China's Rapid Rise

From Backward Agrarian Society to Industrial Powerhouse in Just 35 Years

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Strong job growth, consumer spending and housing activity bode well for the economy this year.

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Tracking the U.S. Economy with Nowcasts
By Kevin L. Kliesen and Michael W. McCracken

The Federal Open Market Committee wants its interest-rate decisions to be data-dependent. But until the past several years, much of the statistical information available—not just to the FOMC, but anyone—had come from reports that looked backward at conditions from the previous month or even quarter. New models developed by economists allow for forecasting of conditions in the current quarter as reports arrive on a day-to-day basis—as in now. Hence, "nowcasts."

Inflation Expectations Are Important to Central Bankers, Too

Modern economic theory says that inflation expectations are an important determinant of actual inflation. How does expected inflation affect actual inflation? Firms and households take into account the expected rate of inflation when making economic decisions, such as wage contract negotiations or firms' pricing decisions. All of these decisions, in turn, feed into the actual rate of increase in prices. Given that central banks are concerned with price stability, policymakers pay attention to inflation expectations in addition to actual inflation.

The two main ways to gauge inflation expectations are survey-based measures and market-based measures. An example of the former is the inflation expectations from the University of Michigan's survey of consumers. As a predictor of inflation, this measure tends to overstate inflation. Over the past 10 years, for example, expected inflation one year ahead averaged more than 3 percent, while actual inflation ended up averaging less than 2 percent. The Michigan survey's results also tend to bounce around quite a bit with the price of gasoline. Because consumers usually go to the gas station, as well as the grocery store, on a weekly basis, changes in those prices strongly shape their inflation expectations. However, many other prices exist in the economy, perhaps making this particular way of looking at inflation expectations less useful.[1]

Another example of a survey-based measure comes from the Survey of Professional Forecasters (SPF), a group that tracks the economy extremely closely. The SPF provides forecasts of inflation based on the consumer price index (CPI) and on the personal consumption expenditures price index (PCE). The group's expectations of PCE inflation, which is the inflation measure that the Fed targets, are consistently around the Fed's target of 2 percent. One interpretation of these forecasts is that these professional forecasters have confidence that the Fed will make sure inflation is 2 percent no matter what is going on in the economy. This could be good from the central bank's perspective because the forecasts are signaling Fed credibility with respect to its stated inflation target. On the other hand, the forecasts might not be very useful because they do not provide much guidance on what the central bank would have to do to steer inflation to 2 percent.

Although many people focus on survey-based measures, I tend to put more weight on market-based measures of inflation expectations. These are tied to the market for Treasury Inflation-Protected Securities (TIPS) and are based on CPI inflation. The basic idea is that a nominal security, such as a Treasury note, and a real (or inflation-adjusted) security with the same maturity both trade in the market. The price difference between the two could be interpreted as the market participants' expectation of inflation over the horizon of the security; this difference is also called the breakeven inflation rate. TIPS-based measures of inflation expectations are available, for instance, at five-year and 10-year horizons, as well as a "five-year, five-year forward" horizon, which reflects expectations of inflation not in the next five years but in the five years after that.

The TIPS-based measures may be viewed as more informative than survey-based measures because the former tend to react more to incoming information about the economy than do the latter. In this sense, the TIPS-based measures of inflation expectations give a better sense of shifting inflation expectations than do other measures. One caveat to this view is that TIPS spreads also reflect differences in the liquidity and risk characteristics of nominal and real securities, and that it may be premia associated with liquidity and risk that are responding to incoming data, as opposed to inflation expectations themselves.[2] I do not find those analyses very compelling. Consequently, I think market-based TIPS spreads provide the best measure of inflation expectations.[3]

Ideally, all of these measures of inflation expectations would be close to the Fed's target of 2 percent—or 2.3 percent for those that refer to CPI inflation, which tends to run about 30 basis points higher than PCE inflation. However, inflation expectations in major inflation-targeting economies have not been running close to target of late. Europe is a prime example where inflation expectations fell dramatically in recent years. The European Central Bank subsequently took extraordinary action to try to return inflation to target by implementing a quantitative easing program. In the U.S., TIPS-based measures of inflation expectations have fallen since the summer of 2014 and are somewhat below levels that would be consistent with a PCE inflation rate of 2 percent.[4] Whether the Fed's policies will be sufficient to return these expectations to more normal levels remains to be seen. Ω

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

ENDNOTES

1   The New York Fed's Survey of Consumer Expectations also provides a measure of consumers' expectations for inflation. See www.newyorkfed.org/microeconomics/sceindex.

2   For instance, see Gospodinov, Nikolay; Tkac, Paula; and Wei, Bin. "Are Long-Term Inflation Expectations Declining? Not So Fast, Says Atlanta Fed," *Macroblog*, Jan. 15, 2016. Also see Bauer, Michael D.; and McCarthy, Erin. "Can We Rely on Market-Based Inflation Forecasts?" *FRBSF Economic Letter* 2015-30, Sept. 21, 2015.

3   Another market-based measure of inflation expectations is so-called inflation swaps. For a discussion of TIPS breakeven rates and inflation swaps, see Lucca, David; and Schaumburg, Ernst. "What to Make of Market Measures of Inflation Expectations?" *Liberty Street Economics*, New York Fed, Aug. 15, 2011.

4   The drop since 2014 has been highly correlated with oil prices. For more on this topic, see my presentation on Feb. 24, 2016, "More on the Changing Imperatives for U.S. Monetary Policy Normalization."

Measuring Trends in Income Inequality

By Michael T. Owyang and Hannah G. Shell

A central issue in economics concerns how output (equivalent to income) is distributed across economic agents (e.g., workers, entrepreneurs). A first step in addressing this issue is understanding how output (or income) is distributed in the United States and understanding how the distribution has changed over time.

Measuring income inequality, however, is not a trivial endeavor. Multiple sources of income—salary, capital gains income, employer-provided health insurance and other non-salaried compensation, etc.—make simply measuring income itself problematic. Nonetheless, using a number of different definitions of income and employing various metrics, researchers have attempted to quantify income inequality in the U.S.

Economists have identified two broad periods in income inequality over the post-World War II period—first in the 1970s and then, more recently, prior to the Great Recession. In the sections that follow, we describe how income inequality is measured and then how it changed over these two periods.

Income Inequality and How It's Measured

Assessing income inequality boils down in effect to measuring the income gaps between high and low earners. Income inequality implies that the lower-income population receives disproportionately less income than the higher-income population: The larger the disparity, the greater the degree of income inequality.

To measure inequality, economists often sort the population by income percentiles and measure the difference across these percentiles. For example, the top 10 percent of earners would be the 90th percentile. A related way of dividing the population is quintiles,

which split the distribution into five even buckets (the bottom quintile is the 20th percentile); quintiles are commonly used percentiles for studying inequality except at the top of the income distribution, where the income difference between 98th and 99th percentiles is large. To summarize inequality across the entire distribution, economists use the Gini coefficient. The Gini coefficient measures income concentration at each percentile of the population and ranges from 0 (perfectly equal) to 1 (perfectly unequal).

In order to study income inequality, one needs income at an individual level. While gross domestic product is the usual aggregate indicator for income, there are many definitions of income and many data sources available at the individual level. Economists often use the Internal Revenue Service's Statistics of Income program (SOI) or the Census Bureau's Current Population Survey (CPS). Studies using different data sources reach various conclusions on income inequality, depending on the definition used for income.

For example, economists Thomas Piketty and Emmanuel Saez compiled a dataset using SOI data back to 1913. They focused on the share of income earned by the top percentiles to avoid poor data quality in the lower percentiles.[1] The SOI definition of income is market income, the cash income reported on tax forms.[2] The SOI data more accurately measure the top of the income distribution, but less accurately measure low-income statistics because low-income households are not always required to file income taxes.[3]

Another source of individual income data is the CPS. Every March, the CPS—a monthly survey of 75,000 households—provides the information used in the Annual Social and Economic Supplement, which is

the primary source for census data on income and poverty. The CPS data are reported in money income—market income plus other cash income, excluding noncash benefits, such as employer-provided health insurance. While the CPS provides quality low- and middle-income data, incomes above a certain threshold are not reported to protect individual privacy. This makes it less ideal for high-income estimates.

The Congressional Budget Office (CBO) also constructed a dataset that merges the CPS and SOI and draws on each source's strengths—the CPS for low income and the SOI for high income. The CBO reports market income, both before-tax (market income plus government transfers) and after-tax income (before-tax income less federal taxes). Most studies find that more equality is seen in after-tax income, followed by before-tax income and then market income.[4] Moreover, it is generally accepted that the U.S. economy is similar to other developed nations' in terms of pretax and transfer income inequality. In other words, U.S. income inequality is not intrinsically different from what is seen in other countries, and any differences are mainly driven by the lack of income-redistributing fiscal policies in the U.S.

Trends in Income Inequality

From the end of World War II to the early 1970s, income inequality in the U.S. was relatively low. The graph shows that from 1947 to 1970, the Gini coefficient was flat or declining.[5] Piketty and Saez, using SOI data with a longer history, found that income inequality peaked in the 1920s, then decreased after the Great Depression, when top capital incomes fell and were unable to recover. Although the U.S. economy rebounded during World

War II, wage controls prevented growth in top incomes. Once the war ended, a progressive tax structure and reforms such as Social Security and unionization kept low- and middle-income growth strong.

Starting in the 1970s, wage growth at the top of the income distribution outpaced the rest of the distribution, and inequality began to rise. The Gini coefficient grew from 0.394 in 1970 to 0.482 in 2013. The CBO estimates that between 1979 and 2011 market income grew 56 percent in the 81st through 99th percentiles and 174 percent in the 99th percentile. In contrast, market income growth averaged 16 percent in the bottom four quintiles.

Government transfers and federal taxes did have a redistributive effect during this period, but income inequality in after-tax income grew substantially. The 1970s increase in inequality was different from the increase during the 1920s. During the period from 1940 to 1970, top-income composition shifted from capital income to wage income. In the top 0.01 percent, the total income share from capital income fell from 70 percent in 1929 to just above 20 percent in 1998. Wage income rose over the same period, from 10 percent to about 45 percent. High growth in top wages is partly explained by the Tax Reform Act of 1986, which lowered the top marginal-income tax rates. The short-term impact of tax reform is circled in red on the graph. Longer-lasting wage growth came from the reporting of stock options and other forms of income as wages on tax returns.

After the increase in the 1970s, inequality continued to rise. In the 2001 and 2007-09 recessions, top incomes fell sharply as stock market crashes decreased the value of capital gains and stock options. However, losses to top incomes were temporary. During the recovery period from 2002 through 2007, for example, the top 1 percent captured about two-thirds of overall income growth, Piketty and Saez estimated. Further, even though top incomes fell 36.3 percent in the 2007-09 recession, the incomes of the bottom 99 percent also decreased 11.6 percent. This decrease is the largest two-year fall in the incomes of the bottom 99 percent since the Great Depression.

