

**RE REGIONAL  
ECONOMIST**

*Insights on economic issues in today's headlines*

2018:Q1 | VOL. 26 | NO. 1



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The “sharing” economy and aging population are among the possible reasons.

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# REGIONAL ECONOMIST

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**Market Concentration and Its Impact on Community Banks**

Increased concentration can make it harder for community banks to acquire within their market.

## Comparing Living Standards across U.S. Metro Areas: Which Ones Fared Well?

About 90 percent of U.S. gross domestic product (GDP) is produced in metropolitan statistical areas (MSAs). Furthermore, about 86 percent of the U.S. population lived in the 381 MSAs in 2015,<sup>1</sup> and about 56 percent of the population lived in the 53 largest MSAs (those with at least 1 million people).

I am keenly interested in how incomes and prices differ throughout the U.S. To gain a better understanding of how the individual MSAs are performing, I recently examined which ones have relatively high and low standards of living, based on a measure of per capita income.<sup>2</sup> From a macroeconomic point of view, we would want all MSAs to be performing at a high level so that overall GDP and standard of living can be as high as possible.

The approach I used to compare MSAs is similar to the methodology used to compare standards of living across countries. I focused on 2015, the most recent year for which we have complete data.

Comparisons across MSAs are usually based on real per capita variables that are adjusted by a nationwide price index. However, the usual comparisons can be misleading because they do not factor in the large differences in cost of living across the country. Differences in housing costs, in particular, can be substantial.

Therefore, adjusting for price differences across MSAs is essential for generating meaningful comparisons of living standards. My colleagues at the St. Louis Fed have done just that.<sup>3</sup> My analysis draws on their research.

The Bureau of Economic Analysis recently released data that measure the differences in price levels across MSAs for a given year. These Regional Price Parities (RPPs) are expressed as a percentage of the national price level. For 2015, these ranged from 79.7 percent for Beckley, W.Va., to 124.5 percent for Honolulu (with the national level being 100 percent). The most expensive MSAs tend to be relatively

larger and located on either coast, and the least expensive MSAs tend to be relatively smaller and located in the interior.

To compare MSAs, the measure of income that I used is real (i.e., inflation-adjusted) per capita personal income, which I adjusted by the appropriate RPP. The results suggest that some MSAs have a much higher standard of living while others have a much lower standard of living than the nation as a whole. St. Louis, for instance, did extremely well. Its RPP-adjusted real per capita personal income was about 13 percent higher than the national average.

Among all MSAs, St. Louis ranked No. 20, putting it in the top 6 percent. Said another way, St. Louis' standard of living was higher than about 94 percent of MSAs in the country.

It is also helpful to look at living standards across the 53 largest MSAs. The top 10 large MSAs with the highest standard of living include three on the West Coast (San Jose, San Francisco and Seattle), three on the East Coast (Boston, Hartford and Washington) and four in the middle of the country (St. Louis, Nashville, Minneapolis and Houston). St. Louis ranked No. 7 in this group.

Some MSAs among the top 10 had a high cost of living and others had a low cost of living. Only St. Louis and Nashville had a lower cost of living than the national average. This suggests that these two MSAs have a cost advantage over their other competitors in the top 10. In some cases, the cost differential was 30 percentage points or more.

While this analysis gives an idea of how MSAs are performing on average, the per capita concept does not account for the income distribution within an MSA. For this, I used data from other research.<sup>4</sup> The main finding is that income inequality tended to be higher in larger MSAs. In addition, among the top 10 large MSAs in terms of living standards, some had very



high income inequality (such as San Jose, San Francisco and Boston). Others had income inequality that was closer to the average (such as St. Louis, Nashville and Minneapolis).

The bottom line is that, among the top 10 large MSAs, St. Louis and Nashville were the only ones that could simultaneously claim a higher-than-average standard of living, a lower-than-average cost of living and moderate income inequality.

The results of this analysis demonstrate the importance of adjusting for price differences across regions when comparing living standards. The facts uncovered here may provide the basis for future research on why some MSAs are more successful than others. **RE**

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

### ENDNOTES

- <sup>1</sup> Because of data availability in earlier years, I did not include Enid, Okla., which was classified as an MSA in 2015.
- <sup>2</sup> Bullard, James. "Living Standards across U.S. Metropolitan Statistical Areas," presentation delivered Oct. 6, 2017.
- <sup>3</sup> Coughlin, Cletus C.; Gascon, Charles S.; and Kliesen, Kevin L. "Living Standards in St. Louis and the Eighth Federal Reserve District: Let's Get Real," Federal Reserve Bank of St. Louis Review, Fourth Quarter 2017, Vol. 99, No. 4, pp. 377-94.
- <sup>4</sup> Sommeiller, Estelle; Price, Mark; and Wazeter, Ellis. "Income Inequality in the U.S. by State, Metropolitan Area, and County," Economic Policy Institute Report, June 16, 2016.

# Why Is Inflation So Low?

The sharing economy, aging population and monetary policy are among the possible reasons

By Hee Sung Kim and Juan M. Sánchez



## KEY TAKEAWAYS

- If low inflation persists, this would raise questions about the central bank's commitment to its inflation target and increase the risk of deflation.
- The U.S. isn't the only country facing this issue. Other developed countries are dealing with low inflation.
- Technological and demographic changes may be likely reasons, although some hypotheses link low inflation to monetary policy.

The U.S. inflation rate has been below the Fed's 2 percent inflation target since 2012. In this article, we revisit the merits of some of the most common explanations for the current low inflation rate.

While a moderate inflation rate can be beneficial for the economy, there are several reasons to be concerned about very low inflation. First, an inflation rate lower than the 2 percent target for a long period of time may signal that the monetary authority does not have inflation under control or that its commitment to the target is not that strong. Second, very low inflation is typically associated with an increased probability of falling into deflation, in which prices and wages are declining on average. Deflation, in turn, is a phenomenon associated with weak economic conditions.

The prime example of the aforementioned concerns is Japan. Since the late 1990s, Japan has experienced a long period of low inflation that is associated

TOP IMAGE: ©THINKSTOCK/ISTOCK/ISFENDIYARA BOTTOM IMAGE: ©THINKSTOCK/ISTOCK/KOJI\_ISHII

with a secular stagnation. In past years, low inflation in the U.S. triggered concern that the country may be heading to a Japanese-style low inflation trap.<sup>1</sup>

Because inflation cannot be measured by an increase in the price of one product or service, or even several products or services, there are many different indexes to measure inflation, each index signaling different information about inflation. The Federal Open Market Committee (FOMC), the Fed’s main monetary policymaking body, prefers to look at personal consumption expenditures (PCE) because, among other reasons, the PCE price index covers a wide range of household spending.

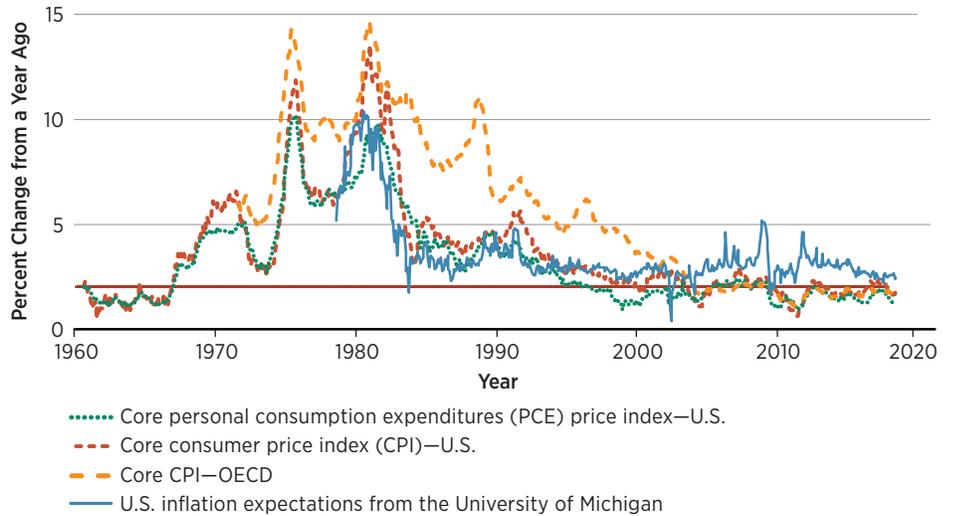
Figure 1 displays the recent evolution of the core PCE and core consumer price indexes (CPI) for the U.S. since the 1960s. Both indexes are seasonally adjusted and are computed as a year-over-year percentage change. It is also important to note that these indexes are “core” indexes, which exclude food and energy items that fluctuate dramatically. Looking at core indexes, rather than focusing on a short episode of spikes in inflation, helps to observe the inflation trend.<sup>2</sup> The PCE inflation in November 2017 was 1.5 percent, well below the inflation target of 2 percent.

Low inflation not only is a phenomenon observed in the United States, but also has been a concern around the world. Figure 1 includes the average core CPI for countries in the Organization for Economic Cooperation and Development (OECD). While the average inflation rate in OECD countries has historically been higher than the inflation rate in the U.S., inflation in these two areas has been sluggish in recent years, with CPI in OECD countries hitting 1.9 percent in October 2017 and CPI in the U.S. hitting 1.7 percent in November 2017.

Finally, Figure 1 also includes inflation expectations from the University of Michigan’s Surveys of Consumers. It shows that expectations have also been on a declining trend since 2011 but remain above the target, at 2.5 percent in November 2017.

Figure 1

### Recent Evolution of Various Inflation Rates



SOURCES: U.S. Bureau of Economic Analysis, U.S. Bureau of Labor Statistics, Organization for Economic Cooperation and Development (OECD), and University of Michigan’s Surveys of Consumers.

NOTES: Core indexes exclude energy and food prices. The red line represents a 2 percent inflation rate, a target that the Federal Reserve formally set in 2012.

### Technological Progress

Alan Greenspan, then chairman of the Federal Reserve, stated in testimony before the U.S. Congress in 2005: “The past decade of low inflation and solid economic growth in the United States and in many other countries around the world ... is attributable to the remarkable confluence of innovations that spawned new computer, telecommunication, and networking technologies, which, especially in the United States, have elevated the growth of productivity, suppressed unit labor costs, and helped to contain inflationary pressures.”

His idea, echoing the voices of many other economists, is that technological advancement has brought down the price of goods that use new technologies intensively. Indeed, innovation of smart electronic gadgets like smartphones has reduced the demand for various other gadgets, exemplified by the fact that the smartphones today can provide better cameras than professional equipment a

#### ABOUT THE AUTHORS

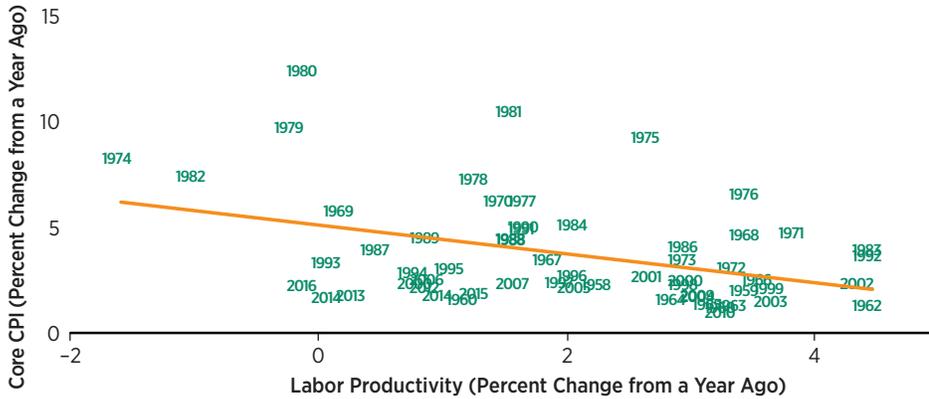
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**Hee Sung Kim** is a senior research associate at the Federal Reserve Bank of St. Louis.



