Mark Aguiar and Mark Bils.⁴ They found great dispersion across products. The consumption of most goods increases as total expenditure increases;⁵ so, the real question is whether the increase is more or less than proportional. For instance, if consumption of food is \$10 and total expenditure is \$100, when

FIGURE 2

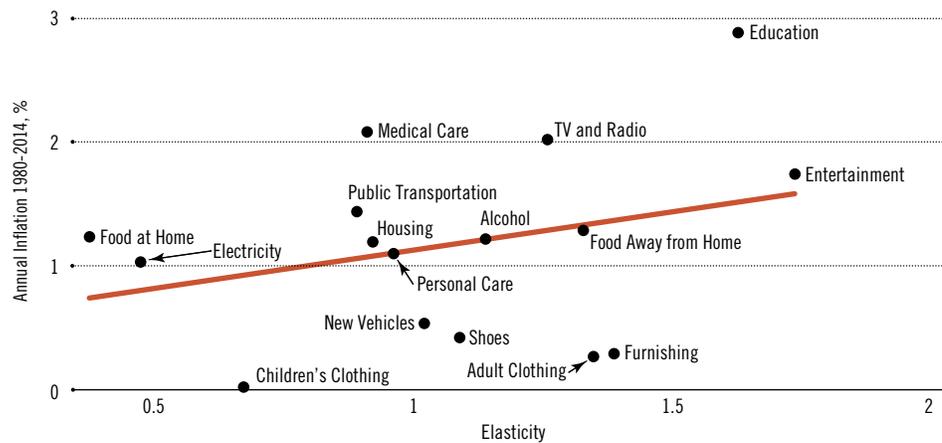
Inflation by Consumption Goods



SOURCE: Haver Analytics.

FIGURE 3

Inflation vs. Elasticity



SOURCES: Aguiar and Bils, Haver Analytics and authors' calculation.

NOTE: Each dot represents a consumption goods item, with the horizontal axis value representing its expenditure elasticity and the vertical axis value showing its annualized inflation from 1980 to 2014.

total expenditures increase to \$200, are food expenditures smaller or greater than \$20? If they are exactly \$20, the expenditure elasticity of food is exactly 1. If they are smaller (larger) than \$20, the elasticity is smaller (larger) than 1.

As total expenditures increase 1 percent, expenditures on the three categories of food at home, utilities and children's clothing go up only by 0.37, 0.47 and 0.67 percent, respectively. Items in all three categories are, therefore, labeled as "necessity goods." As a consequence, the fraction spent on these goods drops as total expenditures increase. The elasticity of housing to total expenditure is close to 1 (0.92), indicating that households tend to allocate almost a fixed

proportion of their expenditures to housing expenditures.

On the other hand, some goods account for a bigger fraction in total expenditures as the latter increases. A person's spending on food away from home, for example, increases 1.33 percent when total expenditures increase 1 percent. Similarly, a 1 percent increase in total expenditures leads to spending increases greater than 1 percent on entertainment, child care and education. This indicates that the composition of consumption goods changes when income increases. In other words, the poor and the rich have different baskets of consumption goods.

continued on Page 16

ENDNOTES

- 1 Technically, we are thinking about the concept of compensating variation (CV) to evaluate the welfare change of a change in prices. This concept answers: When the price of one good rises, how much more do you have to spend to maintain your initial level of happiness?
- 2 Note that, due to mobility, those who are at the top distribution in 2013 are generally different from those who were at the top in 1980.
- 3 Top-coding indicates that values above a certain threshold are coded as the threshold value.
- 4 See Aguiar and Bils.
- 5 A notable exception is tobacco.

REFERENCES

Aguiar, Mark; and Bils, Mark. "Has Consumption Inequality Mirrored Income Inequality?" *American Economic Review*, forthcoming.

Piketty, Thomas. *Capital in the Twenty-First Century*. English version. Cambridge, Mass.: Harvard University Press, 2014.

continued from Page 15

To have a fuller picture of welfare comparison, we need to investigate further the price changes for the different goods mentioned above. Figure 2 uses the Consumer Price Index for All Urban Consumers from the Bureau of Labor Statistics and plots the inflation trends (1982-1984=1) for eight consumption goods from 1980 to 2014. The inflation rates are uneven across goods. The price of education is more than seven times higher today than three decades ago. The price level for medical care, though lower than education, has also increased significantly, at a magnitude of more than four times. Inflation for housing, food and public transportation is moderate, increasing between two and three times from 1980 to 2014.