So far, the top 1 percent has captured 58 percent of income gains from 2009 to 2014. The newest data on income show that growth from 2013 to 2014 was more equal. The incomes of the bottom 99 percent grew 3.3 percent, the best rate in more than 10 years, and the Gini coefficient on household income decreased slightly, marking the first nonrecession decrease since 1998.
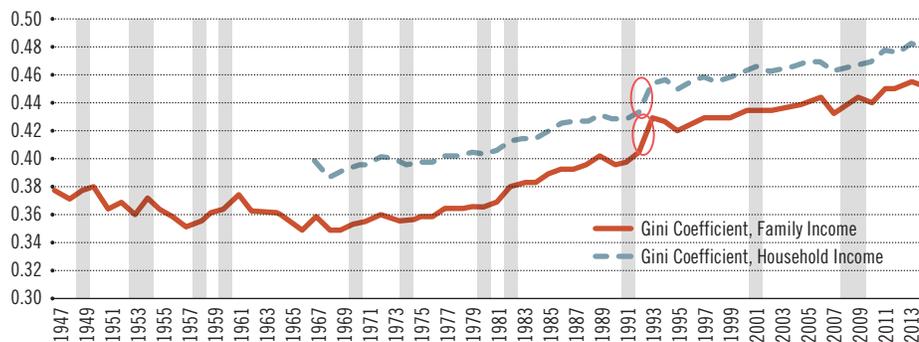
Conclusion

Economists use Gini coefficients, percentiles and detailed survey data to study trends in income inequality. They find that inequality has been rising in the U.S. since World War II, reaching its highest level in 2013 since the 1920s. This result is robust for the definition of income and the chosen measure of inequality.

Understanding the facts about inequality is the first step in assessing what can and should be done. While there is a general consensus that some reallocative transfers from the top of the income distribution to the bottom are desirable, the optimal amount of these redistributions is still up in the air. Ω

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ENDNOTES

[1] Piketty and Saez also estimate the portion of lower income tax units that are excluded in the SOI data and add these estimated values into their measure of total income.
[2] Market income consists of before-tax income from wages and salaries; profits from businesses; capital income, such as dividends, interest and rents; realized capital gains; and income from past services. Other forms of income include cash and in-kind payments from programs like Social Security, food stamps and private benefits (e.g., health insurance).
[3] The SOI data also exclude noncash benefits like health insurance, which are a growing portion of middle-class income.
[4] The differences in inequality by income concept are largely due to a progressive tax structure and social safety nets, such as food stamps, that benefit individuals at the bottom of the distribution.
[5] Family income is defined as that of two or more related persons living in a household. It may exclude single-person households and households with multiple residents who are all not related. Family income is available in the CPS from 1947 to 2011, while household income was not collected until 1967.

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Gini Coefficient for Family and Household Income

Gini Coefficient, Family Income
Gini Coefficient, Household Income

SOURCES: Gini coefficients calculated by the Bureau of Labor Statistics using Current Population Survey data, accessed via Haver Analytics.

NOTE: The figure to the left shows Gini coefficients calculated from Current Population Survey data for family and household income. Only family income is available from 1947 to 1967, but this measure is less ideal than household income because the census defines a family as two or more related individuals living in the same house. Roommates or single-person households are excluded. The red circles mark the temporary increase in income inequality from the Tax Reform Act of 1986, which lowered the top marginal tax rate. Gray bars indicate recessions.

Many Countries Sink or Swim on Commodity Prices —and on Orders from China

By Alexander Monge-Naranjo and Faisal Sohail

Many emerging economies—and also those of some developed countries, such as Australia, Canada and Norway—rely heavily on the production of commodities and their sale to global markets. For example, more than 10 percent of Canada's and Chile's output in 2013 could be attributed to the export of commodities, as can be seen in Figure 1. The equivalent share is much higher for Venezuela and other oil-producing countries. The figure also

Some of the rise of China as the top importer of commodities is due to a global shift in manufacturing, which also has manifested in a decline in energy imports into the U.S. and slow growth in Japan.

shows the diversity in the mix of commodities produced and exported, as well as some diversity in the ratio of commodities exported as a percentage of gross domestic product (GDP) across these countries.

In this article, we examine the extent to which the business cycles in emerging countries are highly dependent on fluctuations in the global prices of commodities. As a corollary, we show that the prospects of expansions and contractions for emerging countries are closely linked with the outlook for the countries importing commodities. Additionally, we show how the changing composition of buyers of commodities has made emerging markets increasingly susceptible to the whims of a single buyer: China. Indeed, the recent decline in commodity prices and the slowdown of growth in China go a long way in explaining the recent recessions in Brazil and Canada and may portend further turmoil in many emerging markets.

Commodity Prices and the Business Cycle

Figure 2 shows the deviations from trend of a weighted index of commodity prices and log output for Argentina, Brazil, Canada, Colombia and Russia for all quarters between 2000 and 2016. This cyclical component of prices and output is obtained by estimating and removing the trend component of each variable.[1] The red line shows the cyclical behavior of global commodity prices (left axis). The figure shows that commodity prices exhibited significant volatility over the past 16 years. In particular, between 2000 and 2006, commodity prices were trending upward (not shown in figure) with frequent fluctuations around this trend. The year leading up to the Great Recession saw a dramatic increase in the price of all commodities, led largely by increases in energy prices and in the prices for food and beverages. The global recession saw a sharp decline in all prices, only to display an equally sharp recovery by early 2009. The causes of the dramatic recovery in commodity prices are debatable, but by 2011 they had recovered or exceeded prerecession levels.[2] Between 2011 and 2014, commodity prices remained relatively stable in trend with small deviations.

Since the summer of 2014, there has been a sustained drop in commodity prices, most noticeably in energy. Some of the decline in energy prices can be attributed to supply-side factors. In particular, the newfound abundance of energy in the U.S. and resulting fight for market share by the Organization of the Petroleum Exporting Countries have led to plentiful supply and falling prices. There is no such obvious supply-side factor that can explain the drop in all other commodity prices, which has attracted much less attention.

The right axis of Figure 2 displays the deviations of output, measured as GDP, from its trend for four emerging market economies and Canada. The figure shows that the cyclical components of output and commodity prices are highly correlated with each other.[3] Indeed, the dramatic, fast and sustained recovery in commodity prices must be credited as a major source of the relatively stronger, faster and sustained recovery of emerging markets following the recession, relative to the recoveries in the U.S., Europe, Japan and other major economies.[4] Both Figures 1 and 2 make a compelling case for the interlinkages between emerging markets and the prices of commodities: One or two years after the collapse in 2009, a tidal wave in rising commodities prices pushed emerging economies to quickly recover and grow. Nowadays, the tidal wave has receded, and many emerging markets are in danger of capsizing.

The Impact of China

From colonial times a few centuries ago, commodity prices have been driving fluctuations of commodity-exporting economies. What is interesting in this last cycle is the emerging role of China, an emerging economy itself. Strikingly, China—and to a lesser extent India—has surged as an importer of commo-

FIGURE 1

Commodity Exports as a Percentage of GDP in 2013
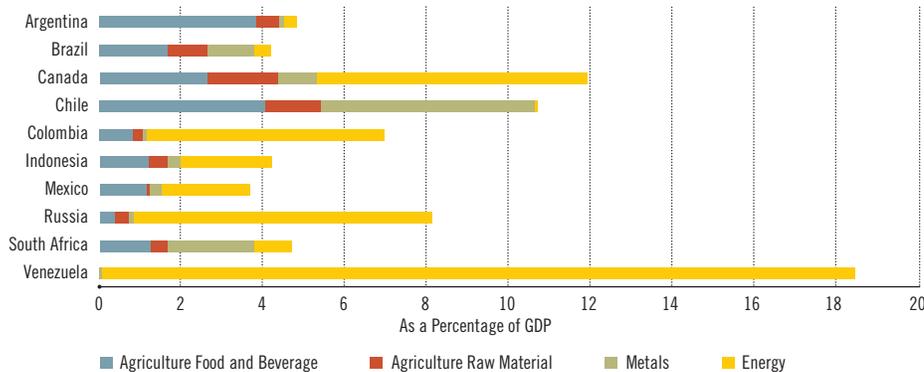
SOURCES: Massachusetts Institute of Technology Observatory of Economic Complexity, Haver Analytics.

NOTE: The figure shows the share of export in commodities as a percentage of real GDP as of 2013. Commodities are grouped following the Standard International Trade Classification, rev. 3.

ENDNOTES

[1] These deviations are computed using the Hodrick-Prescott filter, the most common method to separate business cycle components from long-run trends.

[2] See Fawley and Juvenal.

[3] The values for the coefficient of correlation of output and prices for all the emerging economies are positive and above 0.50, ranging from 0.51 for Argentina to 0.80 for Brazil.

[4] See Helbling.

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dities over the past two decades. In 1990, China accounted for only 2 percent of all commodities traded, while the U.S. and Japan accounted for about 15 percent each. By 2013, China was the leading commodity importer, at 15 percent of global trade, while the U.S. and Japan had fallen to 10 percent each. A similar trend holds if we consider only the market for energy commodities, e.g., oil, natural gas and coal. (India displays similar trends, although starting much later: In 2005, India accounted for 1 percent of all global imports of commodities; in 2013, it accounted for 5 percent.)

Some of the rise of China as the top importer of commodities is due to a global shift in manufacturing, which also has manifested in a decline in energy imports into the U.S. and slow growth in Japan. Moreover, since the early 2000s, the U.S. has increasingly relied on domestic energy sources, lowering its need for energy imports, while Japan's "lost decade" led to a decline in trade. However, China's annual GDP growth rate averaged about 10 percent between 1990 and 2013, and this high growth rate was accompanied by an ever-growing demand for industrial inputs. Indeed, China's growth was shared by many emerging economies as they provided the exports to sustain China's surge. But these same economies must also share in China's slow-growth periods. Recently, China's growth rate has fallen to about 6 or 7 percent (still high compared with that of the U.S. and other developed countries today), and the uncertainty around Chinese growth has increased. All of these factors are behind the recent collapse in commodities prices.

Conclusion

It is striking how strongly commodities prices drive the overall economic fluctuations of emerging countries despite remarkable differences in their composition of commodities for export and their total export shares as a percentage of their GDP. Yet, for these countries a salient common factor emerges: the importance of China and its growth prospects. Ω

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FIGURE 2

Cyclical Component of Prices and Output
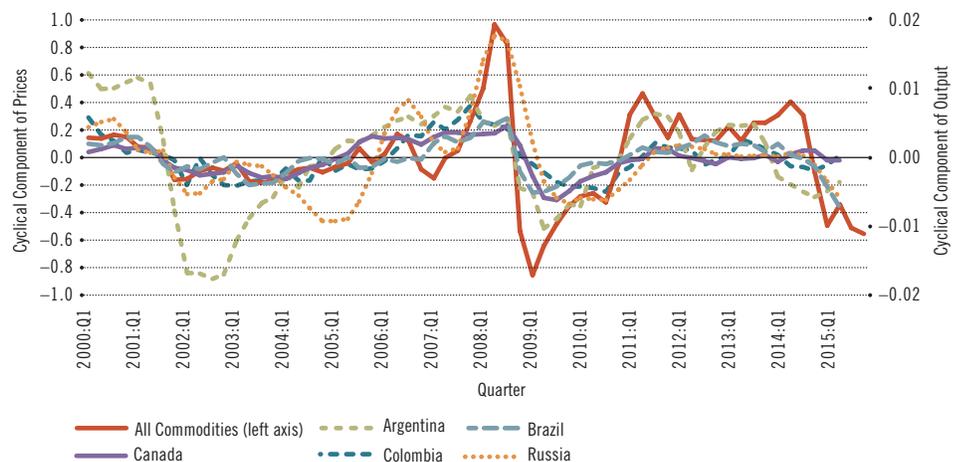
SOURCES: International Monetary Fund, Haver Analytics.