Figure 2

**Relationship between Nonfarm Labor Productivity and Inflation**

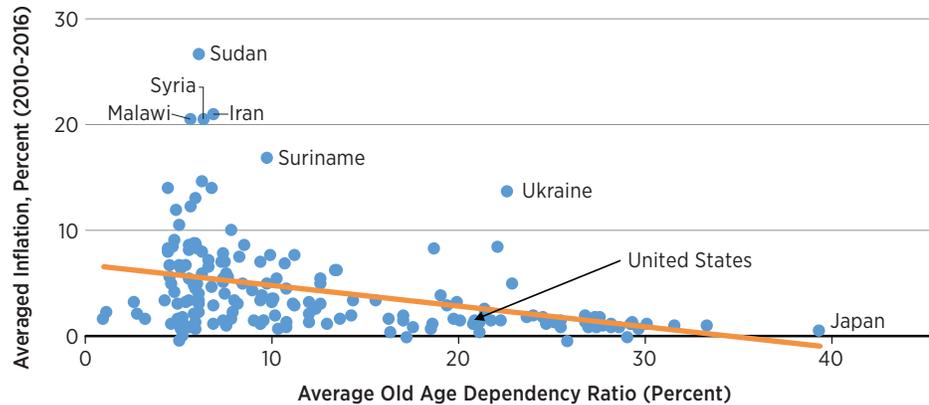


SOURCE: U.S. Bureau of Labor Statistics.

NOTES: Data points are represented by their year, and the core consumer price index (CPI) excludes energy and food prices. The orange line is the regression line, which suggests periods of higher labor productivity are associated with lower inflation.

Figure 3

**Relationship between Old Age Dependency Ratio and Inflation**



SOURCE: World Bank.

NOTE: The orange line is the regression line, which suggests that aging may be deflationary.

decade ago. According to the U.S. Bureau of Labor Statistics, prices of general tuition and medical care have risen 29 percent and 25 percent, respectively, while prices of television and photographic equipment have decreased 73 percent and 24 percent, respectively, since 2010.

Arguably, technological advancement has also increased labor productivity, therefore reducing unit labor cost. With the help of easily accessible information, improved communication, and useful software/applications, it is not too hard to imagine that the recent advances in

technology have contributed to improved productivity.

Figure 2 reports the correlation between labor productivity in nonfarm business and core CPI in the United States. The downward trend illustrates that periods with higher labor productivity are associated with lower inflation. According to the estimated relationship, an increase in labor productivity of 3 percentage points is associated with a reduction in inflation by approximately 2 percentage points.

Economists Ian Dew-Becker and Robert J. Gordon have argued that indeed the slowdown in productivity growth had major effects in boosting inflation during 1965-1979, while a hike in productivity growth between 1995 and 2005 had played a role in low inflation.

But why would inflation be low now if productivity has not grown faster than before? The most recent wave of technological progress that has drawn attention among economists is the “sharing economy.”

While there is no consensus on the exact definition of the term, the sharing economy usually refers to the idea of a crowd-based market that allows the exchange of privately owned goods and services. Airbnb and Uber are prime examples of the sharing economy. Although it is not easy to see this in the official productivity statistics, it is clear that the rise of the sharing economy has improved productivity by allowing for the utilization of otherwise idle goods and services, which then has led to the reduction in prices.

For example, economists Georgios Zervas, Davide Proserpio and John Byers studied the impact of the introduction of Airbnb into the Texas market. They reported that Airbnb’s entry into the hospitality market has had a quantifiable negative impact on local hotel room prices, with lower-end hotels and hotels not catering to business travelers being most vulnerable to the increased competition from Airbnb. They have estimated that a 10 percent increase of Airbnb rooms is associated with a 0.39 percent decrease in hotel room revenue, whereas a 10 percent increase in the supply of hotel rooms has resulted in a 1.6 percent reduction in hotel room revenue; this implies that the effects of introducing

Airbnb are about one-fourth that of creating new hotel rooms. With a massive surge of Airbnb rooms opening recently, this impact is non-negligible.

### Demographic Transitions

It is incontrovertible that the population of the world's developed economies is living a longer life, and the age demographic is shifting upward. How does this shift in population demographic affect inflation? Figure 3 reports cross-country correlation between average inflation and the average old age dependency ratio between 2010 and 2016.<sup>3</sup> Old age dependency ratio is calculated as the ratio of population aged 65 and above to the population aged 15 to 64.

The negative correlation suggests that aging may be deflationary. Notice that in Figure 3, Japan has the highest old age dependency ratio and one of the lowest inflation rates. Indeed, there is a string of literature that studies how the aging Japanese labor force is associated with low inflation.

A study by economists Shigeru Fujita and Ipppei Fujiwara explores a causal link between aging of the labor force and deflationary pressure in Japan. Their argument is that in an economy where skills are very specific to each individual firm, a growing share of old workers who lose their jobs also lose their firm-specific skills and flow into entry-level jobs. This inflow of old workers to entry-level jobs negatively impacts young workers' wages, creating deflationary pressure in the long run.

While the effect of longevity is clear, there is certain disagreement about the effect of changes in the birth rate. On the one hand, economists Mitsuru Katagiri, Hideki Konishi and Kozo Ueda argue that the effect of aging depends on its causes. Their model concludes that aging is deflationary when caused by an increase in longevity but inflationary when caused by a decline in the birth rate. On the other hand, economist Pawel Gajewski extends the analysis to OECD countries and argues that a decline in the birth rate is also deflationary in the data.<sup>4</sup>

How does this Japanese experience translate to the U.S.? We have measured the effects of the young age dependency ratio (the ratio of the population aged 0-14



Some economists argue that globalization of trade and services has kept prices under control. However, others say globalization has a limited influence on a country's inflation rate.

to the population aged 15-64) and the old age dependency ratio on U.S. inflation using the coefficients obtained by Gajewski. Between 1960 and 2016, the old age dependency ratio increased by about 50 percent, and the young age dependency ratio decreased by about 43 percent in the U.S.

Focusing on the post-crisis period from 2010 to 2016 that experienced persistent low inflation, both decreasing young age dependency and increasing old age dependency are associated with a 0.1 percentage point decrease in inflation annually. Since inflation was lower than the target by 0.4 percentage points on average during that period, about 25 percent of the difference could be accounted for by the changes in demographics since 2010.

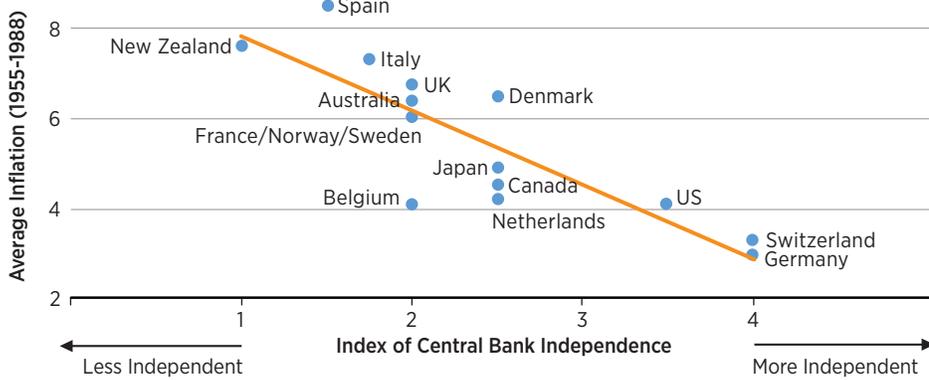
### Globalization

As noted above, low inflation is not uniquely observed in the United States. While some countries, notably Argentina and Venezuela, have suffered from very high inflation in recent years, many of the developed countries are experiencing persistent low inflation. Some economists have argued that widespread low inflation may be due to globalization. Particularly, economists Claudio Borio and Andrew Filardo argue that current inflation models are too "country-centric," failing

Indeed, there is a string of literature that studies how the aging Japanese labor force is associated with low inflation.

Figure 4

### Central Bank Independence and Inflation

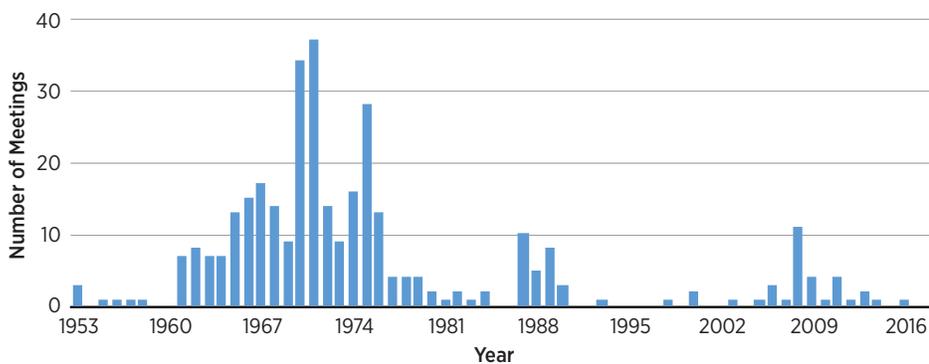


SOURCE: Alesina and Summers (1993).

NOTE: The orange line is the regression line, which suggests that countries with more independent central banks are associated with low average inflation.

Figure 5

### Meetings between the Federal Reserve Chair and the U.S. President



SOURCES: Digital Presidential Library and Federal Reserve Archival System for Economic Research (FRASER).

NOTE: The number of meetings at the White House includes official phone conversations. A decline in the meetings suggests less political interference.

to acknowledge the growing role of global factors on the inflation process. They point out that the sensitivity of inflation to domestic output gaps (the difference between current output and potential output) has been falling, while the importance of global output gaps has been increasing.

The significance of globalization’s impact on inflation is at least debatable, however. The World Economic Outlook report in 2006 from the International Monetary Fund (IMF) describes that the direct effect of globalization on inflation through import prices has, in general, been small in the industrial economies. In addition, speeches by then-Federal Reserve Chair Janet Yellen and former Federal Reserve Vice Chairman Donald Kohn also stressed that the impact of foreign factors on U.S. prices is rather limited.

One of the factors that may explain this is that the exchange rate in cheap-labor countries would eventually appreciate as real wages catch up to past gains in productivity. Along the same lines, more recent empirical papers that analyze cross-country data seem to conclude that globalization has a limited influence on a country’s inflation. A study of 11 developed countries by economists Jane Ihrig, Steven Kamin, Deborah Lindner and Jaime Marquez produced no meaningful evidence for the globalization hypothesis, which asserts that the internationalization of goods and financial markets has been changing the determinants of national macroeconomic outcomes such as inflation.

Another study that observed 50 countries around the world also concluded that while global economic fluctuations affect the dynamic of domestic inflation, foreign output gaps are still not as important as domestic output gaps, and trade openness is still too small to justify significant brakes in inflation dynamics.<sup>5</sup>

### Inflation Targeting and Central Bank Independence

What if inflation is simply very low because monetary policy is too tight? There are at least two reasons to believe that this hypothesis may be relevant. First, inflation targeting has become widespread since its introduction in 1989 by New Zealand. Nine advanced economies and 21 emerging market economies

are now “inflation targeters.”<sup>6</sup> This means that a growing number of countries are making inflation the primary goal of monetary policy. Not surprisingly, this results in lower rates of inflation. Although inflation targeting does not necessarily imply inflation that is too low, the fact that inflation lower than the target is often considered better than inflation higher than the target may contribute to an inflation rate that, on average, is lower than the target.

The second reason is central bank independence, which is closely related to inflation targeting. The fact that central banks can focus solely on reducing inflation depends crucially on their ability to act independently. Indeed, economists Alberto Alesina and Lawrence Summers have empirically shown a negative relationship between inflation and central bank independence by devising indexes to measure the autonomy of the central bank.<sup>7</sup> This clear negative relationship is shown in Figure 4. It suggests that countries with more-independent central banks are associated with low inflation.