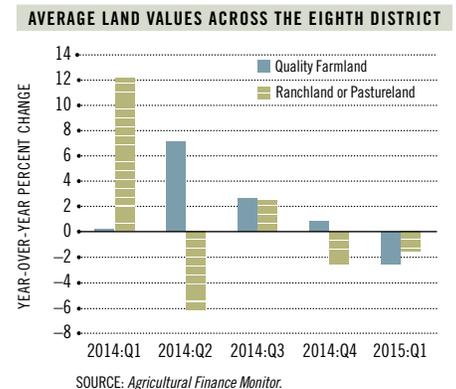
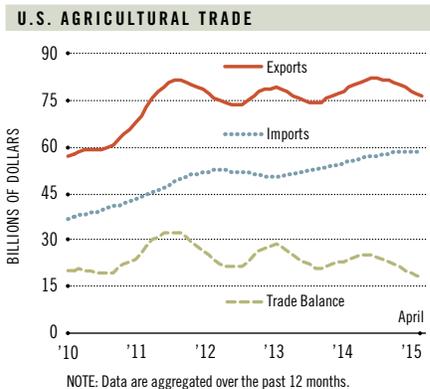
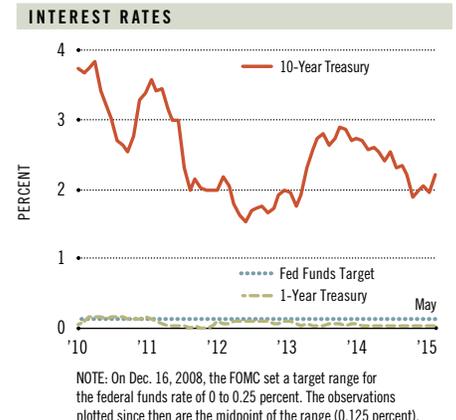
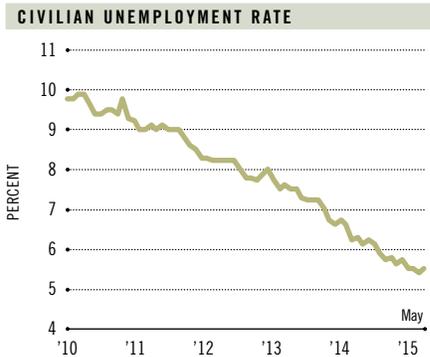
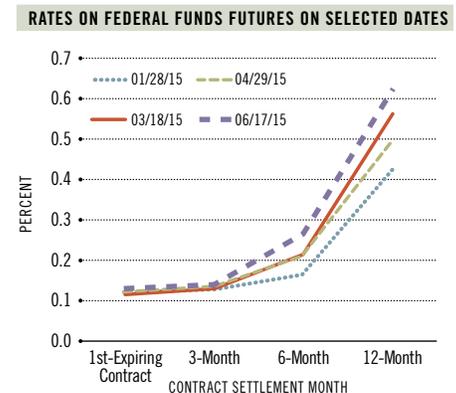
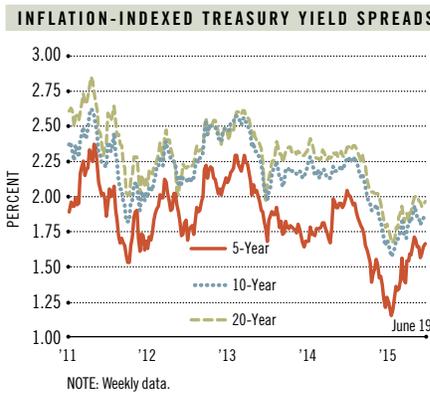
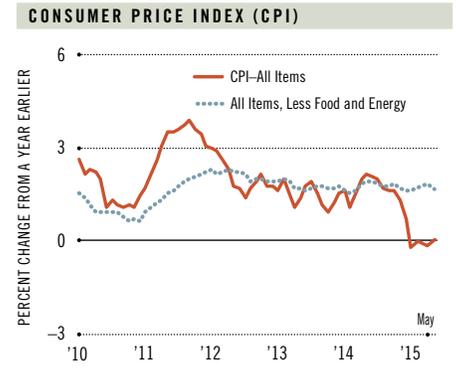
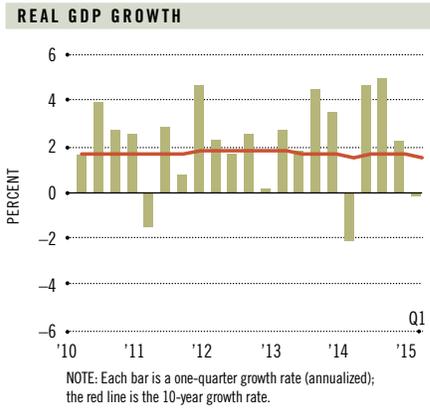
For the past three decades, some goods have also seen limited change in price levels. The prices for new vehicles and for women's apparel increased until the mid-1990s and decreased thereafter. The price for household electricity was almost flat until the 2000s, when the price started to go up steadily.

A casual observation of the change in prices and the income elasticities suggests that the goods consumed more by richer households, such as education, have become more costly over the past three decades. To show that this relationship also extends to additional consumption goods, Figure 3 plots the inflation rate from 1980 to 2014 and expenditure elasticity for 16 consumption goods/categories. The two show a positive correlation, i.e., goods consumed more by richer households had a higher increase in cost.

Overall, the findings suggest the increase in the income gap between rich and poor households might overstate the welfare differences. The reason is that the rich and poor generally consume a different basket of goods, and the goods consumed predominantly by richer households have risen faster in price. Ω

Juan Sánchez is an economist and Lijun Zhu is a technical research associate, both at the Federal Reserve Bank of St. Louis. For more on Sanchez's work, see <https://research.stlouisfed.org/econ/sanchez>.

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.



The U.S. Economy Stumbles Out of the Gate—Again

By Kevin L. Kliesen

After posting healthy growth over the final three quarters of 2014, real gross domestic product (GDP) contracted slightly in the first quarter of this year. This stumble is remarkably similar to last year's, when the U.S. economy contracted in the first quarter. Like then, the decline this time is viewed as the product of temporary factors, rather than a precursor to a recession or an extended period of below-trend growth. Accordingly, most forecasters and policymakers expect that the economy will regain its footing over the final three quarters of this year.

