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# INFLATION

## WHY IT IS VERY LOW, AND WHY IT MATTERS

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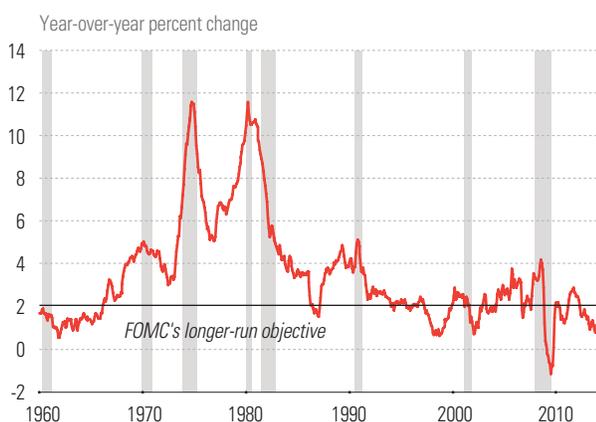
For the past 50 years or so, US policymakers frequently worried about—and fought against—inflation rates running at higher-than-desired levels. But since the financial crisis, they have had to deal with the opposite problem—inflation that is too low.

Inflation fell below 1 percent in 2013, according to the personal consumption expenditures (PCE) price index. At just under half the 2 percent longer-run objective of the Federal Open Market Committee (FOMC), a very low inflation rate is not good news. Often, low inflation is a symptom of an economy that is not firing on all cylinders. And when inflation is very low, deflation is only one adverse shock away.

In this essay, we dissect the recent decline in inflation and lay out its implications for the future, drawing on extensive research done here at the Federal Reserve Bank of Cleveland on inflation measurement and forecasting.

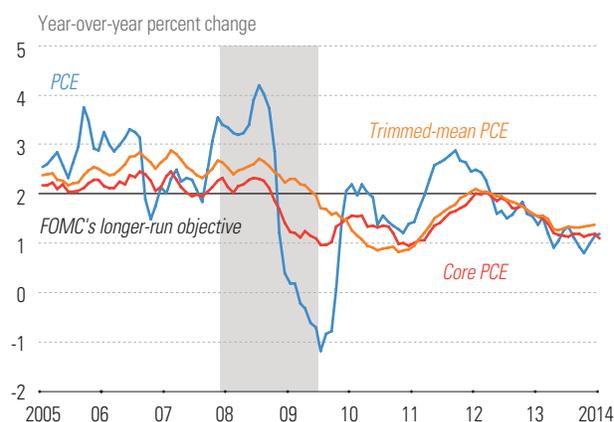
We are reasonably confident that inflation will rise gradually over the next few years toward the FOMC's longer-run objective of 2 percent. However, though the US economy has begun to regain its footing, the inflation forecast could change if unexpected events occur. Our recent experience with very low inflation has highlighted the need to guard against inflation rates that are too low as vigilantly as we guard against inflation rates that are too high.

Figure 1. PCE inflation fell below 1 percent in 2013



Note: Grey shading indicates a recession.  
Sources: Bureau of Economic Analysis; National Bureau of Economic Research (NBER).

Figure 2. Inflation's falloff is evident in most PCE measures



Note: Grey shading indicates a recession.  
Sources: Bureau of Economic Analysis; Federal Reserve Bank of Dallas; NBER.

## Very low inflation: A recent phenomenon

### Inflation then

Our last big battle with inflation began in the 1960s (figure 1). Prices began to rise steadily in the United States during that decade, and high inflation rates became a hallmark of the 1970s. During the 1970s and early 1980s, inflation twice shot above 10 percent—higher than it had been since the 1940s.

Then—Federal Reserve Chairman Paul Volcker has been credited with bringing inflation back down in the early 1980s by aggressively tightening monetary policy. Even with this shift in policy, however, sustained low inflation rates did not become the norm until the mid-1990s. Between 1995 and 2008, the FOMC succeeded in keeping inflation generally low; PCE inflation averaged just above 2 percent over this time.

This is not to say that inflation was completely conquered. Even as recently as 2008, FOMC members were concerned about the possibility of re-living the inflation patterns of the 1960s and 1970s. Memories of high inflation have a long life.