Why is this relevant today? Because the number of countries that are inflation targeters has been increasing, and central banks have become more independent. In particular, the index of central bank independence proposed by economist Fernando Martin, which counts the number of meetings between the chair of the Federal Reserve and the U.S. president, shows a clear downward trend in the U.S., as shown in Figure 5.

## Neo-Fisherism

Finally, some economists have argued that the relationship between interest rates and expected inflation proposed by Irving Fisher implies that low policy rates for a long period of time must imply low inflation.<sup>8</sup> The Fisher relationship indicates that the nominal interest rate can be approximated by the sum of the real interest rate and the expected inflation rate. In the past, this relationship has been interpreted to mean that the real interest rate is the independent variable. Thus, the expected inflation rate has a unidirectional causal relationship with the nominal interest rate, that is, a higher expected inflation rate will result in a rising nominal interest rate.

However, in an environment in which the monetary authority keeps the relevant

nominal interest rate very close to zero for a long period of time, this relationship would simply imply that the expected inflation rate is equal to the negative of the real rate. Recall that under the Fisher hypothesis, the real rate is independent of monetary policy (it depends on factors like long-term economic growth). Thus, if the real rate is close to zero, it must be that, under this hypothesis, expected inflation is close to zero as well. The solution to low inflation in this context is to increase the nominal interest rate.

Some evidence for this argument is derived from Japan, where the nominal interest rate has been close to zero since the late 1990s, and the inflation rate shows no sign of increasing.<sup>9</sup>

## Conclusion

Overall, we find that there are several reasons pushing inflation down, not just in the U.S. but also in other developed countries. The new sharing economy and the demographic transition come up as the most likely explanations. However, it is hard to rule out that long periods of near zero policy rates have implied that only low expected inflation is compatible with the current fundamentals of the economy. **RE**

*(This article was first published online Feb. 2.)*

## ENDNOTES

- 1 See Bullard, 2010.
- 2 However, some economists proposed that the FOMC should focus more on headline inflation. See Bullard, 2011.
- 3 South Sudan and Venezuela are excluded from the sample because both countries experienced a hyperinflation, in which averaged inflation was greater than 80 percent between 2010 and 2016.
- 4 See Canon, Kudlyak and Reed for more details.
- 5 See Bianchi and Civelli.
- 6 See presentation by Murray.
- 7 See Cukierman et al., among many others, for more details.
- 8 See Williamson, 2016.
- 9 See Cochrane, and Williamson (forthcoming).

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# Measuring Labor Share in Developing Countries

By Brian Reinbold and Paulina Restrepo-Echavarria



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## KEY TAKEAWAYS

- Once considered a stable factor, labor's share of GDP has fallen in developed countries. For developing nations, the evidence is mixed.
- The declining labor share can lead to stagnant incomes and lackluster wage growth.
- Alternative ways to measure labor share can help economists better understand a country's growth.

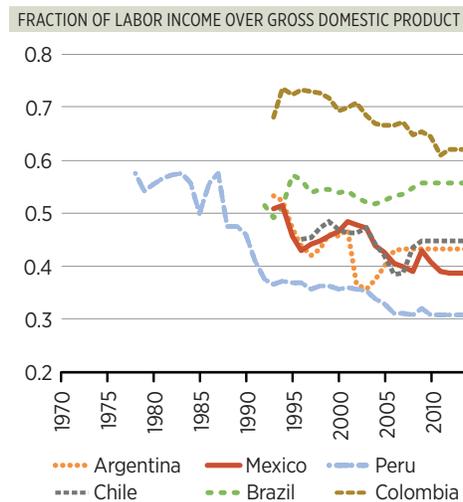
Ofentimes economists think of income in terms of its factor components: labor and capital. The labor share is the fraction of labor income over gross domestic product (GDP), while the capital share is similarly the fraction of capital income over GDP. The labor share used to not draw much attention from researchers because it was long considered to be constant over time. However, it is now well-documented that the labor share in developed countries has, in fact, declined over the last few decades, but evidence remains mixed for developing countries.

A more complete understanding of the labor share can allow economists to better link the income at the macro-level (i.e., GDP) with the experience of individuals at the household level.<sup>1</sup> For example, does an increase in GDP (national income) necessarily translate to higher income for all households or only a few?

A declining labor share can lead to stagnant incomes and lackluster wage growth. Because nominal wage growth signals future inflation, declining wages can lead to low inflation.<sup>2</sup> Therefore, factoring in the labor share can help guide monetary policy. Also, a declining labor share is associated with increased inequality<sup>3</sup> because capital owners are then receiving a greater share of income, but the number of capital owners is typically small relative to the general population.<sup>4</sup>

Figure 1

## Labor Share in Latin America

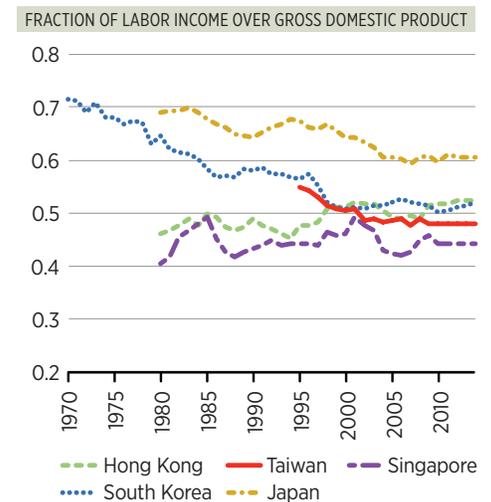


SOURCE: Penn World Table.

NOTE: Data end in 2014. For certain countries, data for the most recent years were extrapolated or assumed constant.

Figure 2

## Labor Share in East Asia



## Gauging the Self-Employed

In this article, we look at the labor share and how it can be estimated in developing countries. If the labor share is declining in developing economies, this could hinder their future economic growth. However, it is more difficult to draw conclusions for developing and emerging economies because of data unavailability. One of the challenges of measuring a country's labor share involves factoring in self-employed people, who can make up a larger share of the workforce in a developing country relative to the share in developed nations.

Figure 1 shows the labor share for Argentina, Brazil, Chile, Colombia, Mexico and Peru. Together these countries make up

around 80 percent of GDP in Latin America.<sup>5</sup>

Figure 2 shows the labor share in Hong Kong, Japan, South Korea, Singapore and Taiwan.<sup>6</sup> These economies experienced similar growth paths in the 20th century. These two groups were at similar stages in their economic development in the mid-20th century, but the East Asian economies grew more rapidly.

As Figures 1 and 2 show, the labor share varies widely among these economies, and for some, it also shows considerable differences over time. In Latin America, we see that the labor share has declined since 1995 for all countries except Brazil. The labor share has shockingly declined nearly 50 percent in Peru since 1980. In

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East Asia, the labor share has declined overall for Japan, South Korea and Taiwan but has actually increased in Hong Kong. The labor share remains fairly constant in Singapore. However, estimating the labor share accurately can be challenging, and the results will vary depending on what assumptions are made.

### Assumptions for Estimating Labor Share

To have a good estimate of the labor share, it is crucial to have good data on labor compensation. Labor income is widely observable for employed individuals that work in formal firms. The challenge lies in estimating the labor income of self-employed individuals because their income contains contributions from both labor and capital.

The Penn World Table (PWT) has data for several estimates of the labor share.<sup>7</sup> Figures 1 and 2 report what PWT considers the best measure based on several criteria.

However, the labor share varies significantly for each country based on what assumptions are made and the quality of data. We graph these different measurements for a subset of countries in Figure 3.

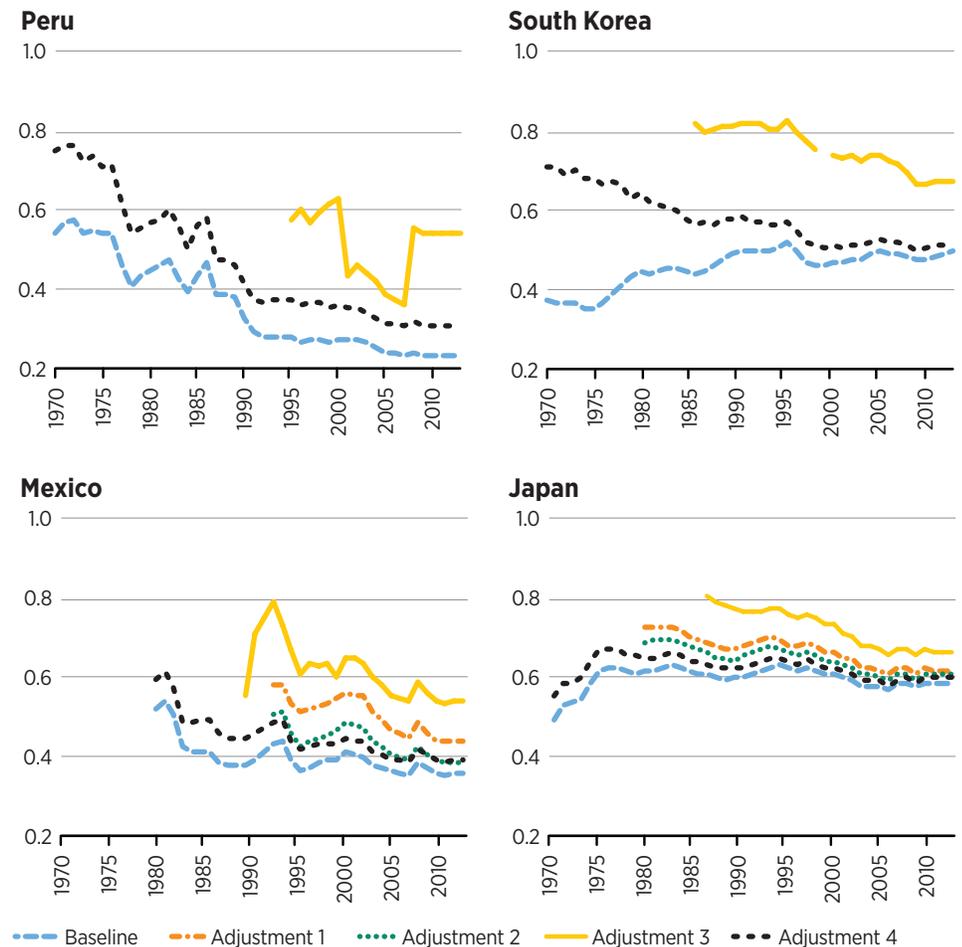
The baseline calculation is the share of labor compensation of employees. Since it does not include self-employed income, it serves as a lower bound for the estimate of the labor share.

The first adjustment that can be done to the baseline calculation involves using mixed-income data. Some countries report mixed-income data, which is total self-employed income. For the countries that report mixed-income data, this adjustment adds all mixed income to total labor compensation, and this adjustment then serves as a reasonable upper bound to the labor share for countries that report mixed income. (See Adjustment 1 in Figure 3.) However, since self-employed income contains both labor and capital income, it overestimates the labor share.

A second common assumption for adjusting the labor share of self-employed income is that self-employed individuals use labor and capital in the same proportion as the rest of the economy. (See Adjustment 2 in Figure 3.) This adjustment is considered the most reasonable estimate. However, Peru, Hong Kong, Singapore, South Korea and Taiwan do not report mixed income, so additional information is required.

Figure 3

### Labor Share Adjustments to Account for the Self-Employed



SOURCE: Penn World Table.

NOTES: The labor share is the fraction of labor income over gross domestic product. The baseline calculation is the share of labor compensation of employees, which does not include self-employed income (mixed income). Adjustment 1 adds all mixed income to total labor compensation. Adjustment 2 modifies the labor share of mixed income by assuming self-employed individuals use labor and capital in the same proportion as the rest of the economy. Adjustment 3 uses data on the total number of self-employed people and assumes that they earn the same average wage as employees. Adjustment 4 assumes that all the self-employed work in the agricultural sector, so the entire value added in agriculture is added to labor compensation. Data end in 2014. For certain countries, data for the most recent years were extrapolated or assumed constant.