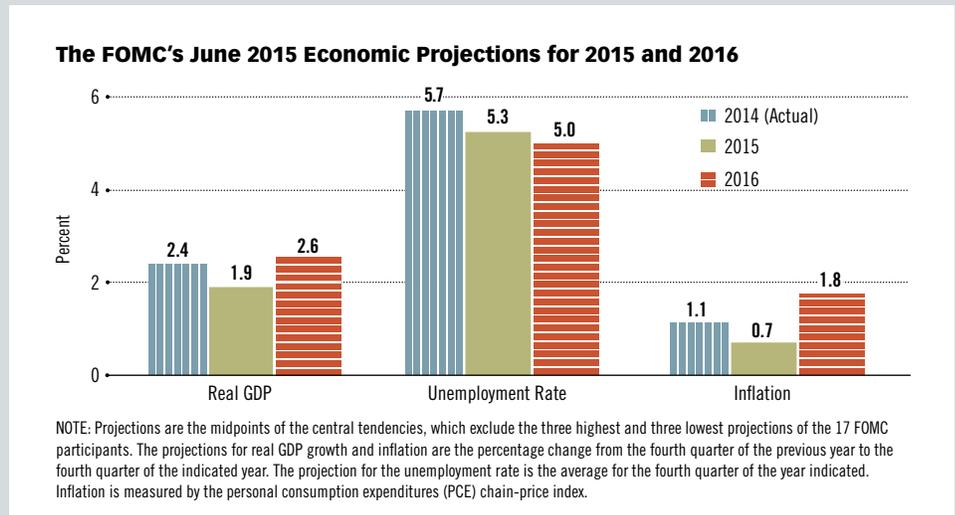
Inflation, by contrast, has been stunted by the plunge in crude oil prices, which began in June 2014. Although the Federal Reserve's preferred measure of consumer prices is little-changed from a year earlier, the modest uptick in crude oil prices since mid-March suggests that headline inflation will eventually return to the Fed's target of 2 percent—though it might take a while.

In short, consensus forecasts support the views of those who believe that the Federal Open Market Committee (FOMC) remains on track to increase its policy (fed funds) rate this year for the first time since June 2006. Ultimately, though, that decision will depend not on the forecasts, but on the actual performance of the economy.

Starting Slow, Picking Up Speed

The U.S. economy finished 2014 on sound footing, registering real GDP growth in excess of 3 percent over the final three quarters of the year. But early this year, the U.S. economy's forward momentum stalled, as real GDP declined at a 0.2 percent annual rate in the first quarter. The swing from positive to negative growth mostly reflected four key developments.

First, real consumer spending slowed dramatically. Despite continued low oil prices, households turned cautious, choosing to save more and spend less; this resulted in a sizable accumulation of unsold goods. This consumer behavior is a bit of a puzzle since



several key drivers of consumer spending look solid: rising net wealth, low real interest rates, low gasoline prices and high levels of consumer confidence. Labor market conditions, another key driver of consumer spending, are healthy. Job gains averaged 236,000 per month from December through May, and the unemployment rate—at 5.5 percent in May—is slightly below its long-run average. The slowdown in consumer spending looks to be temporary, however, as auto sales and other retail sales surged in May.

The second key factor that helps explain the first-quarter dip is the decline in business capital spending. This decrease mostly reflected the plunge in crude oil prices, which caused firms in the energy-producing sector to cut back on exploration activity. The slowdown in drilling also adversely affected other industries, such as steel producers. Overall, though, the decline in oil prices has been a net positive for the economy—chiefly by boosting the purchasing power of households.

Third, the increase in the real trade-weighted value of the dollar contributed to a sharp decline in real exports in the first quarter. The decline trimmed real GDP growth in Q1 by about 1 percent. The rising dollar, coupled with the unfolding Greek drama and a weakening Chinese economy, added to the uncertainty facing U.S. manufacturers and other firms with a global footprint.

Finally, it appears that a confluence of some special factors helped to slow the growth of economic activity in the first quarter. These included adverse weather, the

West Coast port slowdown and the potential presence of seasonal distortions in the data.

An Upbeat Forecast

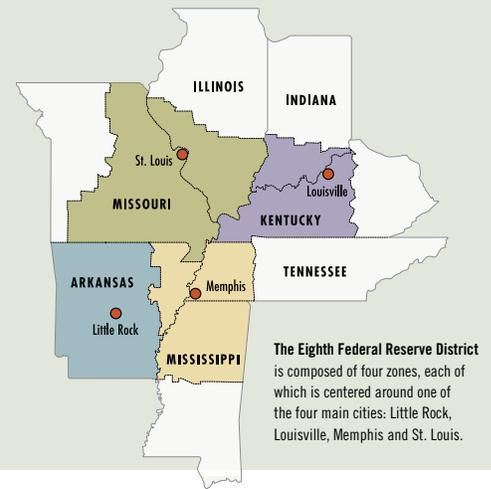
After bottoming out in mid-March at a little less than \$44 per barrel, spot crude oil prices (West Texas Intermediate) have since rebounded, averaging about \$60 per barrel in June. Despite this rebound, headline inflation has been flat (at least into June) and below the Fed's inflation target, and inflation expectations remain relatively low and stable. Most forecasters continue to expect that headline inflation will rise modestly over the remainder of 2015, ending the year with a gain of about 1 percent (compared with 2014). Consumer prices are then expected to rise by about 2 percent in 2016. However, these forecasts are partly conditional on a modest rebound in crude oil prices over the next year or two.

For the economy, the consensus of private-sector forecasters is that it will rebound over the final three quarters of this year—real GDP growth is projected to average about 3 percent, and the unemployment rate is forecast to fall to about 5 percent or less by the end of 2015. Much of this optimism reflects expectations for continued healthy labor markets, a brighter outlook for housing, and modestly faster growth of expenditures by households and businesses. [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.

As in the Nation, New Jobs in the District Are Concentrated in Low-Paying Industries

By Maximiliano Dvorkin and Hannah Shell



Millions of jobs were lost in the United States during the latest recession, and millions were created since its end. However, the majority of jobs added across the nation have been in low-paying industries. In a *Regional Economist* article earlier this year, authors Kevin Kliesen and Lowell Ricketts found that 61 percent of jobs added across the country between 2009 and late 2014 were in industries with a wage rate below the national median wage.¹

For this essay, we investigated various employment trends in the Eighth District by low-paying and high-paying industry groups. We found that the total number of jobs added in the District was greater in low-paying industries than in high-paying industries, consistent with the previously mentioned study's findings about the nation. But, unlike in the national study, we found that jobs in low-paying industries in the District were growing at a faster rate

than jobs in high-paying industries. Low-paying industries in the District also had higher rates of turnover and slower earnings growth than did high-paying industries in the District.