High inflation rates are problematic for an economy because they create distortions that hamper economic performance. For example, firms must constantly raise prices to keep up, and consumers waste their time shopping for bargains and protecting their financial assets from rising prices. Because of these distortions, it is clear why neither the public nor central banks are keen on high inflation.

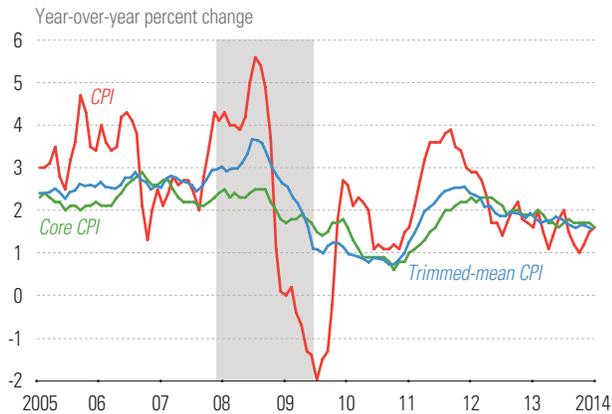
Another problem with high inflation is that it is costly to get inflation rates back down once they're too high. Though Volcker's shift in monetary policy successfully broke the back of high inflation, for example, the cost was a deep recession.

### Inflation now

Since the most recent financial crisis, the story has been different. While inflation typically falls in the immediate aftermath of a recession, it usually rises during the ensuing economic recovery (figure 1). This time around, inflation has remained at very low levels for much of the past five years. Despite a short-lived surge of inflation in 2011, disinflation—when inflation decelerates—occurred again in 2012 and 2013.

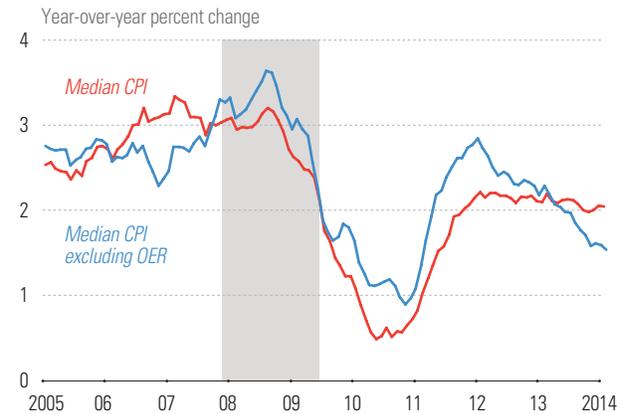
The falloff in inflation is evident in essentially the entire set of consumer price measures that policymakers find helpful in assessing inflation trends. PCE inflation—the FOMC's single preferred measure—fell from 2.5 percent in January 2012 to only 1.1 percent in December 2013. Some of this deceleration in PCE inflation has been driven by energy prices. However, measures of the underlying inflation trend that are less affected by energy prices—like the core PCE or the trimmed-mean PCE—have also slowed significantly. Core PCE inflation, which excludes the short-term volatility that can come from food and energy prices, declined from 2.0 percent to 1.2 percent over the same period. Trimmed-mean PCE inflation, which excludes the most extreme monthly price changes, experienced a similar decline (figure 2).

Figure 3. CPI inflation fell over 2012 and 2013



Note: Grey shading indicates a recession.  
Sources: Bureau of Labor Statistics; Federal Reserve Bank of Cleveland; NBER.

Figure 4. The median CPI has proven sensitive to OER in this recovery



Note: Grey shading indicates a recession.  
Sources: Bureau of Labor Statistics; Federal Reserve Bank of Cleveland; NBER.

Disinflation is also visible in the more familiar inflation measures based on the consumer price index (CPI). CPI inflation typically runs about a half percentage point higher than the PCE inflation rate. In other words, for PCE inflation to be at 2 percent, CPI inflation would typically need to run about 2.5 percent. CPI inflation fell sharply over the course of 2012 and 2013, as did core CPI inflation—which, like the core PCE measure, excludes food and energy prices. The Cleveland Fed’s 16 percent trimmed-mean inflation series declined by a similar amount (figure 3).

One measure of the inflation trend that has remained relatively stable is the Cleveland Fed’s median CPI (figure 4). Year-over-year inflation in the median CPI edged down from 2.2 percent at the start of 2012 to 2.1 percent at the end of 2013.