NOTE: The figure plots the cyclical component of commodity prices (left axis) and output (right axis). The underlying commodity price data are normalized to 1 in the first quarter of 2000. The Hodrick-Prescott (HP) filter with smoothing parameter of 1600 was applied to quarterly data on prices and the natural logarithm of output (measured as real GDP) to obtain the cyclical component. The final data point is 2015:Q4 for prices data and is 2015:Q2 for output data.

China's Rapid Rise

From Backward Agrarian Society to Industrial Powerhouse in Just 35 Years

By Yi Wen

China's industrial revolution, which started 35 years ago, is perhaps one of the most important economic and geopolitical phenomena since the original Industrial Revolution 250 years ago. The reason is simple: Less than 10 percent of the world's population is fully industrialized; if China can successfully finish its industrialization, an *additional* 20 percent of the world's population will be entering modern times. Along the way, China is igniting new growth across Asia, Latin America, Africa and even the industrial West, thanks to the country's colossal demand for raw materials, energy, trade and capital flows.

China's rapid growth has puzzled many people, including economists.

How could a nation with 1.4 billion people transform itself relatively suddenly from a vastly impoverished agricultural land into a formidable industrial powerhouse when so many tiny nations have been unable to do so despite their more favorable social-economic conditions? Among the many conflicting views that have emerged to interpret China's rise, two stand out as the most popular and provocative. The first sees China's hypergrowth as a gigantic government-engineered bubble. It is not sustainable and will collapse because China has no democracy, no human rights, no freedom of speech, no rule of law, no Western-style legal system, no well-functioning markets, no private banking sector, no protection of intellectual properties, no ability to innovate (other than copying and stealing Western technologies and business secrets), nor a host of many other things that the West has possessed for centuries and have proved essential for Western prosperity and technological dominance.[1] According to this view, the bubble will burst at the expense of China's people and environment.

The second view sees China's dramatic rise simply as destiny. It is returning to its historical position: China had been one of the richest nations and greatest civilizations (alongside India) from at least 200 B.C. to 1800, the dawn of the Industrial Revolution in England. (See Figure 1.) It was only a matter of time for China to reclaim its historical glory and dominate the world once again. (As Napoleon once said, "Let China sleep, for when the dragon awakes, she will shake the world." [2])

But neither view is backed by serious economic analysis, instead being based either on prejudice or naïve extrapolation of human history. How could a nation with all those adverse elements for business and innovation be able to grow at a double-digit annual rate for several decades and transform itself in such a short time from an impoverished agricultural economy into a formidable manufacturing powerhouse? If culture or ancient civilization is the explanation, then why aren't Egyptian, Greek or Ottoman empires bursting onto the world stage?

This article provides a different view of China's rise, one based on fundamental economic analysis. It hopefully will lead to a better understanding of China's miracle growth but also will shed light on the failures and successes of many other nations' attempts at industrialization, including the original Industrial Revolution itself.

Admittedly, many people think China's economic miracle has come to an end. The growth of its economy has declined sharply from the double digits to 7 percent or lower. Its stock market is in turmoil, and its currency is under attack. But keep in mind that the United States experienced 15 financial crises and a four-year civil war as it rose to global prominence. It was on the verge of collapse in 1907 after taking on the mantle of the world's superpower from the United Kingdom. The U.S. also weathered the Great Depression in the 1930s and the global financial crisis in 2007. Does all of this mean it is no longer an economic star?

Some Facts about China's Rise

Thirty-five years ago, China's per capita income was only one-third of that of sub-Sahara Africa. Today, China is the world's largest manufacturing powerhouse: It produces nearly 50 percent of the world's major industrial goods, including crude steel (800 percent of the U.S. level and 50 percent of global supply), cement (60 percent of the world's production), coal (50 percent of the world's production), vehicles (more than 25 percent of global supply) and industrial patent applications (about 150 percent of the U.S. level). China is also the world's largest producer of ships, high-speed trains, robots, tunnels, bridges, highways, chemical fibers, machine tools, computers, cellphones, etc.

Figure 2 shows the manufacturing output of the top five countries in the world between 1970 and 2013. In the early 1970s, when President Richard Nixon visited China, it produced very few manufactured goods—a tiny fraction of the U.S. level. About 1980, China's manufacturing started to take off, surpassing the industrial powers one by one, overtaking the U.S. in 2010 to become the No. 1 industrial powerhouse.

"The Secret Recipe"

How did China achieve this in 35 years? The short answer is that China has rediscovered the "secret recipe" of the Industrial

Among the many conflicting views that have emerged to interpret China's rise, two stand out as the most popular and provocative. The first sees China's hypergrowth as a gigantic government-engineered bubble. … The second view sees China's dramatic rise simply as destiny. … But neither view is backed by serious economic analysis, instead being based either on prejudice or naïve extrapolation of human history.

Economic History of China and Other Major Powers

and growth. On the other hand, extractive institutions (such as dictatorship) imply the lack of not only freedom of choice but of protection of private-property rights and the rule of law, all of which leads to the lack of private incentives to work hard, accumulate capital and innovate. The end result is poverty. Therefore, the solution for ending poverty is simple: democracy.[4]

Or is it?

Such theories are difficult to square with the facts. First, there are ample democracies with pervasive economic stagnation and continuous political turmoil: Afghanistan, Egypt, Iraq, Libya, Pakistan, Thailand, Tunisia and Ukraine, to name a few. Second, there are ample extractive institutions that have been economically strong, such as Germany (1850-WWII) and Russia (1860-WWII). The institutional theory also can't explain the dismal failure of today's Russia at economic reform under democracy and shock therapy, Japan's rapid industrialization during the Meiji Restoration, South Korea's economic takeoff in the 1960s-1980s under dictatorship or Singapore's post-independence economic miracle. Nor can the theory explain why under identical political institutions, property rights and the rule of law, there exist pockets of both extreme poverty and extreme wealth, as well as of violent crime and obedience to law. Such dichotomies exist in many U.S. cities, for example. Italy is another example, with its poverty in the south and wealth in the north.

China's Past Failures

What is happening in China is not its first attempt at industrialization but the fourth over the past 120 years.

The first attempt was made between 1861 and 1911. It came on the heels of China's defeat in 1860 by the British in the Second Opium War. Deeply humiliated by unequal treaties imposed by Western industrial powers, the Qing monarchy that was then in control in China embarked on a series of ambitious programs to modernize its backward agrarian economy, including establishing a modern navy and industrial system. This attempt started eight years earlier than the Meiji Restoration that triggered Japan's successful industrialization. Fifty years later, the effort in

Revolution. But what is the secret recipe, and why didn't China find it sooner?

The British Industrial Revolution was one of the most important socioeconomic events in human history—perhaps as significant as the discovery of fire and agriculture. Before this revolution, humanity across all continents had lived essentially at a subsistence level, stagnating in the so-called Malthusian trap.[3] But the Industrial Revolution changed it all: Starting about 1760, the living standard in the United Kingdom began to increase dramatically, leading to an era of permanent growth in per capita income. Because of the almost magical increases in living standards and national income, among other things, almost every nation has tried to emulate the British Industrial Revolution.

Unfortunately, only a few places have succeeded: Northern and Western Europe, the United States, Japan and the Asian Tigers, among others. Although the Asian Tigers (South Korea, Taiwan, Hong Kong and Singapore) industrialized rather quickly after WWII, some of them (such as Taiwan) so far have reached a per capita income of only about half the U.S. level.

Why have only a few nations succeeded? Political institutions are the key, according to the institutional theory. Inclusive institutions (e.g., democracy) put restrictions on the elite class, allowing the free market, free trade, private property rights and the rule of law to flourish. This implies private incentives for wealth accumulation, innovation

China turned out to be a gigantic failure: The government was deep in debt, and the hoped-for industrial base was nowhere in sight.

A nationwide demand for political reforms, followed by social turmoil, ultimately led to the 1911 Xinhai Revolution. It overthrew the "extractive" Qing monarchy and established the Republic of China, the first "inclusive" government in China based on Western-style constitutions. The new republic tried to industrialize China by a wholesale mimicking of U.S. political institutions, including democracy and the separation of powers (legislative, executive and judicial branches of government).

At that time, a famous slogan among the Chinese was "Only science and democracy can save China." The revolutionaries of the educated elite believed that the monarchy's failure to industrialize and China's overall backwardness were due to its lack of democracy, political inclusiveness and pluralism (exactly as the modern institutionalism theory has argued). But 40 years passed, and China remained one of the poorest nations on earth.

In 1949, the republic was defeated by the Communist peasant army. The new government initiated the third ambitious attempt to industrialize China—this time by mimicking the Soviet Union's central planning model. Thirty years passed, and the effort failed again: In 1978, China remained essentially in the same Malthusian poverty trap, with per capita income not significantly different from what it was around the Second Opium War.

Hence, the reason for China's three failures was clearly not the lack of free market and private-property rights—the Qing dynasty had probably a better market system and better private-property rights than did England and the rest of Europe in the 17th and 18th centuries. Nor was it the lack of democracy—the government of the Republic of China was so inclusive that even members of the Communist Party were allowed in the government.

What Was Different This Time?

China's fourth attempt started in 1978 under leader Deng Xiaoping. The country refused to take advice from Western economists (unlike what Russia did in the 1990s) and instead

Manufacturing Output for Top Five Countries in 2013

SOURCE: United Nations.
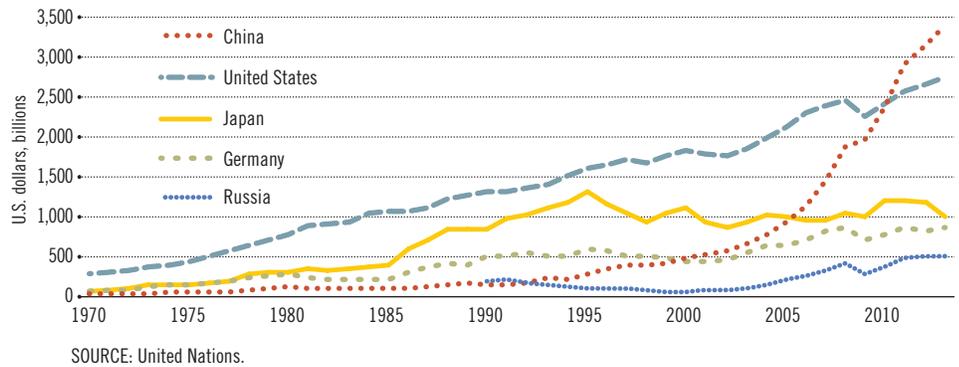
took a very humble, gradualist, experimental approach with its economic reforms. The keys to this approach have been to:

1. maintain political stability at all costs;
2. focus on the grassroots, bottom-up reforms (starting in agriculture instead of in the financial sector);
3. promote rural industries despite their primitive technologies;
4. use manufactured goods (instead of only natural resources) to exchange for machinery;
5. provide enormous government support for infrastructure buildup;
6. follow a dual-track system of government/private ownership instead of wholesale privatization; and
7. move up the industrial ladder, from light to heavy industries, from labor- to capital-intensive production, from manufacturing to financial capitalism, and from a high-saving state to a consumeristic welfare state.