A third adjustment uses information on the total number of self-employed people and assumes that they earn the same average wage as employees.<sup>8</sup> (See Adjustment 3 in Figure 3.) This assumption is only reasonable if the earning ability of employees and the self-employed is similar. However, the self-employed are likely to make less than those employed in formal firms. Since the self-employed make up a large share of the workforce in developing countries, this discrepancy can overestimate the labor share for developing nations.

There is a fourth adjustment that can be made. A 2015 paper suggests another way to estimate labor income of self-employed individuals in poorer countries that may be superior to the third adjustment mentioned above.<sup>9</sup> This fourth adjustment assumes that all the self-employed work in the agricultural sector, so the entire value added in agriculture is added to labor compensation. (See Adjustment 4 in Figure 3.)

(continued on Page 21)

# Many Americans Still Lack Retirement Savings

By YiLi Chien and Paul Morris



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As baby boomers age, significant debate has emerged about whether there is a retirement crisis developing in the United States. Some argue that the retirement situation is poor for many Americans, with many approaching retirement age with little or no savings. However, others describe the situation as better than commonly thought, as many retirees report living comfortably.<sup>1</sup>

This article aims to offer a glimpse into the current state of retirement readiness in the United States. We examine the participation in and usage of the two most common types of financial accounts designed exclusively for retirement savings.

The first type is the employer-sponsored pension plan (ESPP); this includes defined-benefit plans, such as traditional pensions, and defined-contribution plans, such as 401(k) plans. The second is a retirement plan offered independent of the workplace, which includes individual retirement accounts (IRAs) and Keogh accounts.

Overall, our analysis indicates that many households either do not utilize or underutilize the retirement savings plans available to them. We also examine how retirement savings vary with age and discuss alternative ways that nonparticipants may be preparing for retirement.

In our analysis, we utilized data on retirement account participation and account balances from the Survey of Consumer Finances (SCF). Every three years, the survey provides cross-sectional data on U.S. households' demographic characteristics, incomes, balance sheets and pensions. The Federal Reserve Board, along with the Department of the Treasury, released the SCF data for 2016—the most recent year available—in September 2017. The primary unit of analysis in the SCF is the household, and the survey attempts to capture the distribution of households in the U.S. Thus, the results reported in this article should represent the general state of participation in and usage of retirement accounts in the U.S.

## KEY TAKEAWAYS

- A growing debate is focused on whether U.S. households have saved enough for retirement.
- The latest Survey of Consumer Finances data show that 35 percent of households don't participate in a retirement plan.
- Even for households approaching retirement, the problem of underparticipation in retirement plans persists.

## Little or No Retirement Savings

Previous studies documented low participation among households and low account balances for those that do participate. For example, a 2016 study by economist Monique Morrissey used SCF data to show that participation in defined-benefit and defined-contribution plans is quite low, and that many families have little or no retirement savings.

Our findings are generally in line with Morrissey's. The most recent SCF data show that not all employers offer pension plans to their employees and not everyone who has access chooses to participate. Only 27 percent and 33 percent of households have defined-benefit and defined-contribution plans, respectively, at their current jobs; 8 percent of households have both. In total, about 56 percent of households have an employer-sponsored pension plan associated with their current or previous employment.

One might think that households that do not have access to an ESPP are more likely to utilize an IRA or Keogh account as an alternative option. However, this is not what we see in the data. Roughly 30 percent of households have an IRA or Keogh account. Of households that do not have an ESPP, only 20 percent utilize any IRAs or Keogh accounts, while 38 percent

of households that have an ESPP also have at least one IRA or Keogh account. This implies that participating in one type of retirement account increases one's likelihood of participating in additional retirement accounts.

Overall, 35 percent of U.S. households do not participate in any retirement savings plan.<sup>2</sup>

Even among those households that do hold retirement accounts, many of them have low account balances. Figure 1 plots the sum of account balances of all IRAs, Keogh accounts and pension plans by percentile for various age groups.<sup>3</sup> The median (50th percentile) household of all ages (the red bar) holds only \$1,100 in its retirement account. Even the 70th and 80th percentiles of households have only about \$40,000 and \$106,000 in their retirement accounts, respectively.

By contrast, the 90th and 95th (not shown in the figure) percentiles of households hold considerable amounts, at about \$310,000 and \$612,000, respectively. This implies a high degree of inequality in retirement account balances across households.

Intuitively, the balance of a retirement account should increase and peak right before retirement. Thus, it could be useful to exclude younger households from our

## ABOUT THE AUTHORS

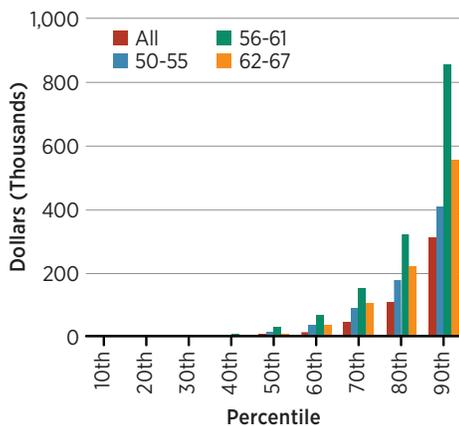
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**Paul Morris** is a senior research associate at the Federal Reserve Bank of St. Louis.



Figure 1

### Retirement Account Balances by Age Group

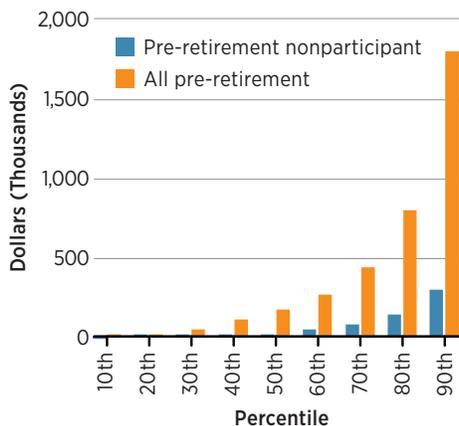


SOURCES: Survey of Consumer Finances and authors' calculations.

NOTE: The retirement account balances reported here do not include pension plans that do not have a defined account balance.

Figure 2

### Net Worth of Pre-Retirement Households



SOURCES: Survey of Consumer Finances and authors' calculations.

NOTE: Pre-retirement households are nonretired households whose heads are ages 50-67; the nonparticipant category is composed of those pre-retirement households that do not have a defined-benefit pension plan, a defined-contribution pension plan, an individual retirement account or a Keogh account.

analysis to avoid downwardly biasing the results. Younger households are likely to be in a stage of saving for expenses, such as a down payment on a house or future education costs for their children. It is reasonable to expect that they might postpone their retirement savings with the intention of catching up later.

To account for this, Figure 1 also plots retirement account balances for non-retired households whose heads are ages 50-55, 56-61, and 62-67. We refer to these households as pre-retirement households throughout the rest of the article.

Participation improves very little for pre-retirement households, indicating that age plays only a small role in the decision to participate and that younger households that do not participate may not be very likely to participate even by the time retirement approaches.

Conditional on having a positive retirement account balance, the households with heads ages 56-61 accumulate more savings, but the underparticipation problem persists. The median of this group holds only around \$25,000. The balances of the 70th and 80th percentiles improve to about \$148,000 and \$320,000, respectively. The degree of inequality is

more pronounced among this age group: The 90th percentile of households holds around \$855,000, while the 95th percentile (not shown in the figure) holds almost \$1,470,000.

### Fallback Options?

The lack of retirement accounts does not necessarily imply that nonparticipants aren't saving for retirement. Households could save through other financial assets or nonfinancial assets, such as home equity. However, the net worth (the value of all assets net of total debt) of pre-retirement nonparticipants is typically quite limited.

Figure 2 plots the distribution of net worth among all pre-retirement households and pre-retirement nonparticipant households. The net worth of pre-retirement nonparticipant households is much lower relative to that of all pre-retirement households. Only the pre-retirement nonparticipant households at the upper end of the distribution have sizable net worth, but the numbers are still not very sizable, especially compared to those of all pre-retirement households. The 80th percentile has a net worth of approximately \$138,000, and the 90th percentile has a net worth of

\$293,000. The net worth of the corresponding percentiles for all pre-retirement households is at least five times larger.

However, these pre-retirement households that don't participate in retirement plans may have some fallback options that fall outside the scope of our analysis. Social Security benefits are the first and most obvious option. In addition, postponing retirement age or taking a part-time job after retirement could alleviate the problem. In fact, the labor force participation rate for seniors (age 65 and above with no disability) has been trending upward for much of the past decade; it was at 23 percent in January 2018.<sup>4</sup>

We also do not take into account the potential inheritance one might get, and financial support or housing assistance from children, relatives and friends could provide some security for those without significant retirement savings.

Still, this article documents that many households either do not utilize or underutilize retirement accounts, such as ESPPs and IRAs. It could be worrisome that, for many American households, the total balances of their retirement accounts may not be sufficient to ensure a solid life in retirement. **RE**

### ENDNOTES

- 1 See Moeller and Henricks for recent reports on the current retirement crisis.
- 2 We define nonparticipants to be households that do not participate in a defined-benefit pension plan, a defined-contribution pension plan, an IRA or a Keogh account.
- 3 The retirement account balance reported here does not include defined-benefit pension plans that do not have a defined account balance. Therefore, one should interpret this measure as a lower bound.
- 4 For the specific data, see <https://fred.stlouisfed.org/series/LNU01375379>.

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# The Relationship between Oil and Equities at the Zero Lower Bound

By Brian Reinbold and Paulina Restrepo-Echavarria



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## KEY TAKEAWAYS

- The correlation between changes in oil prices and equity returns increased sharply when the Fed's policy rate became zero in 2008.
- Some economists believe that this phenomenon was the result of a change in how monetary policy worked at the zero lower bound.
- A study of other countries, however, indicates that this increased correlation didn't occur when their policy rates became zero.

Economists have observed that the correlation between oil price changes and equity returns changed dramatically after 2008. Before 2008, oil and equity prices were generally uncorrelated, while after 2008 they became highly correlated.

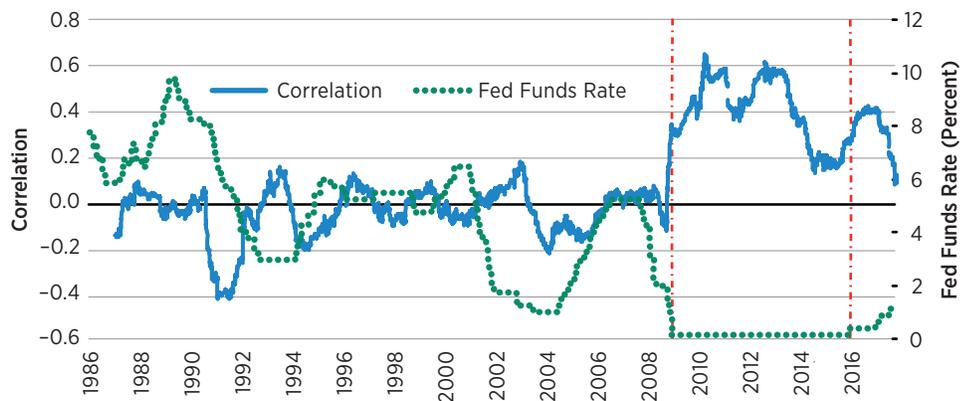
Interestingly, this change in the correlation coincides with the Federal Reserve's monetary policy transition to the zero lower bound (ZLB), in which the Fed's policy rate—the federal funds rate—became zero. In other words, before 2008, the fed funds rate was positive, and oil price changes were uncorrelated with equity returns. Then on Dec. 16, 2008, the fed funds rate became zero, and changes in oil prices became highly correlated with changes in the return on equity.