In general, the median CPI tends to be a useful tool for predicting future inflation trends, so its recent level suggests that CPI inflation should rise closer to 2 percent. But the median CPI may be misleading right now. Much of the stability of median CPI inflation reflects a balance between two divergent trends: first, an acceleration in the biggest component of shelter costs, owners’ equivalent rent (OER), which is very often the component in the middle of the CPI; and second, broad disinflation among other components. Recalculating the median inflation rate without the OER component reveals a sharp slowing of underlying inflation from early 2012 to the end of 2013 that is much more in line with the other measures of inflation.

On the surface, very low inflation sounds like a good thing. If inflation is running at very low levels, then the purchasing power of a dollar is not diminished over time by significant increases in prices. But very low inflation is not always

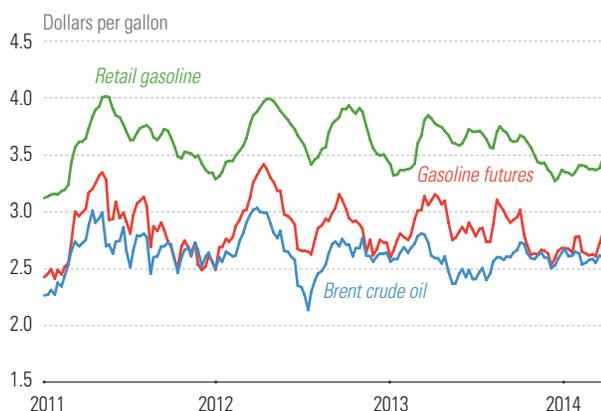
good. For one thing, it can be a sign that the economy is performing under its potential—and in fact, low inflation may actually be a contributing factor in the underperformance. For another, it raises the risk that the economy could fall into deflation. Deflation—where the general price level falls—causes similar problems as inflation in that businesses and consumers waste time and energy trying to work around its consequences. Some analysts view Japan’s long period of near-zero inflation and very low economic growth as a vivid cautionary example of the dangers of extremely low inflation sustained over a long period of time.

## The causes of the disinflation

Whether very low inflation is problematic depends in part on why it is low. Two complementary approaches can be used to determine the source of the falloff. The first might be characterized as a top-down approach: focus on overall inflation and disentangle the causes of the fall. The second might be characterized as a bottom-up approach: focus on more detailed measures of inflation and identify individual factors that pulled down important inflation components.

Our recent research using these approaches points to several key forces at play in the 2013 disinflation. First, the sluggish pace of the US economic recovery broadly helped to limit most price pressures. Second, enough slack remains in labor markets to keep the growth rate of labor costs very low by historical standards. Third, there is little pressure on consumer prices coming from commodities such as energy. Finally, some special, temporary forces—such as a deceleration of medical care inflation associated with changes in laws—have put some short-lived downward pressure on inflation.

Figure 5. Inflation has been held in check by flat commodity prices



Sources: *Financial Times*; Energy Information Agency; *The Wall Street Journal*.

Figure 6. Since early 2012, inflation in core PCE goods prices has fallen by about 2 percentage points



Note: Grey shading indicates a recession.  
Sources: Bureau of Economic Analysis; Bureau of Labor Statistics; NBER.

## The top-down approach

One way to implement the top-down approach is to use a forecasting model that characterizes the relationships among inflation, economic activity, labor costs, import prices, energy prices, and monetary policy. We use one such Cleveland Fed model to assess the contributions of various forces to the decline of core PCE inflation from the second quarter of 2012 through the fourth quarter of 2013.

Approximately three-fourths of the fall in core PCE inflation can be explained by the behavior of the model's inflation determinants. Variables that directly capture economic activity—GDP, employment, and unemployment—play the largest role. On balance, over the 2012 and 2013 period, GDP and employment grew more slowly than expected, while unemployment fell more slowly than expected. These shortfalls put downward pressure on inflation. Overall, real economic activity accounts for about one-half of the fall in inflation. Labor costs, import prices, and energy prices account for another one-fourth or so.

The remaining one-fourth of the decline in inflation since early 2012 cannot be explained by the model's inflation determinants. Instead, this portion of the decline in inflation is the result of unexpected, temporary events that are specific to inflation. Some of these forces are evident from a more bottom-up analysis.