China's fourth attempt mimics the historical sequence of the British Industrial Revolution, despite dramatic differences in political institutions. (After all, China is still an authoritarian state.) The British Industrial Revolution followed five key stages:

1. the proto-industrialization stage, which developed rural industries for long-distance trade;
2. the first industrial revolution, which featured labor-intensive mass production for the mass market;
3. the industrial trinity boom, which involved the mass supply of energy, locomotive power and infrastructure to facilitate mass distribution;[5]

> Along such a development path, democracy is the consequence instead of the cause of industrialization. Democracy reinforces stability only in industrialized societies. Almost all successfully industrialized economies have gone through these key stages in history. ...

4. the second industrial revolution, featuring the mass production of the means of mass production, such as steel and machine tools (including agricultural machinery), as well as the creation of a large credit system; and

5. the welfare state stage, which incorporates economic welfare (such as the modern service economy, unemployment insurance, equal access to health care and education, and a full-fledged social safety net) and political welfare (such as democracy, human rights, the end of the death penalty, legalization of gay marriage).

Along such a development path, democracy is the consequence instead of the cause of industrialization. Democracy reinforces stability only in industrialized societies. Almost all successfully industrialized economies have gone through these key stages in history, as the following examples show:

U.K. path to industrialization:[6]

1. 1600-1760: Proto-industrialization in rural areas, organized and financed by rich merchants (e.g., via the putting-out system[7]);

2. 1760-1830: first industrial revolution in textile industries, relying on wood-framed and water-powered textile machines for mass production;

3. 1830-1850: boom in industrial trinity: energy (such as coal), transportation (such as railroad) and locomotive (such as steam engine);

4. 1850-1900: second industrial revolution, involving the mass production of the means of mass production, such as iron, steel, chemicals and machinery; and

5. After 1900: entering the welfare state (e.g., universal suffrage in 1928).

U.S. path to industrialization:

1. Before 1820: rural industries mushrooming in the countryside;

2. 1820-1860: first industrial revolution—mass production of textiles, based on imported or stolen British technologies;

3. 1830-1870: boom in industrial trinity, such as the 1828-1873 railroad mania;

4. 1870-1940: second industrial revolution, featuring mass production of steel, automobiles, telecommunications, chemicals and mechanized agriculture in the 1940s; and

5. 1940s-present: entering the welfare state after WWII with such key steps as the civil rights movement in the 1960s, universal suffrage in 1965, Violence Against Women Act of 1994 and legalization of same-sex marriage in 2015.

Japan's path to industrialization:

1. 1603-1868 (the Edo period): commercial agriculture and rural artisan manufacturing flourished amid political stability;

2. 1868-1890 (early Meiji): full-fledged proto-industrialization;

3. 1890-1920 (including late Meiji): first industrial revolution, based on mass production of textiles, relying on imported machinery and exports of labor-intensive textile products;

4. 1900-1930: boom in industrial trinity (e.g., railroads);

5. 1920-1941: beginning of second industrial revolution; and

6. 1945-1980: continuation of second industrial revolution, democratic reform under U.S. occupation, entering welfare state.

China's Path

China compressed the several centuries of Western (and Japanese) development into three decades. Its path to industrialization has gone through three major phases:

1. 1978-1988: proto-industrialization. This phase featured the sprouting of millions of rural enterprises (collectively instead of privately owned by farmers) across China's vast countryside and small towns; these enterprises acted as the engine of national economic growth during the first 10 years of economic reform. The number of village firms increased more than 12-fold (from 1.5 million to 18.9 million), village industrial gross output increased more than 13.5-fold (from 14 percent of gross domestic product, or GDP, to 46 percent of GDP), village peasant-workers grew to nearly 100 million by 1988, and farmers' aggregate wage income increased 12-fold. Because of such phenomenal growth in the supply of basic consumer goods, China ended its shortage economy (a typical feature of all centrally planned economies, characterized by the rationing of meat, other food,

clothes and other basic consumer goods) in the mid-1980s and simultaneously solved its food security problem. The 800 million farmers were the biggest beneficiaries of the economic reform in this period.

2. 1988-1998: first industrial revolution. This phase featured mass production of labor-intensive light consumer goods across China's rural and urban areas, relying first mainly on imported machinery. During this period, China became the world's largest producer and exporter of textiles, the largest producer and importer of cotton, and the largest producer and exporter of furniture and toys. Rural enterprises continued their hypergrowth, and their workers reached 30 percent of China's entire rural labor force (not including migrant workers). Village industrial output grew by 28 percent per year, doubling every three years (an astronomical 66-fold increase) between 1978 and 2000.

3. 1998-present: second industrial revolution. This phase featured the mass production of the means of mass production. Because of the rapidly and enormously expanding domestic market for intermediate goods, machinery and transportation, there was a big surge in the consumption and production of coal, steel, cement, chemical fibers, machine tools, highways, bridges, tunnels, ships, etc. In all, 2.6 million miles of public roads were built, including more than 70,000 miles of express highways (46 percent more than in the U.S.). Twenty-eight provinces (out of 30) have high-speed trains (with total length exceeding 10,000 miles, 50 percent more than the total for the rest of the world).

The Triumph of Marketism?

Is China's achievement the triumph of marketism? Yes and no. "Yes" for obvious reasons: Markets impose economic incentives to compete, impose discipline on management and on technology adoption, and create Darwinian "creative destruction" to eliminate losers.

But "no" for overlooked reasons: It's extremely costly for independent, anarchic, uneducated peasants to form cooperatives unless social trust and markets exist; it's also extremely costly to create a unified national mass market and a global market to support the division of labor and mass production; and it is especially costly to create market regulatory institutions to prevent cheating and fraud. These costs prevented the prior formation of industries and, thus, explain the failures of the Qing dynasty and the Republic of China to kick-start China's industrial revolution in the 19th and early part of the 20th centuries, despite their having private-property rights and even democracy.

The poverty of nations is caused by their inability to mass-produce consumption goods. But mass production requires mass markets and mass distribution to render it profitable.

Where does the mass (world) market come from? Early European powers relied on a mercantilist state government and militarized merchants to create monopolistic global markets through colonialism, imperialism and slave trade. In particular, generations of British monarchs and merchants (e.g., the British East India Co.) helped create for England the world's largest textile market, cotton supply chains and trading networks that kick-started the original Industrial Revolution.

Today, developing nations no longer have such "privilege" or the time to nurture such a powerful merchant class to create markets. Hence, governments play a bigger role in market creation.

Therefore, the ongoing industrial revolution in China has been driven not by technology adoption per se, but instead by continuous market creation led by a capable mercantilist government; the market creation is based on mutually beneficial trade instead of the gunboat diplomacy methods of earlier Western powers.[8]

The "Secret" Is Sequencing

Democracy and laissez-faire do not automatically create a global market. Market creation requires state power, correct developmental strategies and correct industrial policies. The "free" market is actually extremely costly to create.[9]

As we've already seen, the development of an industrial market is a sequential process (from the agricultural and artisan stage to the proto-industrial market and so

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on). No matter how late a nation starts its development, it must repeat earlier stages to succeed.[10] It is like learning mathematics. Through thousands of years of development, the human race discovered math knowledge sequentially: from numbers to arithmetic to algebra to calculus, etc. Although calculus is in today's first-year college textbooks, every generation of children must still repeat humanity's evolutionary process to learn math. They do not jump to calculus at age 6; instead they start with learning numbers (with the help of their fingers, just like our ancestors did) and gradually move up the ladder.

In contrast, modern economic theories teach poor countries to leap forward, to start industrialization by building advanced capital-intensive industries (such as chemical, steel and automobile industries), by setting up modern financial systems (such as a floating exchange rate, free international capital flows, and fully fledged privatization of state-owned properties and natural resources) or by erecting modern political institutions (such as democracy and universal suffrage). But such top-down approaches violate the historical sequence of the Industrial Revolution and have led to political chaos, developmental disorders and deformed capitalism in Africa, Latin America, Southeast Asia and the Middle East.

Challenges Ahead

As China has industrialized, it has picked up not only the positives of Western development but the negatives, including rampant corruption and organized crime, unprecedented pollution and environmental destruction, rising divorce and suicide rates, widespread business fraud and scandals, markets full of "lemons" and low-quality goods, pervasive asset bubbles, rising income inequality and class discrimination, frequent industrial accidents, etc. And there are other challenges, including building social safety nets, finishing social and economic reforms in the health care and education sectors, finishing rural urbanization and agricultural modernization, establishing modern financial infrastructure and regulatory institutions as in the U.K. and U.S., and establishing a modern legal system

as in Hong Kong and Singapore.

However, as long as China follows the right sequence of economic development, these problems should be merely growing pains and not the same daunting structural obstacles like the Malthusian poverty trap or the middle-income trap faced by many developing nations in Africa, Latin America, the Middle East and Southeast Asia.

Conclusion

Ever since the 15th century, the spirit of capitalism has been "shake hands and do business," regardless of ideology, religion, culture and national boundary. It is precisely such a spirit that has created modern industrial civilization and will continue to change the world.

For a half-century after World War II, the U.S. pursued one of history's most successful nation-building win-win strategies: It nurtured the rebuilding of Europe and Japan and the development of other poor countries and bonded them economically. China today seems to be carrying the U.S. banner forward: China is pursuing win-win development strategies, too, that are focused on economics. It is doing so through global business engagement and international infrastructure buildup regardless of religion, culture, political system and national boundary.

China's rise provides a golden opportunity for developing nations to ride for free on the China train. But how much each individual nation can benefit from China's rise depends entirely on its own worldview, development strategies and industrial policies.

Meanwhile, the 21st century appears to be shaping up as China's century. Ω

Yi Wen, a native of China, is an economist at the Federal Reserve Bank of St. Louis. This article is based on a lecture of his in November (see www.stlouisfed.org/dialogue-with-the-fed/chinas-industrial-revolution-past-present-future), which drew heavily from his forthcoming book, titled The Making of an Economic Superpower: Unlocking China's Secret of Rapid Industrialization. *For the working paper version of the book, see his website at https://research.stlouisfed.org/econ/wen. Wen would like to thank William R. Emmons, also an economist at the St. Louis Fed, for comments and Maria A. Arias, a senior research associate at the Bank, for research assistance.*

ENDNOTES

1 See Chang.
2 See Jacques or http://wanderingchina.blogspot.com/2008/08/napoleon-and-his-view-on-china.html.
3 The Malthusian trap, named after the 19th century British political economist Thomas Robert Malthus, suggests that for most of human history, income was largely stagnant because technological advances and discoveries only resulted in more people, rather than improvements in the standard of living. It is argued that many countries in tropical Africa still find themselves in the Malthusian trap.
4 See Acemoglu and Robinson.
5 The specific components of the industrial trinity evolve over time. In terms of energy, it was coal in the 19th century, oil in the 20th century and solar power in the 21st century. In terms of communication, it was the telegraph in the 19th century, the telephone in the 20th century and electronic mail in the 21st century.
6 The demarcations of the stages are approximations and can never be exact, and they often tend to overlap with each other for a substantial period of time. But a higher stage always appears later than a lower stage in history for the successfully industrialized nations, whereas the unsuccessfully industrialized nations tend to directly jump into higher stages by skipping earlier stages.
7 The putting-out system was a system of family-based domestic manufacturing that was prevalent in rural areas of western Europe during the 17th and 18th centuries. Domestic workers involved in this system typically owned their own primitive tools (such as looms and spinning wheels) but depended on merchant capitalists to provide them with the raw materials to fashion products, which were deemed the property of the merchants. Semi-finished products would be passed on by the merchant to another workplace for further processing, while finished products would be taken directly to market by the merchants.
8 In this regard, China contributed to and also benefited from the postwar peaceful world order created by the joint efforts of developing countries, their independence movements and the industrial world powers, especially the United States.
9 See Wen for more detailed analysis.
10 A theoretical framework for why successful industrialization must go through stages is provided in my forthcoming book, titled *The Making of an Economic Superpower: Unlocking China's Secret of Rapid Industrialization.* See https://research.stlouisfed.org/econ/wen/sel.