To tailor our data specifically to the District, we used county data from the Census Bureau's Quarterly Workforce Indicators and constructed various measures of earnings, employment and turnover for 20 industries from 2010 to 2013.² We then sorted each

Job and Earnings Growth Characteristics in the Eighth District, 2010-2013

	Employment Level 2010	Employment Change 2010-2013	Percent Change in Employment 2010-2013	Average Firm Job Growth	Average Turnover	YoY% Growth in Monthly Earnings	YoY% Growth in New Hires' Monthly Earnings
<i>Frequency/Rate</i>	<i>Level</i>	<i>3-Year Difference</i>	<i>3-Year % Change</i>	<i>Annual Average</i>	<i>Quarterly Average</i>	<i>Annual Average</i>	<i>Annual Average</i>
High-Paying Industries	1,902,061	40,800	2.15%	1,056	7.41%	2.71%	2.39%
Mining, Quarrying, and Oil and Gas Extraction	19,027	960	5.05	39	8.61	3.95	4.14
Utilities	37,646	286	0.76	18	2.99	2.17	2.03
Management of Companies and Enterprises	107,119	7,155	6.68	284	7.06	2.38	-0.73
Wholesale Trade	232,675	3,099	1.33	1,462	6.84	2.50	2.52
Professional, Scientific and Technical Services	201,309	9,983	4.96	2,006	9.20	4.06	4.71
Finance and Insurance	193,208	7,209	3.73	1,063	5.41	3.43	1.56
Manufacturing	556,834	11,353	2.04	2,528	5.68	2.91	1.76
Construction	226,783	(5,459)	-2.41	1,963	11.23	2.15	2.05
Transportation and Warehousing	243,002	10,494	4.32	1,797	9.70	2.23	2.32
Information	84,457	(4,281)	-5.07	(603)	7.34	1.26	3.50
Low-Paying Industries	3,088,058	112,781	3.65%	2,054	11.00%	1.91%	2.33%
Health Care and Social Assistance	761,860	32,835	4.31	4,005	8.40	1.46	1.28
Educational Services	453,265	9,167	2.02	(782)	5.78	1.03	2.44
Public Administration	212,308	(3,842)	-1.81	121	5.35	1.17	2.36
Agriculture, Forestry, Fishing and Hunting	22,929	1,029	4.49	281	11.56	2.73	3.23
Admin, Support, Waste Management/Remediation	299,212	39,542	13.22	6,276	17.97	1.39	2.71
Real Estate Rental and Leasing	65,857	1,972	2.99	381	9.68	3.03	3.86
Other Services	148,827	(4,266)	-2.87	1,181	9.89	2.42	2.40
Retail Trade	593,108	10,410	1.76	4,395	10.24	2.33	1.91
Arts, Entertainment and Recreation	77,421	3,221	4.16	983	14.69	1.74	1.32
Accommodation and Food Services	453,273	22,713	5.01	3,698	16.48	1.76	1.84

SOURCES: Authors' calculations and U.S. Census Bureau Quarterly Workforce Indicators. NOTES: The individual Industries in each of the two categories are listed from highest- to lowest-paying. Data are rounded.

industry into a “high-paying” group or “low-paying” group depending on whether the average monthly earnings of a worker in that industry were above or below the median earnings across all industries in the District. The table reports the average employment statistics for each group and for each individual industry.

Job Growth by Industry

Overall, employment in the District grew by about 150,000 jobs from 2010 to 2013; employment in the nation grew about 6.12 million over the same time period.³ Similar to the nation, the number of jobs added in the District was more concentrated in low-paying industries than in high-paying industries. Almost 75 percent of jobs that were added in the District were in low-paying industries. The industries in the District that grew the most over the time period were administrative, support, and waste management and remediation services (ASWR); health care and social assistance; and accommodation and food services. These industries alone accounted for more than 90,000 of the jobs added in the District over the three-year period. (Kliesen and Ricketts found that national growth had been largely concentrated in similar industries, such as retail trade, education and health services, and leisure and hospitality.) The District’s slowest-growing industries that still had positive growth rates were the mining, quarrying, oil and gas extraction (MQOG) and utilities industries. Combined, these industries added fewer than 1,300 jobs over the three years.

The rate of job growth in the District in low-paying industries also exceeded the rate of job growth in high-paying industries. Low-paying industries made up about 61 percent of total employment in the District in 2010. As Kliesen and Ricketts pointed out in their article, it makes sense that the absolute number of jobs added is greater in low-paying industries because those industries have a greater share of total employment. In the District, however, the rate of job growth in low-paying industries (3.65 percent) exceeded the rate in high-paying industries (2.15 percent).

High- and low-paying industries in the District not only differed in the number and rate of jobs they created, but also in the dynamics of job creation and destruction. The

table shows that low-paying industries tended to have higher rates of turnover and firm job growth, in other words, higher rates of job creation and destruction. Turnover is defined as the number of new hires and separations as a percentage of average employment each quarter, and job growth is the number of jobs added at expanding firms in excess of the number of jobs lost at shrinking firms.

The average rate of turnover in low-paying industries was 11 percent of employment each quarter. In contrast, the rate of turnover in high-paying industries was only a bit more than 7 percent. This finding is consistent with the view that, all other things equal, workers find high-paying jobs more desirable and prefer not to leave them. The difference in jobs added between high-paying and low-paying industries is about 1,000 jobs per year, with the low-paying industries coming out on top.

Earnings Growth by Industry

Although low-paying industries created more jobs than high-paying industries, nominal earnings growth in high-paying industries exceeded earnings growth in low-paying industries. The average annual earnings growth of workers in high-paying industries was 2.71 percent over the period, while earnings in low-paying industries grew only 1.91 percent. The professional, scientific and technical services (PSTS) industry experienced the strongest earnings growth: 4.06 percent each year on average, nearly double the District’s average of 2.11 percent. Employment in this industry grew by about 10,000 jobs over the three years (far below the 30,000-plus rates of several low-paying industries), and the rate of turnover remained below the low-paying industry average (9.2 percent vs. 11 percent). On net, firms in this industry added about 2,000 jobs each year.