## The bottom-up approach

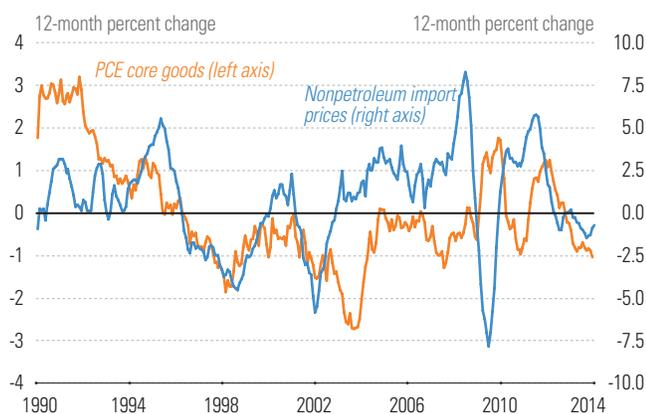
One way to implement the bottom-up approach is to split the price indexes into broad components. We split inflation into several parts—food and energy prices, core goods, and core services—and look at their recent behavior and key drivers.

A key driver of overall inflation is volatile movements in food and energy prices. The results of the decomposition show that for much of 2012 and 2013, inflation has been held in check by flat commodity prices. For example, retail gasoline prices trended down for much of last year (figure 5). This trend helped pull overall inflation below core inflation at times.

Inflation in core PCE goods prices, which exclude food and energy goods, has fallen by about 2 percentage points since early 2012 (figure 6). In an accounting sense, goods comprise approximately one-fourth of the core basket of consumer spending. Thus, the deceleration in goods' prices implies a reduction in core PCE inflation of about one-half of a percentage point, all other things equal.

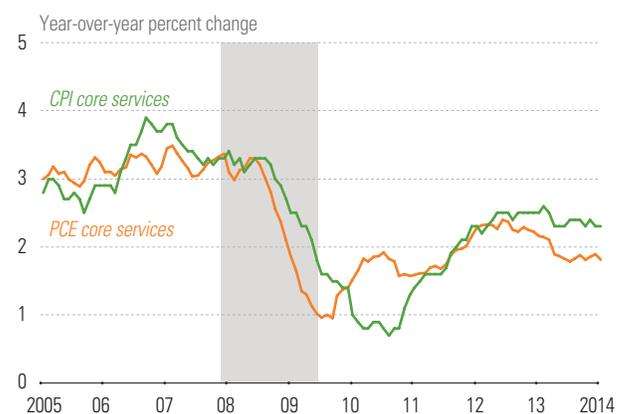
Because a large number of goods are either imported to the United States or have some imported content, there is a significant connection between import prices and goods prices. Over the last few years, the deceleration of core goods prices has been driven in part by an even sharper deceleration in prices of imported goods (figure 7). The falloff in import prices likely reflects slow growth in the global economy and the strength of the dollar.

Figure 7. The deceleration of core goods prices has been driven in part by falling imported goods prices



Sources: Bureau of Economic Analysis; Bureau of Labor Statistics.

Figure 8. Services inflation has slowed since early 2012



Note: Grey shading indicates a recession.

Sources: Bureau of Economic Analysis; Bureau of Labor Statistics; NBER.

Compared with inflation in goods prices, inflation in services prices has been much more stable. However, even core PCE services inflation has slowed since early 2012, from 2.3 percent to 1.9 percent at the end of 2013 (figure 8). Services comprise about three-fourths of the core PCE basket, which means that this more modest reduction in services inflation implies a roughly one-third percentage point reduction in core inflation.

Because the primary cost in the provision of services is labor, the low rate of services inflation is likely attributable to the historically low rate of growth of labor costs that has prevailed since the end of the recession (figure 9). From the mid-1990s through 2007, labor costs as measured by the Employment Cost Index (ECI) increased at an average rate of more than 3 percent. But since 2009, the ECI has been rising only about 2 percent per year.

Using CPI instead of PCE inflation measures paints a mostly similar picture, with a few key differences. Since early 2012, inflation in the CPI for core goods has fallen sharply, in lockstep with the corresponding PCE-based measure (figure 6). However, inflation in the CPI for core services has edged down only slightly since early 2012, while the PCE-based measure slowed more significantly (figure 8).