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Wen, Yi. *The Making of an Economic Superpower: Unlocking China's Secret of Rapid Industrialization.* St. Louis Fed Working Paper 2015-006B, 2015. See https://research.stlouisfed.org/wp/more/2015-006.

Interest Rate Control Is More Complicated Than You Thought

By Stephen Williamson

Most people are aware that decisions by the Federal Reserve (Fed) affect market interest rates. These decisions have consequences for the interest rates that consumers pay on mortgage loans, credit cards and auto loans, and for the interest rates faced by businesses on bank loans, corporate bonds and commercial paper.

But there is more than one interest rate that the Fed sets, either as a target or by administrative fiat. Many people are aware of the target for the federal funds rate, or fed funds rate, that the Federal Open Market Committee (FOMC) of the Fed sets at its eight regular meetings a year. The fed funds rate is an interest rate on overnight credit arrangements among financial institutions—that is, a very short-term interest rate. The Fed also sets the discount rate, or the interest rate on primary credit, which is an interest rate at which the Fed lends to commercial banks in its role as a lender of last resort. Still another rate is that on interest paid by the Fed on reserves. Banks hold reserve accounts with the Fed; these accounts essentially play the role of checking accounts for financial institutions. (A reserve account is useful when a bank needs to make large payments to other financial institutions.) Thus, a reserve account is a loan to the Fed from a bank. Before late 2008, reserve accounts paid zero interest, as dictated by Congress in the Federal Reserve Act.

Prior to the financial crisis (late 2007 through 2008), the Fed conducted monetary policy within what economists call a *channel system*. The Fed targeted the overnight fed funds rate within a "channel," with the discount rate as the upper bound on the channel and the interest rate on reserves as the lower bound on the channel. For

Also by Stephen Williamson

The St. Louis Fed has just released its annual report. The main essay, written by Williamson, is about the Fed's return to normal monetary policy after seven years of abnormally low interest rates. St. Louis Fed President and CEO James Bullard also addresses this topic. Elsewhere in the annual report, the St. Louis Fed's work, people, mission and results are featured. To read the report online, go to www.stlouisfed.org/annual-report.
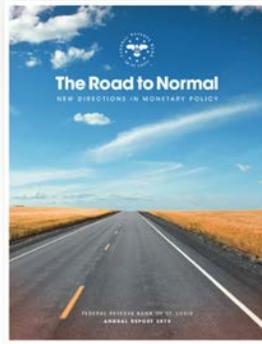
example, in January 2007, the discount rate was set at 6.25 percent, the fed funds rate was targeted at 5.25 percent and the interest rate on reserves was 0 percent. The fed funds rate could not, in principle, go above the discount rate because no bank would choose to borrow from another bank at an interest rate higher than the rate at which it could borrow from the Fed (the discount rate). Similarly, no bank would lend to another bank at an interest rate lower than the interest rate it could receive from the Fed (the interest rate on reserves). In 2007, the New York Fed would intervene every day in financial markets—through open market operations, which are the purchase and sale of assets by the Fed—to try to bring the fed funds rate as close as possible to the target set by the FOMC.

But between 2007 and now, the details of how the Fed conducts monetary policy have changed in important ways. First, since late 2008, the reserves held at the Fed by financial institutions have earned interest; such interest payments are allowed under an amendment to the Federal Reserve Act passed by Congress. Further, and more importantly, the interest rate on excess reserves, or IOER, is set by the Fed and can be changed over time.

Second, during the Great Recession (late 2007 to mid-2009) and its aftermath, the Fed engaged in some unconventional monetary policy actions. For our purposes, the most important of these was a program of large-scale asset purchases, sometimes known as quantitative easing. This program led to a large increase in the stock of reserves at the Fed—effectively, the Fed purchased a large quantity of assets (U.S. Treasury securities and agency mortgage-backed securities) by issuing more reserves.

For the Fed, the large stock of reserves outstanding implies that monetary policy works differently now—within a *floor system* rather than a channel system. In a floor system, the IOER plays a key role. In principle, what should happen in a floor system is that, with plenty of reserves in the system, the Fed can achieve its target for the fed funds rate by simply setting the IOER. Why? If the fed funds rate were lower than the IOER, then banks would be able to make a profit from borrowing on the fed funds market and lending to the Fed at the IOER, thus forcing up the fed funds rate. If the fed funds rate were higher than the IOER, then a bank wanting to lend would earn more interest on the fed funds market than by lending to the Fed at the IOER. The large

demand for fed funds would then force the fed funds rate down.

According to this logic, controlling the fed funds rate should be easy for the Fed under a floor system. But theory and reality sometimes do not agree. From late 2008 to December 2015, the IOER was set at 0.25 percent. However, contrary to what many people might think, since early 2009 the fed funds rate has generally been 5 to 20 basis points (one basis point is equal to 0.01 percentage points) lower than the IOER. This difference between the IOER and the fed funds rate is typically ascribed to costs for commercial banks associated with borrowing on the fed funds market.[1]

The persistent difference between the IOER and the fed funds rate was a concern for the Fed as it anticipated the time when "liftoff" would occur, where liftoff refers to the date at which the Fed would depart from its long period (since late 2008) of zero interest rate policy, or ZIRP. Could the Fed expect that the fed funds rate would increase along with the IOER if the Fed attempted to control the fed funds rate only through increases in the IOER?

The solution adopted by the Fed is unique in central banking—a floor system with a subfloor. The New York Fed, in intervening in overnight financial markets, is now making use of an overnight reverse repurchase agreement (ON-RRP) facility. ON-RRPs are essentially reserves by another name. In ON-RRP transactions, financial institutions lend to the Fed, just as they do when they hold reserve accounts with the Fed. The difference between reserves and ON-RRPs is that, in an ON-RRP arrangement, the Fed posts securities in its portfolio as collateral, just as in any private repurchase agreement transaction. A repurchase agreement is simply a special kind of financial market loan that is secured by collateral just as, for example, your mortgage is secured by your house, which can be seized if you default on the mortgage.

Without getting into all the details,[2] the idea behind the floor-with-subfloor system is that the Fed sets, along with the discount rate and IOER, an ON-RRP rate, which is the rate at which financial institutions can lend to the Fed in the market for repurchase agreements. The ON-RRP rate is set below the IOER, and then policy is announced as a target range for the fed funds rate, with the
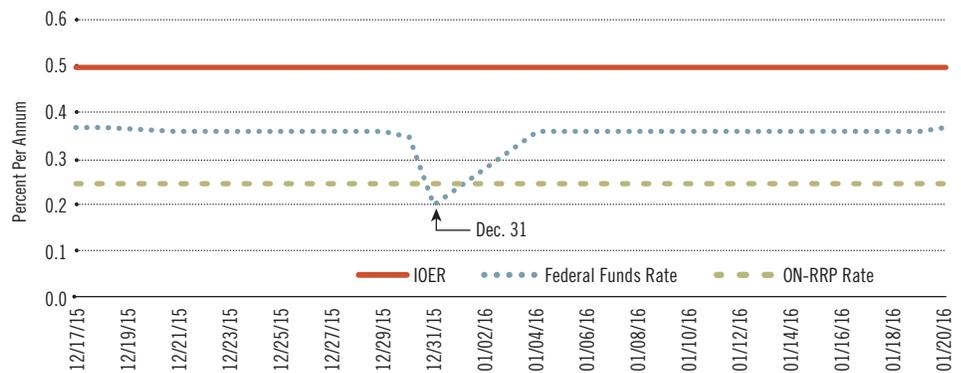
FIGURE 1

Value of ON-RRPs Outstanding
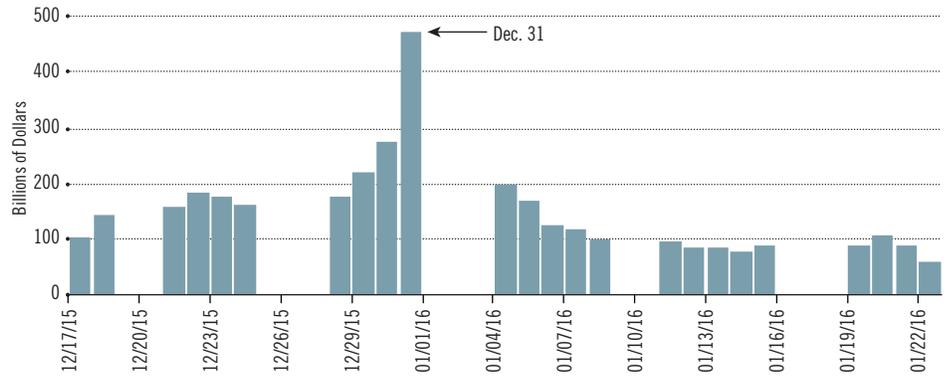
SOURCES: Federal Reserve Board/Haver Analytics. NOTE: ON-RRP stands for overnight reverse repurchase agreement.

FIGURE 2

A Floor and a Subfloor for the Federal Funds Rate

SOURCES: Federal Reserve Board/Haver Analytics.

NOTE: In principle, the large stock of reserves outstanding should result in the fed funds rate equaling the interest on excess reserves (IOER), but economic factors have resulted in the former rate running below the latter. The rate for overnight reverse repurchase agreements (ON-RRP) should serve as a secondary floor for the fed funds rate, and it largely has. The only time the fed funds rate has fallen below the ON-RRP rate since liftoff was Dec. 31, 2015, and this is likely explained, in part, by the fact that financial reporting took place on that day and the fact that there are differences in the time frames of fed funds and ON-RRP transactions.

top of the range given by the IOER and the bottom of the range determined by the ON-RRP rate. Thus, the IOER sets the floor, and the ON-RRP rate sets the subfloor.

But could this system work? On Dec. 16, 2015, the FOMC decided to increase the target range for the federal funds rate from 0-0.25 percent to 0.25-0.50 percent,[3] with the discount rate at 1.0 percent, the IOER at 0.50 percent and the ON-RRP rate set at 0.25 percent.

As shown in Figure 1, the value of ON-RRPs outstanding increased from $105 billion on Dec. 17, 2015, to $475 billion on Dec. 31, following which the quantity dropped back to the neighborhood of $100 billion. In the fed funds market, as shown in Figure 2, the average daily fed

funds rate has typically been within a tight range of 0.35-0.37 percent, except on Dec. 31, 2015, when the average rate was 0.20 percent. Thus, in terms of results, the Fed has been successful in controlling the fed funds rate within the 0.25-0.50 percent range.