Earnings growth was also strong in the MQOG and the finance and insurance industries, growing at average annual rates of 3.95 percent and 3.43 percent, respectively. Employment in MQOG grew by 960 jobs over the three years, and on average firms added about 39 jobs each year in excess of job destruction. The finance and insurance industry was growing at a pace closer to the PSTS industry, with employment growth at about 7,000 jobs and firm job growth at about 1,000 jobs. Turnover was again below the low-paying industry average, at about

ENDNOTES

- ¹ The authors of that earlier article noted that low-paying industries accounted for a greater share of total employment than did high-paying industries and that the percentage growth of jobs in high-paying industries actually exceeded that in low-paying industries. See Kliesen and Ricketts.
- ² We chose this time period due to data limitations and to capture the progress of the indicators over the recovery from the 2007-09 recession.
- ³ National employment growth is calculated using average total nonfarm payrolls from the Bureau of Labor Statistics’ Establishment Survey.
- ⁴ In this dataset, new hires are defined as workers who started a job that they had not held within the past year, and stayed for at least one quarter.

REFERENCE

Kliesen, Kevin L.; and Ricketts, Lowell R. “Faster Real GDP Growth during Recoveries Tends To Be Associated with Growth of Jobs in ‘Low-Paying’ Industries.” The Federal Reserve Bank of St. Louis’ *The Regional Economist*, January 2015, Vol. 23, No. 1. See www.stlouisfed.org/publications/regional-economist/january-2015/gdp-growth.

9 percent of employment in MQOG and 5 percent in finance and insurance.

The difference in earnings growth between high-paying and low-paying industries was much smaller when only the earnings of new hires were considered. The average monthly earnings of newly hired employees in high-paying industries grew 2.39 percent per year over the period studied, only 0.06 percentage points above the growth rate in low-paying industries.⁴ This relative equality in growth rates suggests that the disparity in earnings growth between high-paying and low-paying industries was largely driven by wage increases for existing workers, as opposed to higher starting wages.

In conclusion, the Eighth District recovery in employment since the end of the recession has been very heterogeneous, with employment growth more concentrated in low-paying industries than in high-paying industries. The discrepancy in growth rates in the District is different from the discrepancy in the nation, where Kliesen and Ricketts found that jobs in high-paying industries are growing at a faster rate than jobs in low-paying industries. 

Maximiliano Dvorkin is an economist, and Hannah Shell is a research associate, both at the Federal Reserve Bank of St. Louis. For more on Dvorkin’s work, see <http://research.stlouisfed.org/econ/dvorkin>.

Bowling Green, Ky.: Cars, College and Caves

By Georgette Fernandez Laris and Charles S. Gascon

© CLINTON LEWIS/WESTERN KENTUCKY UNIVERSITY

Located in western Kentucky between the rapidly growing areas of Nashville, Tenn., to the south and Louisville, Ky., to the north, the Bowling Green metropolitan statistical area (MSA) shares in this region's relative prosperity. Since 1970, population growth in Bowling Green has outpaced that of the nation and that of the state. In the past decade alone, the metro area's population has increased 18 percent, double the national rate of 9 percent and triple Kentucky's rate of 6 percent.

A major employer, Western Kentucky University has an enrollment of about 16,000 students at its Bowling Green campus (above) and about 4,000 more at three other campuses.

The four-county region that comprises the metro area is centered on the city of Bowling Green, in Warren County.¹ The population of the metro area stands at just over 165,000. Three-quarters of the people live in Warren County, and half of those reside in the city of Bowling Green.

Annual output for the region was just under \$6 billion in 2013, which is about 3 percent of the state's total output and about 9 percent of the Louisville MSA's.

This population and output place Bowling Green among the nation's smaller metro areas, very close in size to nearby Elizabethtown, Ky., and Bloomington, Ind.²

"We are a 'mini-politan' area with metropolitan-area interests. ... We sit right in the middle between Nashville, Tenn., and Louisville, Ky."

—Wholesaler in Bowling Green area³

Being a smaller metropolitan area generally brings with it a lower cost of living, and this is true for the Bowling Green MSA. The cost of living is about 15 percent below the nation's average, 10 percent below Nashville's and about 6 percent below Louisville's. The low cost of living in Bowling Green can be

mostly attributed to the low cost of rent/housing: At about \$127,000, the median house price is roughly 30 percent below the nation's average, 25 percent below Nashville's and 13 percent below Louisville's. The cost of goods and the cost of services other than rents are 7 and 10 percent below the national average, respectively.

The median household income in Bowling Green is \$42,000, roughly 21 percent lower than the national average of \$53,000. However, when factoring in the lower cost of living in the region, the "real" median household income in the MSA is about \$49,000.⁴

Cars in a Cave

In February 2014, a sinkhole collapsed under the National Corvette Museum in Bowling Green, claiming eight cars. (No one was harmed.) This event brought together two things that draw national attention to the region: cars and caves.

As in much of Kentucky and Tennessee, the auto industry is a key sector. Bowling Green is home to numerous auto-parts suppliers, as well as to General Motors' only Corvette manufacturing facility. GM has already invested close to \$135 million in refurbishing its Bowling Green plant and

recently announced plans to invest an additional \$500 million for a new paint shop.