Figure 1 plots this rolling correlation alongside the fed funds rate.<sup>1</sup> The left axis shows the correlation coefficient between the change in oil prices and the change in the Standard and Poor's 500 Index return, and the right axis corresponds to the fed funds rate.

More specifically, the correlation between changes in oil prices and changes in the return on equities was essentially zero before the ZLB. However, the correlation spiked significantly just before

Figure 1

## The Oil-Equity Correlation in the U.S.



SOURCES: The New York Times, U.S. Energy Information Administration, Board of Governors of the Federal Reserve System, FRED (Federal Reserve Economic Data), Haver Analytics and authors' calculations.

NOTES: The area between the red dashed lines corresponds to the fed funds rate at the zero lower bound. The correlation is the one-year rolling correlation between the daily change in the crude oil price of West Texas Intermediate-Cushing, Okla., and the daily S&P 500 equity return. A one-year rolling correlation calculates the correlation between two time series using the last year of data.

the zero lower bound was reached, and the increased correlation persisted during the ZLB. (See the period between the red dashed lines on Figure 1.) Indeed, the average rolling correlation was only  $-0.04$  before the ZLB, but averaged  $0.40$  during the ZLB.<sup>2</sup> Also, we see that as the fed funds rate increased from zero starting in late 2015, the correlation between oil and equities eventually declined, although it is still too soon to make any predictions that price changes in oil and equity will become uncorrelated again.

Given this coincidence between the ZLB and the increased correlation, it is worth asking whether being at the ZLB may be

the cause for the increased correlation. Datta, Johannsen, Kwon and Vigfusson tackled exactly this question. Using a new-Keynesian model augmented to include oil, they concluded that, yes, being at the ZLB can be the cause for the increased correlation.<sup>3</sup>

The intuition behind their result is the following: When the monetary authority is constrained by the ZLB (i.e., the policy rate is set at zero, effectively setting the short-term nominal interest rate at zero), it cannot use the fed funds rate to respond to changes in inflation. The opposite is true away from the ZLB: The nominal rate changes in response to changes in inflation.

## ABOUT THE AUTHORS

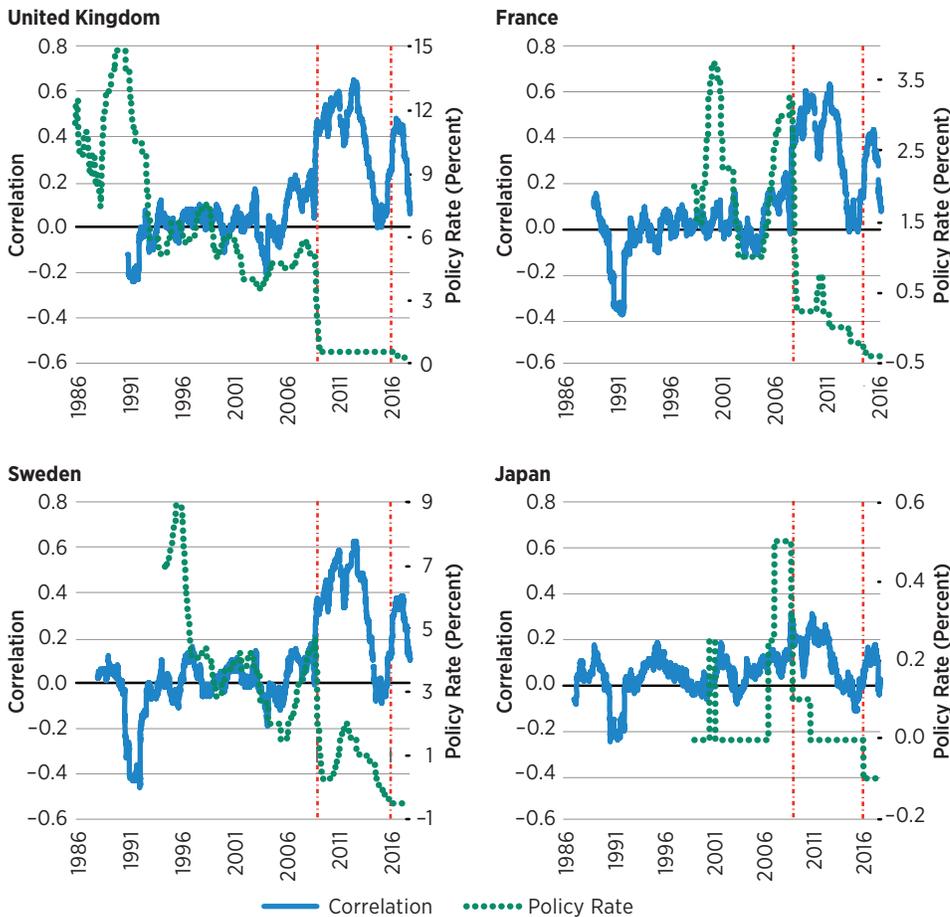
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Figure 2

### The Oil-Equity Correlation in Other Countries



SOURCES: U.S. Energy Information Administration, Financial Times, Nasdaq OMX Nordic Exchange, Sveriges Riksbank, Bank of England, Bank of Japan, European Central Bank, FRED (Federal Reserve Economic Data), Haver Analytics and authors' calculations.

NOTES: The area between the red dashed lines corresponds to the fed funds rate at the zero lower bound. The correlation is a one-year rolling correlation between the daily change in the crude oil price of West Texas Intermediate-Cushing, Okla., and the daily equity returns of the respective countries' stock exchange indexes. The policy rate is the relevant nominal interest rate set or targeted by the country's central bank.

This intuition follows from the Fisher equation, in which the nominal interest rate approximately equals the real interest rate plus the inflation rate. Away from the ZLB, the monetary authority can respond to inflation by adjusting the policy rate. However, at the ZLB, the monetary authority cannot respond to decreases in inflation by lowering the policy rate; therefore, the nominal rate is essentially fixed, and the real interest rate has to adjust for the Fisher equation to hold.

This model-implied mechanism means that changes in inflation affect the real interest rate differently at the ZLB and

away from it, and hence, it makes sense that the transmission to output, consumption, oil prices and equity prices is different at the ZLB and away from it.

#### An Alternative View

However, if the argument in Datta et al. is right, and the mechanism that changes the correlation between the change in oil prices and the change in equity prices is through a country's inability to respond to inflation using the nominal interest rate, we should expect a consistent pattern at a cross-country level. That means the increased correlation should coincide with

a country's policy rate being at zero, as we observe for the U.S.

Figure 2 shows data similar to those plotted in Figure 1 for the United States, but for the U.K., France, Sweden and Japan. For these plots, we used each country's own stock exchange index for equity returns<sup>4</sup> and the relevant policy nominal interest rate.<sup>5,6</sup>

We can see that for all countries except Japan, the correlation between the growth rate of oil and equity prices oscillates around zero up to 2008 and then becomes positive up to around 2012, just as in the U.S. However, their policy rates were not at the zero lower bound. For those that did reach the ZLB, they reached it around 2012, with the exception of Japan, which went to the ZLB in the early 2000s. Interestingly, we do not see a global spike in oil-equity correlations coinciding with Japan entering the ZLB.

This cross-country evidence hints to the fact that the inability of the monetary authority to react to deflationary shocks does not explain the change in the correlation between oil and equity prices. If this were the right argument, we would observe a coincidence between the correlation becoming positive and the policy rate becoming zero for all these countries, which is not the case. (See Figure 2.)

However, the increase in the correlation for all countries coincides with the one in the U.S. This is because the stock exchanges in these countries are highly correlated with the S&P 500 and the price of oil is the same. This means that this is a more general phenomenon that seems to be related more to the policy rate of the U.S. than to the policy rate of each individual country.<sup>7</sup> **RE**

#### ENDNOTES

<sup>1</sup> We use the West Texas Intermediate-Cushing, Okla., for the crude oil index, and we use the S&P 500 for the equity index. We then calculate the daily price change in oil and the S&P 500 return using 100 times the log-difference of consecutive prices. Finally, we calculate the one-year rolling correlation between the daily change in oil prices and the daily S&P 500 return. A one-year rolling correlation calculates the correlation between two time series using the last year of data. This allows us to see whether there is any time variation in the correlation between oil and equities.

<sup>2</sup> A correlation coefficient of 1.0 means the two

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# Health Care Remains Important Job Engine in Eighth District

By Charles Gascon



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As the U.S. population has aged, the health care sector has become one of the fastest-growing parts of the economy, causing a surge in new job openings. Even technology companies are finding ways to expand into the health care space, with products such as wearable medical devices and the use of 3-D printing to manufacture health care products. With all the challenges and opportunities that exist, it is worth taking a closer look into the health care sector.

## Size of the Health Care Sector

The economic size of the sector can be measured in various ways. Depending on the measure, the sector could be as small as one-tenth of the economy or as large as one-quarter of the economy.

The first stage in measuring the size is determining which industries should be included in the sector. A narrow definition focuses on health care service-providing firms, such as doctors' offices, hospitals and nursing homes.<sup>1</sup> Nationally, about 12 percent of the workforce is employed in these industries.

However, there are other industries often included in the definition, such as drug manufacturers, pharmacies and insurance companies.<sup>2</sup> Including these increases the share of employment to about 14 percent. Table 1 highlights the largest firms in each of these industries. Due to data availability, this article will primarily rely on the narrower definition of the sector to provide consistency across various metrics.

Providing health care services is generally more labor-intensive than other sectors of the economy, such as manufacturing. As a result, the share of national output (or value added) derived from the health care sector is about 7 percent, which is considerably smaller than the share of employment. However, household consumption of health goods and services is notably higher, at around 22 percent of all household spending, of which 16 percent is health care services and

## KEY TAKEAWAYS

- While the output share is relatively small, health care comprises about 22 percent of household spending, up from 10 percent in the 1970s.
- The health care sector has generated about 30 percent of new jobs nationally since 2007, and 50 percent of new jobs in the Eighth District.
- Not all jobs in health care are high-pay. One-third of workers are in health care support occupations that pay below the average private sector wage.

the rest going to goods such as drugs or medical devices.

With relatively fast growth in health care prices during the past few decades, the share of households' expenditures on health care has increased from 10 percent in the early 1970s. The share of spending on pharmaceutical products has more than doubled, from 1.1 percent in 1970 to 3.8 percent in 2016, but remains a relatively small component of overall household spending. While an aging population will demand more health care services, technological improvements and better overall health outcomes could offset some increased spending.

## Strong Growth in Employment

Growth in the health care sector has been a key driver of employment growth in the past decade. Since 2007, the U.S. economy has added about 9.7 million jobs. During this same period, the health care sector added just over 3 million jobs, which breaks down to about 1 million during the recession and another 2 million after the recession. (See Figure 1.)

In total, gains in the health care sector over this period account for about 32 percent of new employment, which is impressive considering the sector employed only 9 percent of the workforce in 2007. Among the three major industries in health care (according to our narrow definition, as

seen in Endnote 1), the ambulatory care service industry (e.g., doctor offices, dentist offices, outpatient centers) added over 2 million of the new jobs.

Job growth in the health care sector has created a wide variety of jobs beyond the typical occupations of doctors or nurses. In fact, only about 60 percent of people employed in the health care sector work in health care occupations. The other 40 percent are in areas such as office or administrative work, personal care, food preparation, and community and social services.

## Jobs Openings to Remain High

Building off the distinction between the health care *sector* and health care *occupations* can provide some useful insights about the sector and the outlook.

The two major health care occupational groups are: (1) health care practitioners and technical occupations, and (2) health care support occupations. The former group predominantly includes physicians, specialists, pharmacists and registered nurses. Of the 8 million people in this group, the biggest subset is registered nurses, at over 2.8 million. Health care support occupations are predominantly nursing assistants, home health aides and medical assistants.