But why was the average fed funds rate so low and the ON-RRP quantity so high on Dec. 31, 2015? This date was both the quarter-end and year-end, which is important because at this time financial reporting takes place and financial institutions want to have their balance sheets appear as favorable as possible to their shareholders and regulators. Lending on the fed funds market can be a risky activity, as lending is unsecured, while lending to the Fed in the form of ON-RRPs is essentially riskless. Therefore, we might

expect that, on Dec. 31, lenders in the overnight market would shift their activity from the fed funds market to the ON-RRP market, as this would reduce risk on their balance sheets. Sure enough, we saw a large increase in ON-RRP activity on Dec. 31.

Still, why were fed funds market lenders accepting an average interest rate of 0.20 percent on Dec. 31, 2015, which is lower than the ON-RRP rate on that date, and why were some participants accepting interest rates as low as 0.08 percent? A potential explanation for this is that fed funds market trades and ON-RRP trades are very different in terms of the time of the day lending occurs and when the loan is paid back the next day. In particular, ON-RRP borrowing by the Fed occurs between 12:45 and 1:15 p.m. ET, and loans are paid back the next day between 3:30 and 5:15 p.m. ET. However, a fed funds transaction can occur as late as 6:30 p.m., with funds potentially returned early the next day.[4] So, while a fed funds market transaction may be riskier because lending is unsecured, it is also more liquid, as lending can occur later in the day and funds can be returned more quickly the next day. Thus, lenders may be willing to pay for liquidity with a lower overnight interest rate, and this would have a larger effect at the quarter-end, when trading on the fed funds market is thin. Ω

Stephen Williamson is an economist at the Federal Reserve Bank of St. Louis. For more on his work, see https://research.stlouisfed.org/econ/williamson. Research assistance was provided by Jonas Crews, a research analyst at the Bank.

ENDNOTES

1 See Williamson.
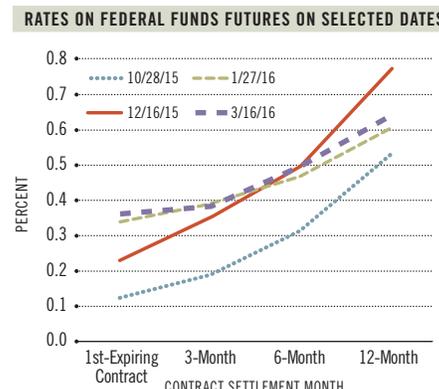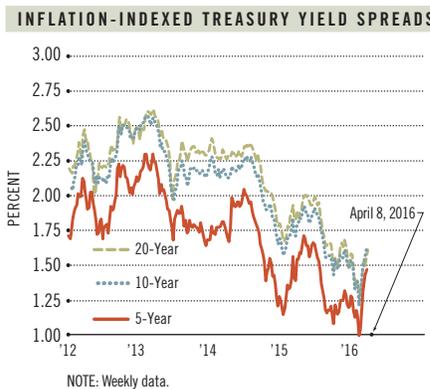2 See Williamson for more information.
3 See Board of Governors.
4 See Bartolini, Hilton and McAndrews for more information on the timing of transactions.

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REAL GDP GROWTH

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

CONSUMER PRICE INDEX (CPI)

INFLATION-INDEXED TREASURY YIELD SPREADS

NOTE: Weekly data.

RATES ON FEDERAL FUNDS FUTURES ON SELECTED DATES

CIVILIAN UNEMPLOYMENT RATE

INTEREST RATES

NOTE: On Dec. 16, 2015, the FOMC set a target range for the federal funds rate of 0.25 to 0.5 percent. The observations plotted since then are the midpoint of the range (0.375 percent).

U.S. AGRICULTURAL TRADE

NOTE: Data are aggregated over the past 12 months.

AVERAGE LAND VALUES ACROSS THE EIGHTH DISTRICT

SOURCE: Agricultural Finance Monitor.

On the web version of this issue, 11 more charts are available, with much of those charts' data specific to the Eighth District. Among the areas they cover are agriculture, commercial banking, housing permits, income and jobs. To see those charts, go to www.stlouisfed.org/economyataglance.

Immigration Patterns in the District Differ in Some Ways from the Nation's

By Subhayu Bandyopadhyay and Rodrigo Guerrero

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

Immigration has a variety of economic effects on a nation. For example, immigrants may provide employers with cheaper or more-skilled labor than what the native population provides, which makes the host nation more competitive in its export markets. Domestic consumers may benefit from lower prices due to greater production efficiencies. On the negative side, immigration may lead to overcrowding of cities and may cause public services to be stretched thin. On balance, if the positives outweigh the negatives, then immigration is viewed favorably by a host nation.

The stock of immigrants of a nation is affected by both *push* and *pull* factors. The *pull* factors are ones that raise the desirability of the host nation to a potential immigrant, factors such as higher incomes or presence of close family members in the host nation. The *push* factors are those in the source nation of the immigrant that encourage the potential immigrant to seek better prospects abroad—factors such as poverty. Another determinant of immigration patterns is the cost of immigration. For example, India is far from the U.S.; so, migration costs are relatively high. On the other hand, Latin America is relatively close to the U.S., reducing migration costs.

This overview first provides a sense of the extent of immigration into the U.S. and into the Federal Reserve's Eighth District, served by the St. Louis Fed. Second, the source areas for immigrants coming to the U.S. and, more specifically, to the District, are identified. Regarding District immigrants, we restricted our attention to the four largest metropolitan statistical areas (MSAs), which are St. Louis, Memphis, Louisville and Little Rock. We compared these MSAs with the nation and also with the Chicago MSA, which is outside the District but is a good benchmark for comparison with District MSAs.

Measuring Immigration

After people immigrate, they may, over the years, become naturalized U.S. citizens. If we had excluded all such citizens from

> What is quite interesting in looking at recent data on the foreign-born is that the Asian-born population, which was a substantial share of the total number of foreign-born in 2014, grew at a faster pace than the foreign-born population from Latin America.

our immigration count, we might have ended up with a distorted sense of the role that immigration played in the recent past. An alternative was to count the number of foreign-born[1] in the population, which reflects some of the recent past in addition to current immigration flows. This was the method we chose. We estimated the number of foreign-born using the birthplace variable of the American Community Survey (ACS) and the 1990 and 2000 censuses.

The chart shows that the share of the U.S. population that is foreign-born has risen steadily, from 8.7 percent in 1990 to 14.2 percent in 2014. Chicago has a similar trend but with higher initial and final shares of the foreign-born. The District MSAs have starkly lower figures, with Memphis having the largest share in 2014 at 6.1 percent. Considering, however, that the 1990 share in all four of the District MSAs was 2.5 percent or less, the trend in the District is one of growth. For example, St. Louis doubled its foreign-born share to 5 percent in the most recent estimate.

Where Are They Coming from?

The table presents the share of foreign-born in the population in 2014 and the compound annualized growth rate of foreign-born between 2005 and 2014, shown in parentheses.[2] The table also sorts these data by different geographical areas of origin. Out of all the foreign-born in the nation in 2014, about half were from Latin America, and about half of the Latin Americans were from Mexico. Asian nations contributed the next highest share, at 4.1 percent, followed by European nations at 1.9 percent, while the African-born share was a modest 0.6 percent. The picture was roughly similar for the Chicago MSA, except that the European share was considerably larger compared with that of the nation. In St. Louis, however, the Asian share (2 percent) was more than twice that of all of Latin America's (0.9 percent), and the European share was 1.4 percent. The other district MSAs were more similar to the nation in the sense that the largest share of their foreign-born population was from Latin America.

For the U.S. as a whole, the foreign-born population grew at 2 percent per year in the 2005-2014 period. This substantially exceeded the overall annual U.S. population growth rate of 1.1 percent during the same period. What is quite interesting in

Foreign-Born as a Percentage of Population
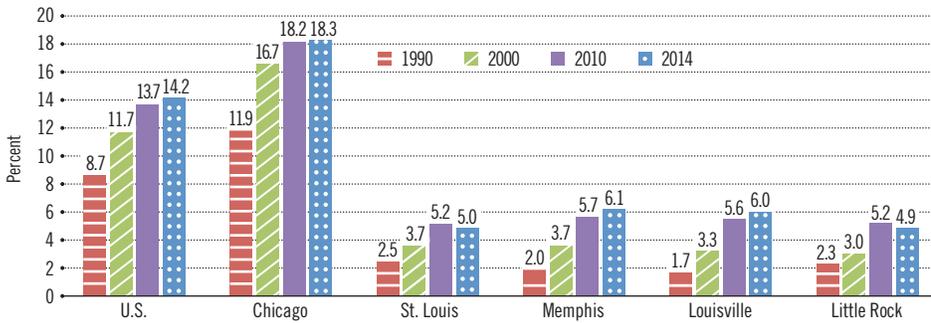
SOURCES: Authors' calculations from American Community Survey and decennial census data, accessed via IPUMS-USA.

Foreign-Born as a Percentage of Population in 2014

(Compound Annual Growth Rate of Foreign-Born from 2005-2014)

Region	Total Foreign	Latin America	*Mexico*	Europe	Africa	North America	Oceania	Asia	Population (mil)
U.S.	14.2 (2.0)	7.1 (1.6)	3.8 (0.8)	1.9 (0.2)	0.6 (4.8)	0.3 (–0.1)	0.1 (5.0)	4.1 (3.3)	319.0 (1.1)
Chicago	18.3 (0.4)	8.2 (–0.5)	6.9 (–0.7)	4.2 (–0.4)	0.5 (3.8)	0.2 (–1.1)	0.0 (2.3)	5.3 (2.6)	9.5 (0.3)
St. Louis	5.0 (1.0)	0.9 (–0.9)	0.5 (–2.6)	1.4 (–2.0)	0.4 (7.0)	0.2 (7.3)	0.1 (5.0)	2.0 (3.4)	2.8 (0.8)
Memphis	6.1 (3.2)	3.0 (5.8)	1.6 (4.6)	0.8 (3.3)	0.4 (5.1)	0.1 (–7.2)	0.0 (–9.3)	1.7 (0.4)	1.2 (0.1)
Louisville	6.0 (5.4)	2.2 (6.6)	1.0 (3.1)	1.2 (0.4)	0.8 (13.0)	0.2 (0.4)	0.0 (–24.0)	1.6 (6.8)	1.2 (1.3)
Little Rock	4.9 (1.4)	2.4 (3.3)	1.6 (4.1)	0.6 (–5.9)	0.2 (–2.0)	0.1 (–0.6)	0.0 (–13.0)	1.6 (4.5)	0.7 (1.8)

SOURCES: Authors' calculations from American Community Survey data, accessed via IPUMS-USA.