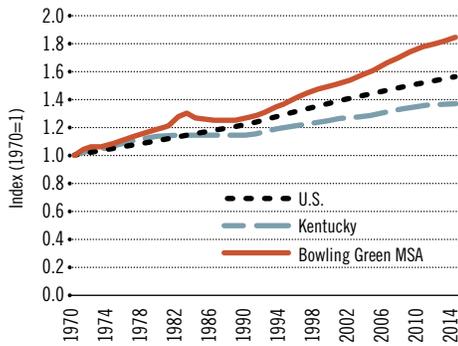
Including the 900 workers at the plant, about 4.3 percent (roughly 3,100 jobs) of the region's workforce is employed in the transportation equipment manufacturing sector. In comparison, 1.1 percent of the nation's workforce and 2.9 percent of the state's are employed in this sector. In addition to auto manufacturing, cars serve as a tourism anchor: The Corvette museum drew more than 250,000 visitors last year.⁵

Bowling Green is one of only a handful of MSAs that are home to a national park. Mammoth Cave National Park preserves the world's longest known cave system. More than 400 miles of the cave have been explored in the park, according to the National Park Service. The majority of the park, including its visitor center, is located in Edmonson County, roughly a half-hour drive from downtown Bowling Green. The park attracts about 500,000 visitors annually.

Because of these and other tourist attractions and related businesses, about 11 percent of the workforce in the MSA is employed in the leisure and hospitality sector. The national average is 9.6 percent.

FIGURE 1

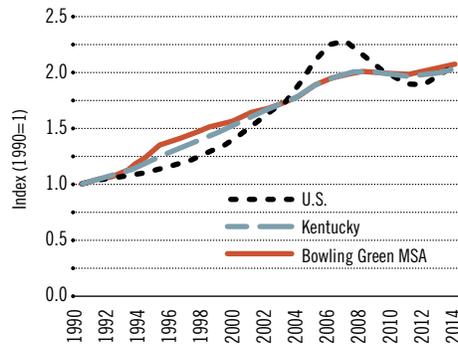
Population Trends



SOURCES: Census Bureau and Federal Reserve Economic Data (FRED).

FIGURE 3

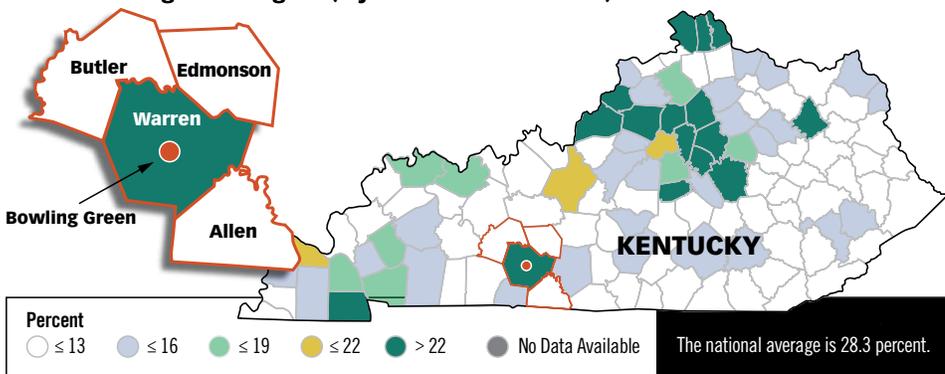
FHFA House Price Index



SOURCES: Federal Housing Finance Agency and FRED.

FIGURE 2

Bachelor's Degree or Higher (5-year estimate 2008-12)



SOURCE: GeoFRED.

Beyond cars and caves, Western Kentucky University (WKU) plays a significant role in shaping the region's economy. With an enrollment over 20,000 students, WKU is one of the region's largest employers. (As a public university, its workers show up on government payrolls.) The university works closely with other local businesses to train the local workforce.

"We have a great university in Western Kentucky University ... as well as an extensive vocational school network. Currently, the largest obstacle to growth is [the lack of] a skilled workforce."

-Bowling Green equipment wholesaler

WKU is partly responsible for the high educational attainment in Warren County, relative to the surrounding area. More than a quarter of the population 25 and older in Warren County has a bachelor's degree or higher, which is roughly three times the rate of the other counties comprising the MSA.⁶ Thus, Warren County's educational attainment helps to positively push the broader

metro area average. Still, the MSA's average is below that of the nation: 22.3 percent compared with 28.3 percent.

Businesses contacted for this article expressed concern about the lack of skilled workers despite the positive impact of the university. This isn't necessarily specific to Bowling Green, as Kentucky has the fourth-lowest college attainment rate in the nation. One contact noted that, outside of the university-driven research and development, there is not a strong environment of innovation. Another contact noted a lack of technology-trained workers available to fill current needs.

No Boom and Bust in Housing

Many business contacts noted that Bowling Green seemed relatively insulated from the drastic housing price changes observed during the bursting of the housing market bubble in 2007. During the housing boom from 1999 to 2006, national home prices increased by about 7 percent per year. In Bowling Green, as in the rest of Kentucky, home prices appreciated by a modest



© THINKSTOCK, SNIKELTRUT

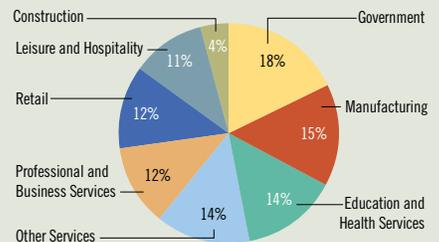
Kentucky is known for its caves, particularly Mammoth Cave, which is located in the Bowling Green MSA. It's a major tourist attraction, drawing about 500,000 visitors annually to the national park.

MSA Snapshot

Bowling Green, Ky.

Population (2014)	165,732
Population Growth (2014)	1.2%
Employment Growth (2014)	1.7%
Population (Age 25+)	
with Bachelor's Degree or Higher	22.3%
Population in Poverty	19.9%
Median Household Income	\$42,385
Unemployment Rate	4.8%
Real GDP (2013)	\$5.5 billion
Annual Growth (2013)	3.2%

2014 Employment by Major Sector



NOTE: The total number of jobs is 71,400.