Table 2 summarizes the employment and wage profiles of these two subsets of



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workers. Notice that 8.8 percent of the U.S. workforce is employed in health care occupations, of which two-thirds are practitioners and the rest are in support occupations. Health care practitioners earn an average wage of \$38 an hour, which is about 60 percent higher than the average private sector wage. On the other hand, support occupations earn an average of \$15 an hour, or 40 percent below the average private sector wage.

For the latest 10 years for which data are available (2006-2016), employment in both occupation groups was strong, with employment of practitioners growing 21 percent and employment in support occupations growing 15 percent. Wage growth over the period was more modest, with practitioners' wages growing slightly faster than the national rate, and support occupations experiencing slightly slower growth.

The U.S. Bureau of Labor Statistics lists three health care support occupations among the top five fastest-growing occupations over the next 10 years: home health aides, personal care aides and physician assistants.<sup>3</sup> Projected employment growth in these occupations is between 37 and 47 percent. "Nurse practitioners" is the only practitioner group in the top 10, with a projected growth rate of 36 percent.

While the projected growth rate of registered nurses is slower, the base number is so large that this occupation is projected to have the third most new jobs over the next decade (437,000). Again, personal care aides and home health aides are also in the top five, with 754,000 and 425,000 new jobs, respectively.

What begins to appear, based on past trends and BLS projections, is a gradual shift in the health care sector toward more low-pay support positions.

### The Sector in the Eighth District

Like in most parts of the nation, health care plays an integral role in the economy of the Eighth District, which is the area covered by the St. Louis Fed. Louisville, Ky., is home to two of the nation's largest health care firms: Humana Inc. and Kindred Healthcare. St. Louis is home to two of the District's other national health care firms: Express Scripts Holding Co. and Centene Corp.

Although the District is the headquarters for many large firms, the overall share of employment in the health care sector is only

Table 1

### Largest Health Care Firms by Industry

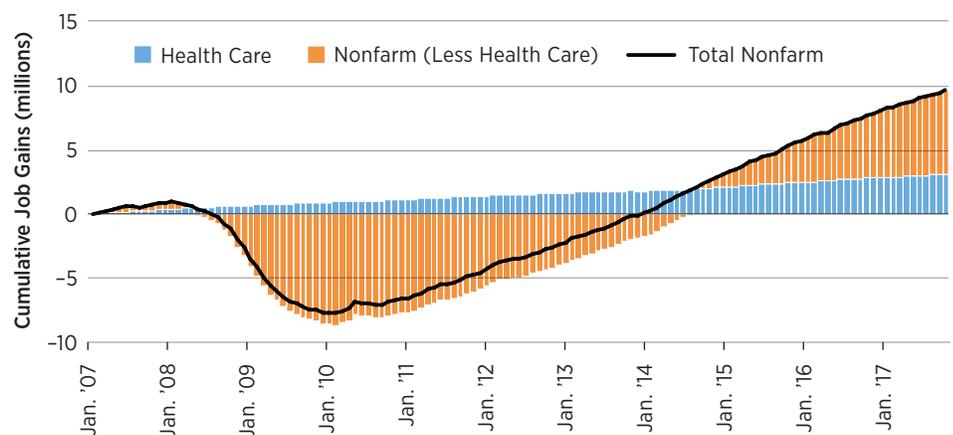
NAICS Code	Industry Name	National	Eighth District
3254	Pharmaceutical and Medicine Manufacturing	Johnson & Johnson	Reliv International Inc.
44611	Drug Stores and Pharmacies	CVS Health Corp.	Express Scripts Holding Co.
52411	Life and Health Insurance Carriers	UnitedHealth Group Inc.	Centene Corp.
621	Ambulatory Health Care Services	Humana Inc.	Humana Inc.
622	Hospitals	HCA Healthcare Inc.	BJC HealthCare
623	Nursing and Residential Care Facilities	Kindred Healthcare Inc.	Kindred Healthcare Inc.

SOURCES: Compustat, Dow Jones.

NOTES: The Eighth Federal Reserve District is headquartered in St. Louis. The District includes all of Arkansas and parts of Illinois, Indiana, Kentucky, Mississippi, Missouri and Tennessee.

Figure 1

### U.S. Health Care Shows Steady Job Growth since 2007



SOURCES: Bureau of Labor Statistics, Haver Analytics and author's calculations.

NOTES: The line represents cumulative gains or losses for all nonfarm payrolls, while each bar shows cumulative monthly employment gains or losses for the health care sector and nonfarm payroll less health care since January 2007. For example, the U.S. economy added 9.7 million nonfarm jobs from January 2007 to November 2017, of which 3.1 million were in health care and the rest were outside health care.

about 0.5 percentage points higher than the national rate. The sector's output share, however, is 7.9 percent in the District, compared with 6.6 percent nationally. Among the four largest metro areas in the District, St. Louis has the greatest share of output derived from health care, at 8.2 percent.

The District's growth in the health care sector over the last decade has broadly followed the national trends. The District health care sector steadily added jobs throughout the recession. (See Figure 2.)

Overall, the District health care sector grew only slightly slower than the national

Table 2

**Health Care Jobs and Pay: 2016**

	U.S.	Eighth District	Little Rock	Louisville	Memphis	St. Louis
<b>Share of Workforce in Health Care Occupations</b>	<b>8.8%</b>	<b>9.6%</b>	<b>11.3%</b>	<b>9.2%</b>	<b>9.2%</b>	<b>9.5%</b>
Health Care Practitioners and Technical Occupations	5.9%	6.8%	8.2%	6.7%	6.8%	6.6%
Health Care Support Occupations	2.9%	2.8%	3.1%	2.5%	2.4%	3.0%
<b>Average Hourly Wage for all Private Sector Workers</b>	<b>\$23.86</b>	<b>\$21.24</b>	<b>\$20.70</b>	<b>\$21.28</b>	<b>\$20.64</b>	<b>\$23.19</b>
<b>Average Hourly Wage for all Health Care Occupations</b>	<b>30.40</b>	<b>27.98</b>	<b>27.49</b>	<b>29.40</b>	<b>29.91</b>	<b>27.40</b>
Health Care Practitioners and Technical Occupations	38.06	33.87	32.71	34.82	35.66	33.60
Health Care Support Occupations	14.65	13.64	13.40	14.86	13.59	13.68

SOURCE: Occupational Employment Statistics, Bureau of Labor Statistics.

benchmark; however, job growth outside the health care sector has been about half the national rate. As a result, the District economy added about 500,000 jobs almost equally split between the health care sector and other sectors. The health care sector employs about 10 percent of the regional workforce and generated almost 50 percent of the new jobs in the last 10 years.

Employment of health care practitioners grew 17 percent in the District, slightly slower than the national rate of 21 percent. However, employment in support occupations in the District grew only 5.5 percent, notably slower than the national rate of 15 percent. The wage premium for practitioners in the District is broadly consistent with the national average of 60 percent more than what private sector workers in general earn; however, practitioners in Memphis have the highest hourly rate among the District's major MSAs, and earn 73 percent more than other private sector workers in the Memphis metro area. In St. Louis, practitioners earn a wage premium of 45 percent.<sup>4</sup>

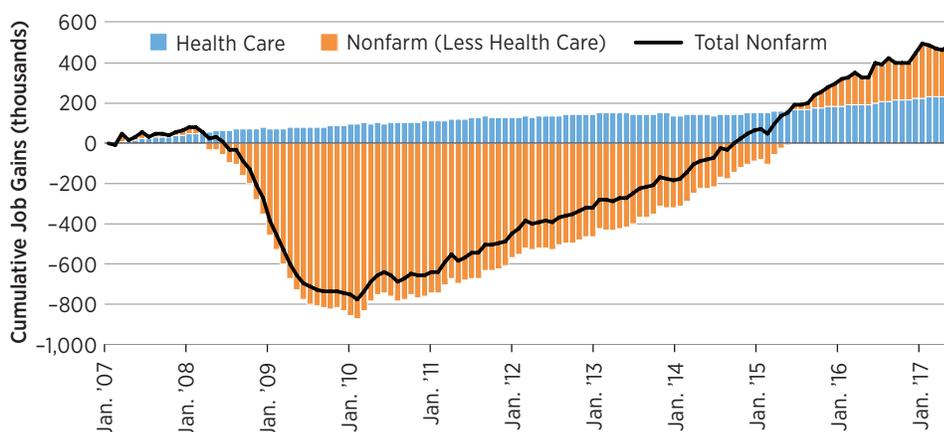
**Outlook**

These trends present a unique set of challenges and opportunities. The key reason that health care has dominated regional employment growth over the last decade is *not* because job growth in the sector has been considerably faster than the nation; rather, it is because growth outside the sector has been much weaker.

Overall demographic trends continue to indicate that the health care sector will continue to show strong growth, and the sector is less sensitive to business cycle fluctuations. These are positives for the region.

However, growth in health care does

Figure 2

**Health Care Accounts for Half of Job Growth in the Eighth District since 2007**

SOURCES: Bureau of Labor Statistics, Haver Analytics and author's calculations.

NOTES: The line represents cumulative gains or losses for all nonfarm payrolls, while each bar shows cumulative monthly employment gains or losses for the health care sector and nonfarm payroll less health care since January 2007. For example, the Eighth District added about 500,000 nonfarm jobs from January 2007 to June 2017, of which 229,000 were in health care and the rest were outside health care.

not guarantee broad-based prosperity. Beyond the high pay of health care practitioners, the health care jobs in highest demand pay lower-than-average wages. More importantly, 40 percent of jobs in the health care sector are not jobs like doctors, nurses or health aides, but jobs in management, technology and other professional occupations. As a result, continued growth in the health care sector will require a pool of workers with diverse skill sets and backgrounds that may come from other industries. **RE**

*Research assistance was provided by Heting Zhu, a senior research associate at the Federal Reserve Bank of St. Louis.*

**ENDNOTES**

- <sup>1</sup> The specific industries are: Ambulatory Health Care Services (NAICS 621); Hospitals (NAICS 622); and Nursing and Residential Care Facilities (NAICS 623). NAICS is the North American Industry Classification System.
- <sup>2</sup> Pharmaceutical and Medicine Manufacturing (NAICS 3254); Drug Stores and Pharmacies (NAICS 44611); and Direct Life and Health Insurance Carriers (NAICS 52411).
- <sup>3</sup> See [www.bls.gov/emp](http://www.bls.gov/emp).
- <sup>4</sup> Much of the differences in these wage premiums can be attributed to differences in the types of practitioners on a more detailed level. For example, Memphis has a larger share of general internists compared to St. Louis, and these workers earn a very high wage premium of 550 percent in both areas.

# Income and Living Standards within the Eighth District

By Brian Reinbold and Yi Wen



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.

## KEY TAKEAWAYS

- The paycheck itself doesn't provide a complete picture of one's lifestyle since cost of living can vary geographically.
- Regional price parity indexes can measure differences in the cost of living across regions.
- The District's cost of living is about 15 percent below the national average, though this level varies among its counties.

Income inequality has long been an important issue in welfare economics. However, solely looking at income tells only part of the story about the differences in people's living standards because income does not reveal information about the cost of living, i.e., the actual purchasing power of a person's income.

For example, housing prices vary immensely across the country as well as across urban, suburban and rural areas. Since housing typically consumes a large share of an individual's income, a high income does not necessarily translate to a high standard of living if housing is very expensive.

In other words, the purchasing power of a dollar is not the same across regions due to variations in the cost of living. Therefore, factoring in cost of living can yield fruitful insights about true inequality. In this article, we look at income adjusted for cost of living in the Eighth District<sup>1</sup> to evaluate income inequality, or more accurately, living-standard inequality.