NOTE: North America, in this case, consists of Canada and Atlantic Islands. The last column pertains to the level of the country's or MSA's population as a whole; its parenthetical numbers indicate 2005-2014 annual population growth rates.

looking at recent data on the foreign-born is that the Asian-born population, which was a substantial share of the total number of foreign-born in 2014, grew at a faster pace than the foreign-born population from Latin America. Chicago and St. Louis show a similar pattern, where the Latin American-born population actually shrank while that from Asia grew at a healthy clip. Little Rock saw the foreign-born from Asia grow at a somewhat faster rate than the Latin American-born, while in Louisville, the growth rates were similar. Memphis is the outlier in the District in the sense that it shows strong growth in Latin American-born but an almost level population of Asian-born over the 2005-2014 period.

Conclusion

The District's foreign-born population share started from a much lower base in 1990 compared with that of the nation as a whole. Although the District's foreign-born share has grown during this period (1990 to 2014)—with St. Louis and Little Rock doubling their foreign-born shares, and Memphis and Louisville tripling theirs— the District's current share remains considerably lower compared to the national level. A closer look at immigration patterns in the last decade reveals a degree of heterogeneity in terms of the geographical areas of origin of the foreign-born within the District. Future investigation may provide insights into the factors that are driving the difference in immigration patterns between the District and the nation, as well as among MSAs within the District. Ω

Subhayu Bandyopadhyay is an economist, and Rodrigo Guerrero is a research analyst, both at the Federal Reserve Bank of St. Louis. For more on Bandyopadhyay's work, see https://research. stlouisfed.org/econ/bandyopadhyay.

Some Sectors Are Strong in Cape Girardeau, but Recovery from Recession Remains Elusive

By Charles S. Gascon and Joseph T. McGillicuddy

The city of Cape Girardeau sits along the Mississippi River in southeastern Missouri. During the steamboat era, the city boomed, becoming the busiest port between St. Louis and Memphis. Today, the port remains an active part of the community, handling more than 1 million tons per year.

The city is the center of the three-county region called the Cape Girardeau-Jackson metropolitan statistical area (MSA). Of the three counties in the MSA, Cape Girardeau County contains about 80 percent of the MSA's population, with half of those residents living in the city of Cape Girardeau.

The population of the entire MSA was just under 100,000 in 2015. Growth over the previous 10 years was a modest 4.7 percent, about the same as for the state overall. The nation's population grew 8.8 percent over the same period. The local growth was concentrated entirely in Cape Girardeau County; the other two counties—Bollinger in Missouri and Alexander in Illinois—experienced population declines of 2.3 percent and 23.9 percent, respectively.

Employment

Total employment in the metro area was about 44,000 in 2015, or 44 percent of the region's population, a percentage nearly identical to that of the state and nation. As expected, most of these employees work in Cape Girardeau County. About 25 percent of the county workforce commutes in from outside counties. Many of the workers live outside the MSA; they make up 18 percent of the Cape Girardeau County workforce.

Historically, many Midwestern cities relied on the manufacturing sector to drive the economy. However, the makeup of Cape Girardeau today is largely that of a diversified, service-sector economy. The fraction of Cape Girardeau MSA employees who work in manufacturing is about 10 percent, only slightly greater than the national average. Nonetheless, manufacturing plays a prominent role in the local economy, with Procter & Gamble being the third largest employer in the region.

One sector where the metro area does have a larger employee concentration than does the nation is the health care and social assistance sector. As of 2015, about 9,000 employees worked in this industry—just under a quarter of the region's employment and a share that is about 1.7 times the national average. Over half of these workers are employed by the region's two largest employers: St. Francis Healthcare System and SoutheastHEALTH, both of which serve the area through multiple locations and have their main facilities in the city.

Education also plays a significant role in the economy, largely due to Southeast Missouri State University, which is in the city of Cape Girardeau. The university has an enrollment of about 12,000 students; with 1,107 employees, it is the fourth-largest employer in the region.

The health care and education industry steadily added jobs during and after the Great Recession (2007-09), making it a vital source of economic growth over the last decade.

Output, Productivity and Income

Annual output of all goods and services produced in the Cape Girardeau MSA was $3.4 billion in 2014 (measured by real gross metropolitan product). This is 1.3 percent of Missouri's total output and 2.5 percent of the St. Louis MSA's. In comparison, 2014 output for the nearby Carbondale-Marion MSA in Illinois was $4.3 billion.

Total output per worker in the Cape Girardeau MSA is approximately $80,000, about 16 percent lower than the state average of $96,000 and 32 percent below the U.S. average of $117,000. This lower level of productivity is consistent with the lower

FIGURE 1

Population

Index 1970=100

Legend:
— United States
···· Missouri
---- Cape Girardeau MSA
···· St. Louis MSA
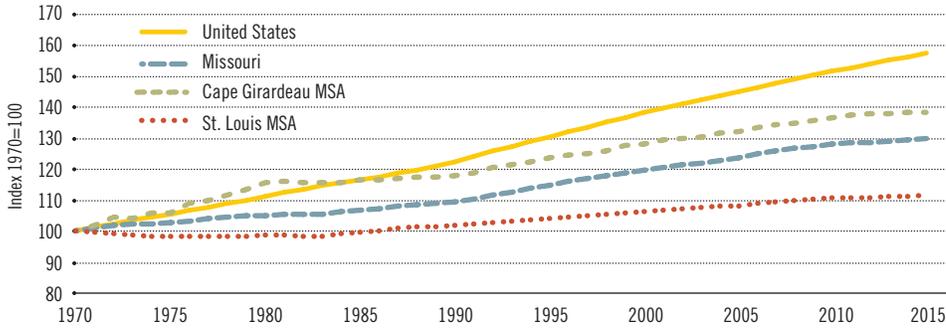
SOURCE: U.S. Census Bureau.

FIGURE 2

Total Nonfarm Payroll Employment

Index December 2007=100

Legend:
— United States
···· Missouri
---- Cape Girardeau MSA

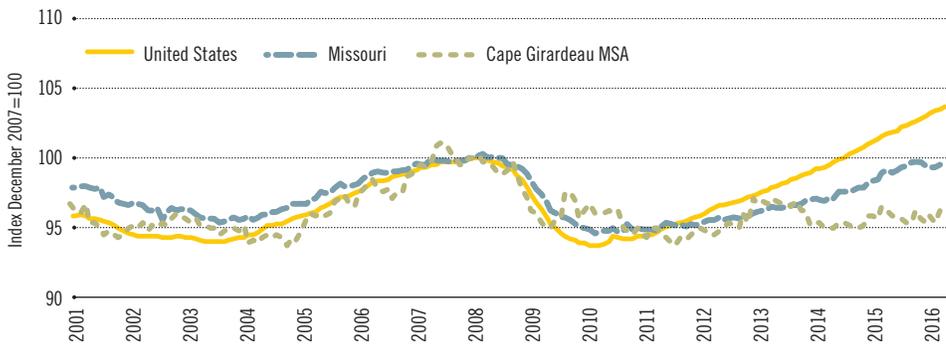SOURCE: Bureau of Labor Statistics.

FIGURE 3

Output Growth

Percent Change, Year-over-Year

Legend:
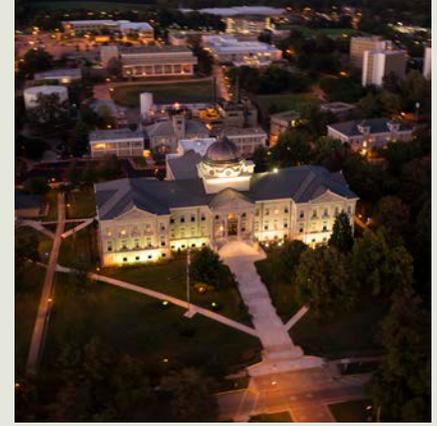United States | Missouri | Cape Girardeau MSA
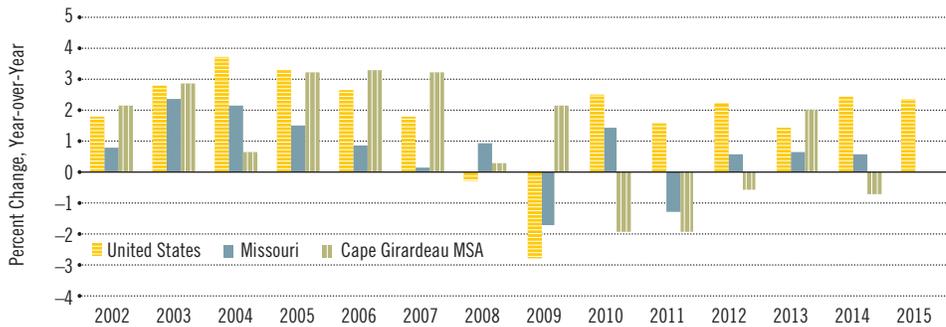
SOURCE: Bureau of Economic Analysis.

NOTE: Output growth for the nation is measured by real gross domestic product; for the state, real gross state product; and for the MSA, real gross metropolitan product.

Education plays a big role in the economy of the MSA, thanks in no small part to Southeast Missouri State University in Cape Girardeau (above). The university has an enrollment of about 12,000 and employs more than 1,100.

MSA Snapshot

Cape Girardeau, Mo.

Population	97,534
Population Growth (2010-2015)	1.13%
Percentage with Bachelor's Degree or Higher	24%
Percentage with a HS Degree or Higher	86%
Per Capita Personal Income	$37,507
Median Household Income	$43,415
Unemployment Rate (December)	4.5%
Real GMP (2014)	$3.45 billion
GMP Growth Rate (2014)	−0.66%

Largest Employers

St. Francis Healthcare System	2,817
SoutheastHEALTH	2,430
Procter & Gamble Paper Products	1,200
Southeast Missouri State University	1,107
Cape Girardeau Public Schools	713

Industry Breakdown by Employment

Other services 2%
Financial activities 4%
Construction 4%
Professional and business services 10%
Manufacturing 11%
Leisure and hospitality 8%
Information 2%
Natural resources and mining 0%
Education and health services 23%
Trade, transportation and utilities 22%
Government 14%

MISSOURI
ILLINOIS
Cape Girardeau
Bollinger
Alexander
MISSOURI

level of wages and income in the region. Total wages per employee in the MSA were $36,000, which is 18 percent lower than the state average of $44,000 and 29 percent below the national average of $51,000. Per capita income (which includes other sources of income and is calculated based on the entire population, not just workers) follows a similar pattern: $38,000 for the MSA, $42,000 for Missouri and $46,000 for the nation.

One of the key factors explaining the differences in productivity (and earnings) across regions is the skill level of the workforce (measured by educational attainment). However, the educational attainment gap between the Cape Girardeau region and the nation is small. In the MSA, 86 percent of the population 25 and older has at least graduated from high school and 24 percent of the same population has at least a

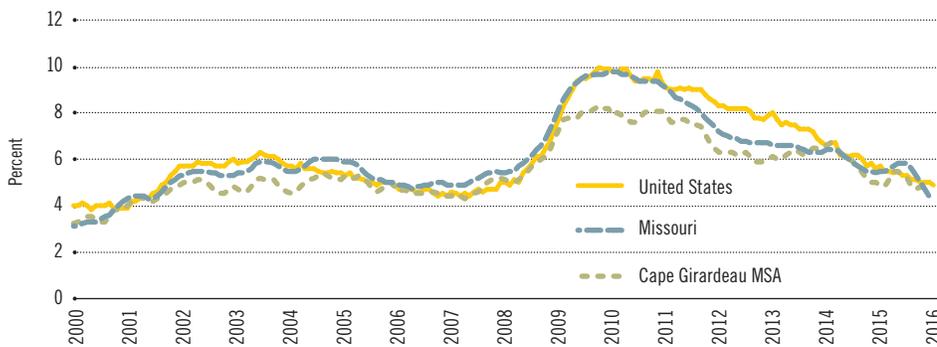**The Bill Emerson Memorial Bridge** spans the Mississippi River between Cape Girardeau (foreground) and East Cape Girardeau, Ill. The bridge was opened 12 years ago and was named in honor of a former congressman from the area.