LARGEST EMPLOYERS

1. Houchens Industries	5,000
2. Western Kentucky University	3,530
3. Commonwealth Health Corp.	2,690
4. Warren County Public Schools	2,574
5. Dart Container Corp.	1,488



© NATIONAL CORVETTE MUSEUM

General Motors makes its popular Corvette sports car in only one place: Bowling Green. The area is also home to the National Corvette Museum, which drew about 250,000 visitors last year. In other ways, the auto sector is a large employer in the area.

3.5 percent per year. During the housing bust, national prices fell by 4.4 percent per year, while regional prices fell by only 0.4 percent per year—and then quickly rebounded. Bowling Green’s price decline was also closely aligned to Kentucky’s average price drop. Stable household finances probably helped the local market: The percentage of borrowers who were 90-plus days delinquent on their mortgages rose from 1 percent to only about 4 percent, compared with the increase to 8 percent observed nationally.

“Prices didn’t necessarily decline, but there was a spike in the number of homes for sale.”

—Bowling Green-area real estate agent

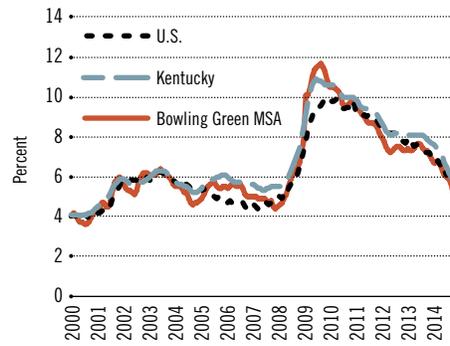
Although prices were stable, the local construction industry did take a hit. As the inventory of homes for sale escalated, construction of single-family houses plummeted. Both nationally and locally, the number of permits for single-family homes dropped more than 50 percent between 2007 and 2009, resulting in job losses in the construction sector.

Manufacturing’s Impact

Despite the stability in the housing market, the national collapse in auto sales (and production) during the recession ultimately hurt Bowling Green’s economy. Between 2007 and 2009, the U.S. economy contracted by about 3 percent, while Bowling Green’s economy contracted by 7.5 percent. Given Bowling

FIGURE 4

Unemployment Rate



SOURCES: Bureau of Labor Statistics and FRED.

Green’s large share of workers in the auto industry, job losses in the sector impacted the MSA more than the nation: About 5.6 percent of Bowling Green’s workers lost their jobs over the two-year period, compared with a 4.9 percent loss nationally. The metro area’s unemployment rate reached a high of 11.7 percent in the fall of 2009, above the national peak at 10 percent. In some of the less-populous counties outside of the central city, the unemployment rate rose to about 15 percent.

Of the roughly 5,000 jobs lost during the recession in the MSA, slightly more than half were in the manufacturing sector (primarily auto and transportation industry components), with the other half spread across construction and the much larger service sector.

A Strong Recovery

The combination of stable housing prices and the recovery in auto sales has set the foundation for the strengthening of the local economy.

In other parts of the country, households have spent many years rebuilding their balance sheets due to losses in home equity resulting from falling home prices. Because prices in the region fell only slightly, the hit to households’ balance sheets in the area was less pronounced. Additionally, residential activity has picked up in recent months; however, limited inventories of homes for sale continue to stymie buyers. Construction activity remains focused on the multifamily sector. Given the current environment, some contacts noted that they began to see multiple offers on homes starting this spring.

With the rebound in auto sales, 2,000 manufacturing jobs have come back to the region. Coupled with continued job gains in

the education and health care sector (1,800 jobs) and increases in the hospitality sector (1,400 jobs), total employment in Bowling Green has grown faster than the national growth rate and has surpassed the MSA’s prerecession peak. The region’s number of jobs is now about 4,000 higher than before the recession.

Employers’ concern about finding workers with needed skills may slow down job growth in the short term. As in other areas, any change in the national economy is also likely to be felt in the region. Nonetheless, contacts remain optimistic about growth prospects for Bowling Green, some noting that they have seen an increase in their customer base and others believing that the local economy seems to get better daily.

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>. Georgette Fernandez Laris was an industry relations specialist at the Bank at the time this was written.

ENDNOTES

- 1 The MSA, as defined in 2013, is made up of Allen, Butler, Edmonson and Warren counties.
- 2 Bowling Green ranks 248th out of 381 metropolitan areas based on population and 263rd out of 381 based on output, measured by gross metropolitan product.
- 3 Anecdotal information in this report was obtained from surveys and interviews with local business contacts in Bowling Green conducted by the authors. The anecdotes should be interpreted with caution because of the small sample of respondents. Some quotes were lightly edited to improve readability.
- 4 Economists Nathaniel Baum-Snow and Ronni Pavan have found a positive relationship between wages and city size: Workers in larger cities earn higher wages because they tend to be more productive, in part due to the additional resources afforded by larger cities. The authors found a 1 percent increase in wages for each additional 100,000 people in a metro area.
- 5 For perspective, the Louisville Slugger Museum in Louisville attracts about 550,000 visitors each year.
- 6 Percent of the population over 25 with a bachelor’s degree or higher: Warren (27.5); Allen (11.0) Edmonson (9.3); and Butler (7.5).

REFERENCE

Baum-Snow, Nathaniel; and Pavan, Ronni. “Understanding the City Size Wage Gap.” *Review of Economic Studies*, January 2012, Vol. 79, No. 1, pp. 88-127.

ASK AN ECONOMIST



Stephen D. Williamson has been an economist and vice president at the Federal Reserve Bank of St. Louis since June 2014. Previously, he held academic positions at Washington University in St. Louis, the University of Iowa, the University of Western Ontario and Queen's University. He also worked at the Minneapolis Federal Reserve Bank and the Bank of Canada, and he was an adviser at several Federal Reserve banks, including the St. Louis Fed. Williamson's research focuses on monetary economics, macroeconomics and financial economics. His roots are in Canada, where he attended all levels of school. Williamson and his family enjoy outdoor activities, particularly hiking, and music. For more on his research, see <https://research.stlouisfed.org/econ/williamson/sel>.