### Real Per Capita Income in the District

Many are familiar with the consumer price index (CPI) and the personal consumption expenditures price index (PCEPI). These temporal indexes are useful for gauging the nationwide consumption price level and its changes over time, but they do not tell us much about the cost

of living among different regions.

For example, without taking into account the heterogeneity of the cost of living, we find that the average 2015 PCEPI-adjusted per capita personal income by county for the District is about \$31,000, which is well below the U.S. average of \$43,996; the gap is about \$13,000, or 30 percent.<sup>2</sup> However, as the analysis below shows, the living standard in the District is much closer to the national average than suggested by per capita income per se.

### Regional Price Parity Indexes and Cost of Living in the District

Recently, the Bureau of Economic Analysis (BEA) developed regional price parity indexes (RPPs) to facilitate the measurement of living standards across regions. The RPP is a spatial index that allows us to compare prices of consumption goods and housing across regions. The BEA has RPPs by state, metropolitan statistical area (MSA) and nonmetropolitan area. RPPs are constructed to compare prices relative to the national average. Therefore, the RPP for the nation is 100.

The 2015 RPP for every MSA and nonmetropolitan area in the District is less than 100, so cost of living is lower in the District relative to the nation. The average RPP is 86.6 and the median RPP is 85.6,

suggesting that the cost of living in the District is about 15 percent below the national average.

But the cost of living is not even across the region. For example, the MSA with the lowest RPP is Jonesboro, Ark., at 81.9, and Columbia, Mo., has the highest RPP at 92.2. Also, nonmetropolitan, or more rural, areas tend to have lower RPPs and thus a lower cost of living.

### Living Standard or Income-Adjusted for Cost of Living

Now we take county-level real per capita income and adjust it for cost of living. However, the BEA does not provide RPPs by county, so we adjust counties that belong to an MSA by their MSA's RPP, and we adjust counties outside an MSA by their states' respective nonmetropolitan RPPs. Table 1 reports income adjusted for cost of living in the District for the top five and bottom five counties.

As expected, standard of living is not the same across the District. The average 2015 RPP-adjusted real per capita personal income by county is \$36,482, compared with the national average of \$43,996.<sup>3</sup> Now the gap between the District and the national average shrunk dramatically from about \$13,000 in PCEPI-adjusted terms to about \$7,500. Namely, due to the District's low cost of living, we see the gap narrow between the District's "income" and the nation's. This result is similar to what St. Louis Fed President James Bullard has demonstrated about the importance of adjusting income for cost of living across MSAs in the U.S.<sup>4,5</sup>

#### ABOUT THE AUTHORS

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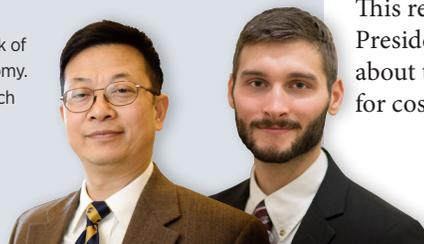


Table 1

**Adjusted Real Per Capita Income by County: Top Five and Bottom Five**

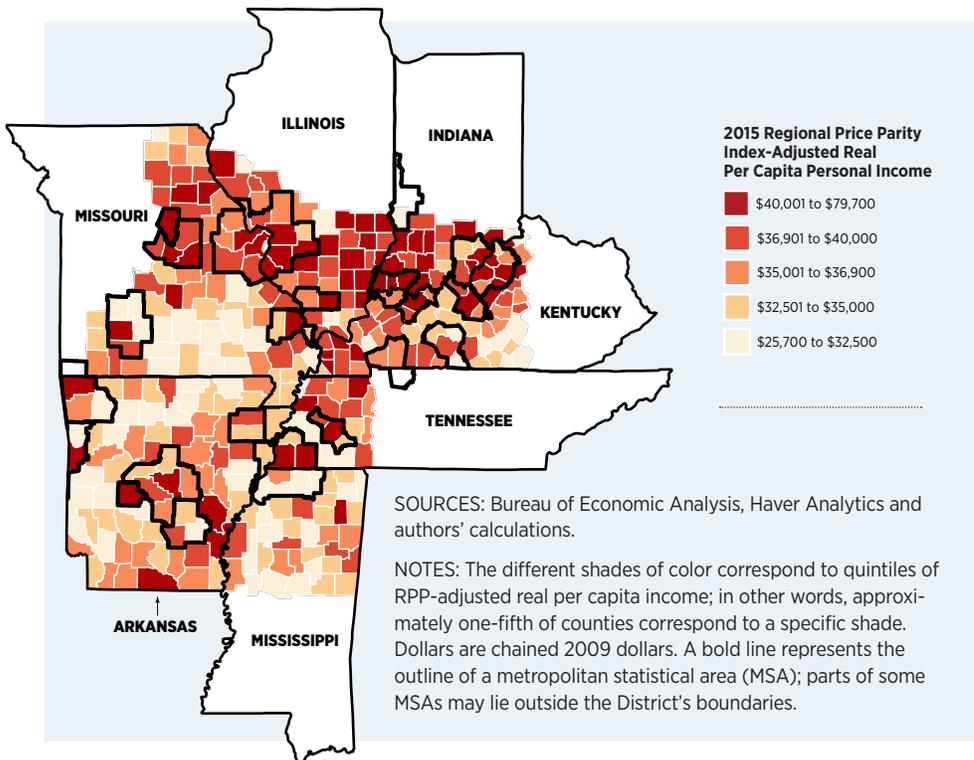
Rank	County	State	MSA Name	Regional Price Parity Index, 2015	RPP-Adjusted Per Capita Personal Income*
1	Benton	Arkansas	Fayetteville-Springdale-Rogers, AR-MO	89.8	\$79,678
2	St. Louis	Missouri	St. Louis, MO-IL	90.6	\$62,314
3	Oldham	Kentucky	Louisville, KY-IN	91.2	\$55,023
4	Dubois	Indiana	Nonmetropolitan Portion	85.3	\$53,895
5	Monroe	Illinois	St. Louis, MO-IL	90.6	\$52,090
334	Benton	Mississippi	Memphis, TN-MS-AR	91.5	\$27,641
335	Lincoln	Arkansas	Pine Bluff, AR	83.5	\$26,483
336	Shannon	Missouri	Nonmetropolitan Portion	84.4	\$26,089
337	Lake	Tennessee	Nonmetropolitan Portion	84.4	\$26,068
338	Douglas	Missouri	Nonmetropolitan Portion	84.4	\$25,771

\*Chained 2009 dollars

SOURCES: Bureau of Economic Analysis, Haver Analytics and authors' calculations.

Figure 1

**Adjusted Real Per Capita Income: Eighth District Counties**



However, inequality remains: The “richest” county commands a living standard more than 300 percent of that in the “poorest” county. For example, the living standard in St. Louis County, Missouri, is \$62,314, and the living standard in Benton County, Arkansas, is \$79,678. Still, despite these outliers, the living standard is

relatively consistent across most counties in the District.

Figure 1 displays 2015 RPP-adjusted real income per capita on a map of the District so that we can better visualize the distribution of the standard of living geographically. The darker a county is, the higher its standard of living is. For

example, southern Indiana has a relatively high standard of living, with median RPP-adjusted real income at around \$41,000, while northern Mississippi has a relatively low standard of living at \$33,000.

We also see that counties within MSAs tend to have higher adjusted incomes despite the fact that nonmetropolitan areas tend to have a lower cost of living. This suggests that income levels tend to rise more than proportionately with the cost of living, so that high-income regions tend to also have a high standard of living despite the higher cost of living.<sup>6</sup>

**For Further Research**

Our analysis allows us to see heterogeneity in living standards—the purchasing power of incomes—across the District and its relative position in the nation, but we would have greater insight into cost of living if we had RPPs by county. Also, within each county, both income and cost of living can vary substantially. For example, income and cost of living vary significantly between urban and rural areas. Therefore, finer micro-data would allow for a greater understanding of income inequality within a county.

**Conclusion**

In this article, we have looked at the distribution of living standards in terms of the purchasing power of real per capita personal income by county using RPPs. Adjusting income for cost of living allows us to evaluate inequality in income’s local purchasing power instead of income per se. We see that overall inequality is not so severe in the District once adjusted for the cost of living, both across counties and in comparison to the nation. We also see that living standards tend to be higher within MSAs than outside them. In general, inequality is less severe when measured by living standards than by income per se. Still, finer micro-data is necessary to better understand heterogeneity within each county. **RE**

**ENDNOTES**

- Headquartered in St. Louis, the Eighth Federal Reserve District includes all of Arkansas and parts of Illinois, Indiana, Kentucky, Mississippi, Missouri and Tennessee.
- See Coughlin, Gascon and Kliessen.
- The RPP national real per capita personal income is

the same as the non-RPP-adjusted national real per capita personal income because RPPs are constructed to be 100 for the nation.

<sup>4</sup> See Bullard, 2017, and Bullard, 2018.

<sup>5</sup> Bullard also shows that MSAs with low incomes may in fact have higher living standards than MSAs with higher incomes when adjusting for RPP.

<sup>6</sup> The average 2015 RPP-adjusted real per capita personal income for District counties within MSAs is \$38,734.92, while the average for District counties outside of MSAs is \$35,688.72.

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## Oil and Equities

(continued from Page 15)

variables are perfectly positively correlated, a correlation of -1.0 means the two variables are perfectly negatively correlated, and a correlation coefficient of 0.0 means no correlation.

<sup>3</sup> See Datta et al.

<sup>4</sup> For the equity indexes, we used the Paris CAC 40 for France, London Financial Times All-Share for the U.K., the Stockholm Affarsvarlden for Sweden, and the Nikkei 255 for Japan.

<sup>5</sup> For nominal interest rates, we used the Bank Rate set by the Bank of England for the U.K., the overnight deposit rate set by the European Central Bank for France, the repo rate set by the Sveriges Riksbank for Sweden and the overnight deposit rate on excess reserves set by the Bank of Japan for Japan.

<sup>6</sup> We use the West Texas Intermediate-Cushing, Okla., for the crude oil index, and we use each country's respective equity index. We then calculate the daily price change in oil and the equity return using 100 times the log-difference of consecutive prices. Finally we calculate the one-year rolling correlation between the daily change in oil prices and the daily equity return.

<sup>7</sup> One might wonder whether quantitative easing (QE) might have had something to do with this phenomenon. However, we do not believe that this is the

case. The periods for QE1, QE2 and QE3 were fairly close together—constantly increasing the Fed's balance sheet—and there is no systematic behavior for the correlation between the price of oil and the price of equity that can be observed for those periods. QE1 occurred from December 2008 to March 2010, QE2 occurred from November 2010 to June 2011, and QE3 occurred from September 2012 to October 2014. See Williamson.

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## Labor Share

(continued from Page 11)

This adjustment does not separate capital income from agriculture, which can inflate the estimate. However, in developing economies, agriculture is less capital-intensive than in developed economies, so this distortion may be insignificant. Also, self-employed labor income outside of agriculture is not counted, which lowers the estimate. All things considered, this adjustment is a reasonable approximation of the labor share for developing economies.

This adjustment is also reasonable in poorer nations because agriculture employs about half of the self-employed and uses little capital.<sup>10</sup> This measure, therefore, gives a rough idea of the labor share in poorer countries, and this is the measure reported in Figure 1 and Figure 2 for Peru, Hong Kong, South Korea, Singapore and Taiwan. Adjustment 4 is nearly identical to the baseline measure for Singapore, Hong Kong and Taiwan. Adjustment 4 also seems reasonable for Argentina, Chile and Mexico.

However, it might not be very accurate for countries that are already in their second stage of their structural

transformation. The number of workers in the agricultural sector declines as a country develops. Therefore, Adjustment 4 may simply capture a falling share in agriculture and not necessarily the entire labor share. This may be why we see a significant decline in labor share for Peru and South Korea.