FIGURE 4

Unemployment Rate

SOURCE: Bureau of Labor Statistics.

bachelor's degree. The national averages are 86 percent and 29 percent, respectively.

Given this lack of gap in the observed skill level, there must be other explanations for the earnings gap. Economists have found a strong positive relationship between wages and city size—a 1 percent increase in wages for each additional 100,000 people.[1] For example, the model would project that if Cape had a population of 2.8 million people (like St. Louis), wages per employee would be about $48,000. Actual wages per employee in St. Louis are about $49,000.

Nonetheless, incomes should be adjusted for a household's cost of living when measuring economic well-being, and with the smaller city size comes a lower overall cost of living. Based on regional price parity measures, the prices in the MSA are 16 percent cheaper than the national average, 7 percent lower than those in the St. Louis MSA and 6 percent lower than those for Missouri overall. After adjusting for the regional cost of living, real personal income per capita for the MSA is nearly $45,000, slightly below the U.S. average of $46,000.

Low housing costs are the main driver behind the region's low cost of living. Rent in the Cape Girardeau MSA is 32 percent lower than the U.S. average. As of 2014, the median house price in the MSA was $126,000, 28 percent below the national average. Buying a home in the MSA is still relatively more affordable even after taking into account differences in income, as the median house in Cape Girardeau costs just 2.9 times the median household income; for the nation, that figure is 3.3 times.

Aside from being affordable, housing prices in the MSA have also been relatively stable over the past decade compared with those in the rest of the country. House prices increased 4 percent during the boom years from 2004-2007, when U.S. prices climbed 24 percent. Local prices fell by only 5 percent during the Great Recession, while national housing prices dropped by more than 19 percent.

Recovery or Stagnation?

Before the Great Recession, the MSA experienced moderate growth of real output, with an average growth rate of 2.6 percent per year from 2001 to 2007, close to the nation's growth rate and double that of Missouri. However, since then, the region's economy has stagnated, with real output declining by an average of 0.1 percent per year from 2007 to 2014. This trend is consistent with Missouri's lackluster average annual growth of 0.2 percent during that time; in comparison, the nation's average for this period has been 1 percent.

Employment has followed a similar trend. Payroll employment in the MSA increased 0.9 percent per year from 2001 to 2007, the same rate as that of the nation and slightly higher than that of Missouri. During the recession, the MSA lost about 2,000 jobs. The area has yet to recover these jobs; total employment has remained essentially flat since 2009, when the recession officially ended. In contrast, employment levels in Missouri and the nation are approaching and surpassing their prerecession peaks, respectively.

Several industries have shown signs of growth since 2009 even though overall employment has been flat. The health care services industry continues to be a strong driver of growth. However, the most growth in recent years has come from the leisure and hospitality sector. To encourage that growth, the city is constructing a new conference center and related amenities. These projects are attempts to boost the city tourism in the slow winter months. Ω

Charles S. Gascon is a regional economist at the Federal Reserve Bank of St. Louis. For more on his work, see https://research.stlouisfed. org/econ/gascon. Joseph T. McGillicuddy is a research associate at the Bank.

ENDNOTE
[1] See Baum-Snow and Pavan.

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.

Modest Improvement in Economy Expected over Rest of the Year

By Kevin L. Kliesen

After beginning 2015 on a weak note, the U.S. economy rebounded modestly in the middle part of the year. However, the economy then stumbled badly in the fourth quarter, eking out a meager 1.4 percent rate of increase in real gross domestic product (GDP). For the year, the U.S. economy grew by a modest 2.0 percent, a slowdown from 2014's gain of 2.5 percent.[1]
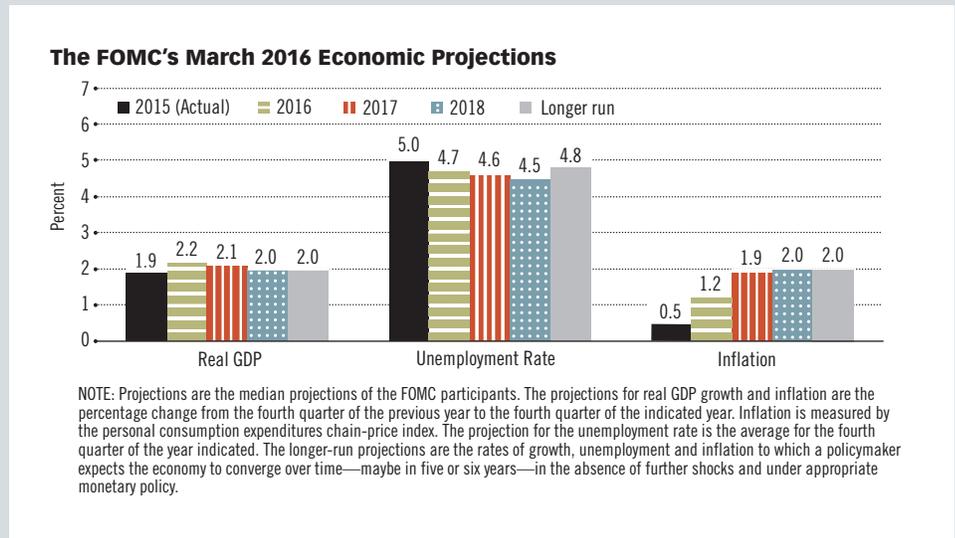
As usual, the headline GDP estimate was a combination of some strengths and weaknesses during 2015. Bolstered by strong labor markets, low interest rates and falling energy prices, consumer spending continued to advance at a healthy pace. In particular, automotive sales registered their highest sales rate on record, and total housing sales—new and existing—registered their highest levels since 2007. Nonresidential construction activity also advanced at a brisk pace.

By contrast, business expenditures on capital goods (real business fixed investment) in 2015 grew at their slowest pace since 2009, while real U.S. goods and services exports declined for the first time since 2008. Businesses were dramatically scaling back planned expenditures because of a myriad of factors. These included the effects of lower oil prices (less drilling and exploration), an appreciation of the U.S. dollar and weakening foreign growth that reduced the foreign demand for manufactured goods.

Consumer prices, as measured by the personal consumption expenditures price index, rose by only 0.7 percent in 2015. Last year's inflation rate, although similar to that of 2014 (0.8 percent), was the lowest since 2008. Low inflation over the past two years mostly reflected the plunge in oil prices, which began in late June 2014, although falling prices of nonpetroleum imported goods and non-energy commodity prices were also important factors. With inflation low and monetary policy still highly accommodative, nominal interest rates remain relatively low.

Evolving Trends in 2016

The consensus of professional forecasters is that real GDP growth and inflation in 2016 will be modestly stronger than last year's and that the unemployment rate will fall modestly further. Despite a sell-off in stock prices early in 2016 that spawned fears of a recession and helped to elevate economic uncertainty, available data over the first three months of the year mostly support the consensus of professional forecasters. Importantly, job gains were stronger than expected in March and averaged 209,000 over the first three months of the year. Also in the first quarter, the unemployment rate averaged 4.9 percent. Somewhat unexpectedly, the labor force participation rate has rebounded over the past several months. If this trend continues over the near term, then the unemployment rate might not fall as much as forecasters are expecting.

Importantly, two of the economy's sources of strength—consumer spending and housing—still look solid. Consumer spending was stronger than expected in January, as was residential and nonresidential construction. Strong growth of real after-tax incomes, healthy labor markets and ready access to credit should continue to bolster the confidence of both homebuilders and consumers.

Indeed, many housing industry analysts and forecasters remain optimistic. Still, some have pointed to a lack of qualified workers, a shortage of lots and disruptions in the permit-approval process as impediments to faster construction activity. Others have pointed to rapid rates of increases in housing prices in some areas that have reduced housing affordability and, thus, the pace of home sales.

Therefore, improving data signal a healthy rebound in real GDP growth in the first quarter of 2016. In response, financial markets have stabilized, recession fears have faded and oil prices have rebounded modestly as of early April.

Typically, rising oil prices are seen as a net negative for the U.S. economy. But this is not so clear-cut in an era when the United States is a major crude oil producer. Moreover, financial markets seem to believe that the decline in oil prices is an indicator of slowing global real GDP growth (less demand for oil). In this view, then, higher oil prices reflect improved prospects for global growth (and less uncertainty); therefore, a recovery in U.S. oil production should lift business fixed investment, exports and, thus, manufacturing activity.

But with the growth of the global oil supply still projected to outpace oil demand growth well into 2017, the recent uptick in oil prices may be temporary. If not, then inflation is likely to increase by more than most forecasters expect in 2016. For now, though, most forecasters and the Federal Open Market Committee (see the chart) do not see higher inflation and weaker growth as the most likely outcomes in 2016. Ω

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

The FOMC's March 2016 Economic Projections

Legend: 2015 (Actual), 2016, 2017, 2018, Longer run

Real GDP: 1.9, 2.2, 2.1, 2.0, 2.0
Unemployment Rate: 5.0, 4.7, 4.6, 4.5, 4.8
Inflation: 0.5, 1.2, 1.9, 2.0, 2.0

NOTE: Projections are the median projections of the FOMC participants. The projections for real GDP growth and inflation are the percentage change from the fourth quarter of the previous year to the fourth quarter of the indicated year. Inflation is measured by the personal consumption expenditures chain-price index. The projection for the unemployment rate is the average for the fourth quarter of the year indicated. The longer-run projections are the rates of growth, unemployment and inflation to which a policymaker expects the economy to converge over time—maybe in five or six years—in the absence of further shocks and under appropriate monetary policy.

ENDNOTE

1 Unless otherwise noted, this article follows Federal Reserve convention in terms of defining yearly percentage changes. Thus, for quarterly series like GDP, the percent changes are from the fourth quarter of one year to the fourth quarter of the following year. Similarly, yearly changes using monthly data are the percentage change from December of one year to December of the following year.

NEXT ISSUE

What Is Neo-Fisherism?

Why is inflation currently so low in many countries in the world? Possibly, it's because central bankers have made a fundamental error in neglecting the ideas of the late American economist Irving Fisher on the relationship between interest rates and inflation. In the July issue of *The Regional Economist*, read about those ideas, how they are finding their way into modern economics and their application to practical monetary policy problems.
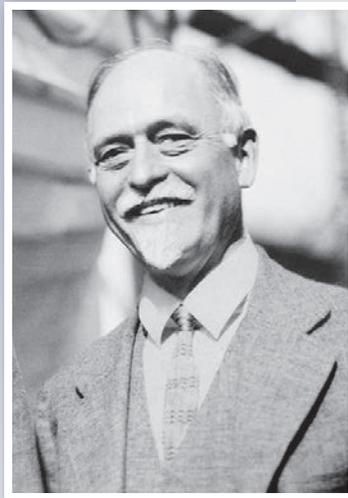
Irving Fisher

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