Q: How is normalization of monetary policy going to work?

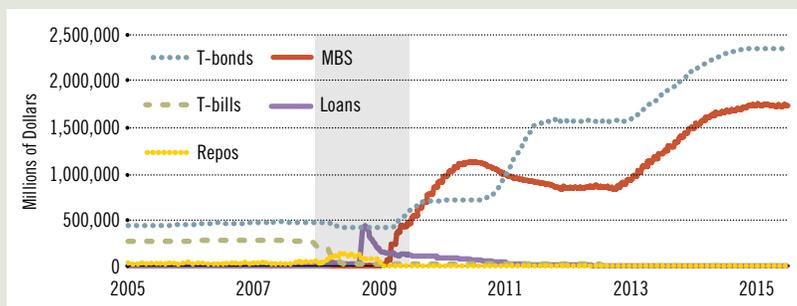
A: Monetary policy normalization refers to the steps the Federal Open Market Committee (FOMC)—the Federal Reserve's monetary policymaking body—will take to remove the substantial monetary accommodation that it has provided to the economy since the financial crisis began in 2007. The committee has made it very clear that normalization is going to be data-driven. In other words, policy decisions will be based on the future performance of inflation, labor markets and gross domestic product (GDP), among other things.

In its "Policy Normalization Principles and Plans," announced in September 2014, the FOMC laid out a program that would ultimately allow the Fed to conduct monetary policy in essentially the same way it did before the beginning of the financial crisis. The principles and plans outline a sequence of actions by which normalization will be achieved:

- 1. "Liftoff"**—The FOMC will raise its interest rate target when it deems there is no longer as great a need for monetary accommodation. Liftoff is expected to happen sometime later in 2015, but, again, the timing of liftoff will be data-driven, not calendar-dependent.
- 2. End "reinvestment"**—The FOMC wishes to ultimately reduce the Fed's balance sheet to a size such that the quantity of interest-earning liabilities (including bank reserves) is small, as was the case before the financial crisis. Reinvestment is the process of replacing assets on the Fed's balance sheet as they mature; so, when reinvestment ends, the balance sheet will begin to shrink.
- 3. Shrink balance sheet**—Balance-sheet reduction will occur slowly, with no plans to sell assets, though this option has not been ruled out. The Fed's assets will decline as Treasury securities and mortgage-backed securities (MBS) mature. While Treasuries mature at a predictable rate, MBS do not, as this depends on the rate at which the mortgages backing the MBS are refinanced and on mortgage defaults.

Federal Reserve Board economists estimate that the normalization process will take about seven years once it starts.

Assets on the Fed's Balance Sheet



SOURCE: Board of Governors of the Federal Reserve System.
NOTE: Shaded area indicates U.S. recession.

For more information, read "Monetary Policy Normalization in the United States," an article by Williamson in the latest issue of the St. Louis Fed's *Review* at <https://research.stlouisfed.org/publications/review/article/10381> or watch a video of Williamson's recent *Dialogue with the Fed* on "Monetary Policy Normalization: What's New? What's Old? How Does It Matter?" at <https://www.stlouisfed.org/dialogue-with-the-fed/monetary-policy-normalization-whats-new-whats-old-how-does-it-matter>.

FED WORKS TO IMPROVE PAYMENT SYSTEM



A safe, efficient, secure and broadly accessible U.S. payment system is crucial to the U.S. economy and contributes to the nation's financial stability. As the nation's central bank, the Federal Reserve has a stake in ensuring that the payment system is functioning at its highest level. This year's annual report of the

St. Louis Fed examines a project that the Fed is spearheading to improve the payment system. The essay is written by St. Louis Fed First Vice President David Sapenaro, who recently completed his responsibilities as the project's interim payments strategy director.

In addition, St. Louis Fed President James Bullard discusses the importance of the payment system to the U.S. economy in his column. The report also features an essay on the rising interest in mobile payments, a message from the chairman of the St. Louis Fed's board of directors and the Bank's 2014 financial statements.

To read any or all of the report online, see <https://www.stlouisfed.org/annual-report/2014>.

FRED APP FOR IOS HAS BEEN UPGRADED

Federal Reserve Economic Data (better known as FRED) has once again upgraded its app for the iPhone and iPad. With version 3.0, you can do even more with the numbers behind the economy—and you can do so anywhere and anytime.

The new version of the app includes FRED user accounts, which allow you to share your "favorites," saved graphs and data lists across your devices. Other new features include The FRED Blog, the ability to download data, better graph customization and enhanced search functionality. With location services, you can also receive economic data for your area.

To improve your access to the more than 260,000 data series in FRED, download the FRED Economic Data app from the iTunes Store. There, you will also find a 30-second video preview of the upgraded app. Questions about using v. 3.0? Contact the FRED team at 314-444-FRED (3733) or at web-master@research.stlouisfed.org.

Android users can download the Android app from Google Play. The Android version has not yet received the same updates as the iOS app, but there are plans for improvements.



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 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.



FEDERAL RESERVE BANK of ST. LOUIS

CENTRAL to AMERICA'S ECONOMY®

P.O. Box 442
St. Louis, MO 63166-0442

STLOUISFED.ORG

PRSR STD
US POSTAGE
PAID
ST LOUIS MO
PERMIT NO 444

Change Service Requested

NEXT ISSUE

The Income Trap around the World

Economic growth since WWII has lifted many low-income economies from poverty to a middle-income level and other economies to even higher levels of income. However, very few countries have been able to catch up with the high per capita income levels of the developed world and stay there. Most developing countries have remained or been “trapped” at constant low- or middle-income levels. The “low- or middle-income trap” phenomenon raises concern about the validity of the neoclassical growth theory, which predicts global economic convergence. Read the full article in the October issue of *The Regional Economist*.



© THINKSTOCK/ISTOCK

FOLLOW THE FED
stlouisfed.org/followthefed



 printed on recycled paper using 10% postconsumer waste