In summary, estimates of the labor share can vary depending on data availability and what assumptions are made for measuring the share of labor income of the self-employed. This can make a huge difference for developing countries with a large number of self-employed individuals. Since Peru, Hong Kong, Singapore, South Korea and Taiwan do not report mixed income, drawing conclusions on the behavior of labor share in these economies is challenging. Ultimately, knowing the behavior of labor share can help economists better understand a country's economic growth. **RE**

## ENDNOTES

<sup>1</sup> See Atkinson.

<sup>2</sup> See Barrow and Faberman.

<sup>3</sup> See International Labor Organization and the Organization for Economic Cooperation and Development.

<sup>4</sup> If labor share is declining, then capital share is increasing. This result follows from the accounting identity that national income is the sum of its factor components: labor and capital.

<sup>5</sup> See Ohanian, Restrepo-Echavarría and Wright.

<sup>6</sup> Although Japan is a developed economy, we can compare the other developing countries with a developed country.

<sup>7</sup> See Feenstra, Inklaar and Timmer.

<sup>8</sup> See Gollin.

<sup>9</sup> See Feenstra, Inklaar and Timmer.

<sup>10</sup> See Timmer.

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# U.S. Economy Continues to Strengthen

By Kevin L. Kliesen

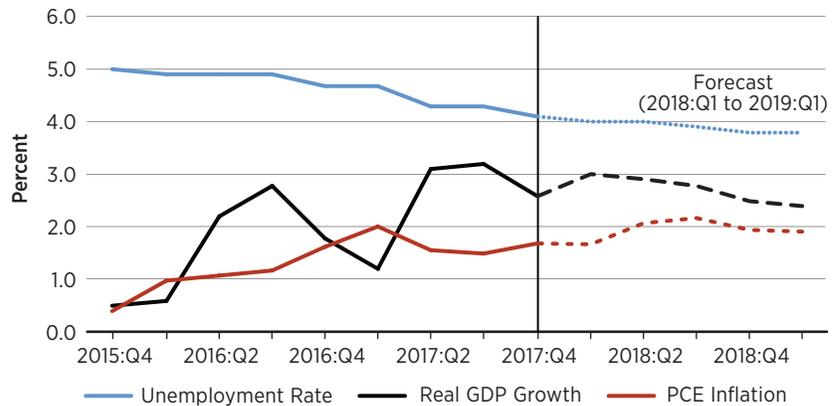
From an economic standpoint, 2017 was a good year. Compared with 2016, the U.S. economy registered stronger real gross domestic product (GDP) growth, continued low inflation, a further drop in the unemployment rate and record-high equity prices. Indeed, last year's economic performance exceeded the expectations of most professional forecasters. This performance was all the more impressive since it occurred against the backdrop of a modest tightening in monetary policy—and, moreover, the prospect of further modest tightening actions in 2018.

Most forecasters are anticipating a continued strengthening in economic activity in 2018 because of this year's modest reductions in personal and corporate income tax rates and increases in federal defense and nondefense government expenditures. A key question is whether inflation will also heat up.

## Building Economic Momentum

Compared with 2016, real GDP growth accelerated from 1.8 percent to 2.5 percent in 2017.<sup>1</sup> Last year's acceleration in output growth reflected, to a large extent, much stronger growth in real business fixed investment and exports of goods and services. The acceleration in business capital spending was especially heartening, since it generally signals increased confidence in the economic outlook by businesses. Increased capital spending and exports naturally boosted the nation's industrial sector. Following a 0.1 percent decline in 2016, industrial production rose by 3.5 percent in 2017; this was the largest increase in seven years. The demand for goods reflected solid real consumption spending in 2017 (2.8 percent); however, real residential fixed investment advanced at a more modest pace (2.6 percent), while total government expenditures accelerated slightly in 2017 (0.7 percent).

## What Are Forecasters Predicting for the Economy?



SOURCE: Survey of Professional Forecasters, February 2018.

NOTE: For real gross domestic product (GDP), the percent represents percent change at annual rate; for personal consumption expenditures (PCE) inflation, it represents percent change, year over year. The SPF report was released prior to the second estimate for real GDP growth on Feb. 28.

## KEY TAKEAWAYS

- U.S. GDP growth accelerated to 2.5 percent last year from 1.8 percent in 2016, exceeding forecasters' expectations.
- Modest reductions in income tax rates and increases in federal government spending are expected to help strengthen the economy in 2018.
- Long-term inflation expectations have moved steadily higher so far this year.

In late December 2017, the Tax Cuts and Jobs Act was signed into law. Two key provisions of the act were the reduction of marginal tax rates for most individuals and the lowering of the statutory U.S. corporate tax rate from 35 percent to 21 percent. According to the Joint Committee on Taxation of the U.S. Congress, the act is expected to lower U.S. tax revenues by about \$1 trillion over the next 10 years, or about \$100 billion a year. While sizable in dollar terms, the revenue loss is quite modest in terms of GDP—0.6 percent.

The tax reform package has spurred many forecasters to raise their medium-term outlook for the U.S. economy. For example, the February 2018 Survey of Professional Forecasters (SPF) projects

that real GDP will increase by 2.8 percent in 2018; this increase is moderately larger than the forecast from six months earlier (2.4 percent). The SPF projects that real GDP growth will then slow to 2.5 percent in 2019 and then to 2 percent in 2020. The pace of economic activity could get a further boost over the next two years because of the Bipartisan Budget Act that was signed into law in February. The budget act, among other things, increases federal defense and nondefense discretionary expenditures by nearly \$300 billion in fiscal years 2018 and 2019, and an additional \$90 billion in supplementary spending for natural disaster relief.

Although the unemployment rate is already quite low at 4.1 percent, the SPF projects that, with stronger growth, the

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unemployment rate will decline to an average of 3.8 percent in the fourth quarter of 2018 and remain at a 3.8 percent average in 2019, but then drift back up to an average of 3.9 percent in 2020.

### Inflation Developments

In January 2012, the Federal Open Market Committee (FOMC) established a 2 percent inflation target for the personal consumption expenditures price index (PCEPI). Since then, inflation has regularly been below the FOMC's target. In 2017, the PCEPI increased by 1.7 percent, which followed gains of 1.6 percent in 2016 and 0.4 percent in 2015. But with the pace of economic activity heating up and the unemployment rate expected to fall slightly further in 2018, the SPF projects that inflation will firm to 1.9 percent in 2018 and to 2 percent in 2020.

It is important to remember, though, that the relationship between the unemployment rate and inflation—known as the Phillips curve—is extremely weak or nonexistent. As a result, it is generally thought to be highly unreliable as a predictor of inflation.<sup>2</sup> Market-based measures of inflation expectations seem to do a better job of predicting inflation. In this regard, inflation expectations embedded in Treasury securities have moved steadily higher in 2018. Expected inflation over the next five years and over the next 10 years has averaged 1.95 percent and 2.07 percent, respectively, since the start of 2018. However, both year-to-date averages are up only 20 basis points since their averages in the fourth quarter of 2017. **RE**

*Research assistance was provided by Brian Levine, a research associate at the Federal Reserve Bank of St. Louis.*

*(This article was first published online March 2.)*

### ENDNOTES

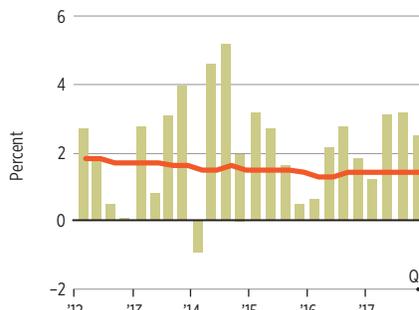
<sup>1</sup> Unless noted otherwise, annual percentage increases in output and prices are changes from the fourth quarter of one year to the fourth quarter of the following year.

<sup>2</sup> See this recent presentation by St. Louis Fed President James Bullard at [www.stlouisfed.org/-/media/Files/PDFs/Bullard/remarks/2018/Bullard\\_KU\\_Outlook\\_Conference\\_Lexington\\_KY\\_6\\_February\\_2018.pdf?la=en](http://www.stlouisfed.org/-/media/Files/PDFs/Bullard/remarks/2018/Bullard_KU_Outlook_Conference_Lexington_KY_6_February_2018.pdf?la=en).

## ECONOMY AT A GLANCE

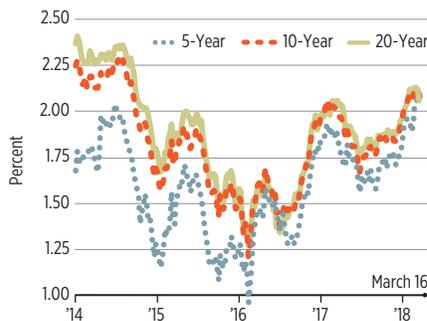
All data as of March 19

### Real GDP Growth



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

### Inflation-Indexed Treasury Yield Spreads

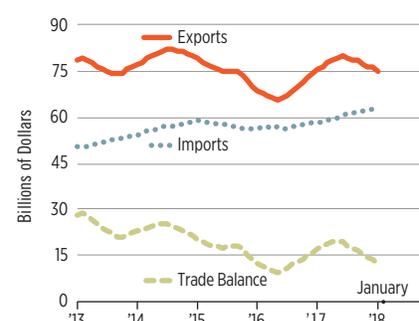


NOTE: Weekly data.

### Civilian Unemployment Rate

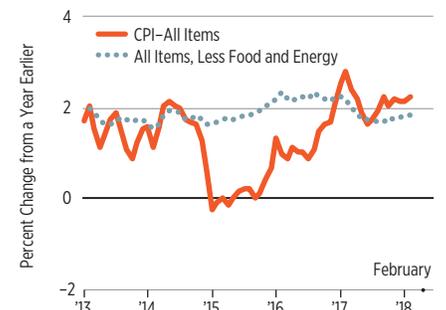


### U.S. Agricultural Trade



NOTE: Data are aggregated over the past 12 months.

### Consumer Price Index (CPI)



### Rates on Federal Funds Futures on Selected Dates

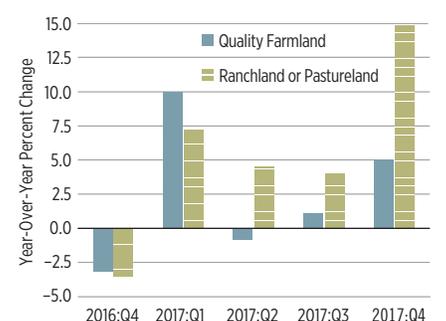


### Interest Rates



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.

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



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**N E X T I S S U E**

## Hispanic Human Capital

In 1950, Hispanics accounted for 1.6 percent of the U.S. labor force. By 2016, they represented 13.4 percent of the country's workers. As the Hispanic workforce rapidly grows, its composition also changes, with increasing diversity in education levels and occupations. Alexander Monge-Naranjo, a St. Louis Fed economist, examines the impact of this demographic change on the country's human capital in the Second Quarter issue of the Regional Economist.



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## Welcome to the New Regional Economist

We hope you like the changes we've made in the print and online versions of the Regional Economist, starting with this issue. Among other things, we've included key takeaways to highlight the author's main points. We also have a bit more info on the authors, as well as their photos. In addition, we are posting articles online at [www.stlouisfed.org/re](http://www.stlouisfed.org/re) as soon as they are complete—about one every 10 days. This allows you to read the RE's fresh insights and analysis in a timely manner. (To receive an email when a new article is posted, sign up at [www.stlouisfed.org/subscribe/regional-economist](http://www.stlouisfed.org/subscribe/regional-economist).)

When all of the articles for an issue are done, we will continue to compile them into a quarterly magazine and mail to those who have a print subscription.

If you want to tell us something about the changes, please email our new managing editor at [Gregory.Cancelada@stls.frb.org](mailto:Gregory.Cancelada@stls.frb.org).

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