Cleveland Fed research has attributed the widening gap between PCE and CPI services inflation to several forces. One important source of the gap is shelter costs, which have a larger weight in CPI services and whose inflation rates have been running above those of some other components of services. Putting a relatively large weight on a component with a relatively high rate of inflation—even if the rate of inflation is not high in an absolute sense—causes inflation in

the services component of the CPI to run above inflation in PCE services.

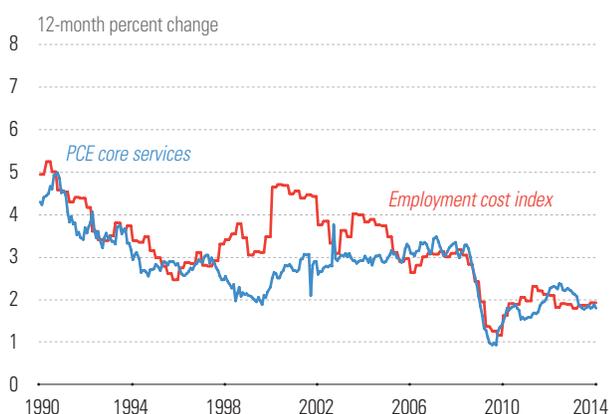
Another important source of the CPI–PCE gap in services inflation is medical care costs and the larger weight they receive in PCE services. Inflation in medical care costs as measured by the PCE index has slowed sharply, partly as a result of downward pressures on Medicare prices associated with the Affordable Care Act. As a result, the deceleration of medical care costs has put more downward pressure on PCE services inflation than on CPI services inflation.

## Monetary policy options for handling very low inflation

The FOMC's longer-run inflation objective of 2 percent seeks a balance between inflation being far enough away from zero to make the threat of deflation low, and inflation being low enough to mitigate many of the economic distortions associated with high inflation. An inflation rate of only 1 percent therefore falls short of meeting the right balance between these tradeoffs, especially in the current policy environment.

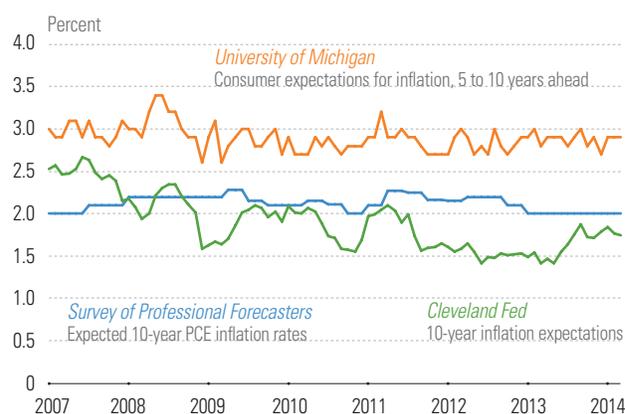
Basic macroeconomics and a large body of research suggest that central banks should ease monetary policy when inflation falls below or is expected to fall below the central bank's inflation objective. But since December 2008, the FOMC's primary monetary policy tool, the federal funds target rate, has been at 0 to 0.25 percent—what is effectively the zero lower bound on nominal interest rates. Thus, there exists a limit on the extent to which monetary policymakers can provide additional accommodation through normal channels.

Figure 9. Since 2009, the ECI has been rising only about 2 percent per year



Sources: Bureau of Economic Analysis; Bureau of Labor Statistics.

Figure 10. Longer-term inflation expectations have been roughly stable for some time



Sources: University of Michigan; Federal Reserve Banks of Cleveland and Philadelphia.

As a result, the FOMC has been using other policy tools to provide additional monetary accommodation. These include large-scale asset purchases (buying large volumes of an expanded set of eligible securities on the open market) and forward guidance on future interest rate policy (providing information about future policy decisions). Countering a hypothetical adverse shock to the economy that slowed the pace of recovery or pushed the economy into recession would require using these other policy tools to an even greater extent than the FOMC has so far.

### Making its way toward 2 percent

In thinking about how policy should respond to very low inflation today, the forecast for inflation's future trajectory plays a crucial role. A forecast of falling or continued stagnant inflation would call for different policy actions than a forecast of rising inflation.

Recent historical behavior is often a good predictor of future inflation. But inflation expectations, economic slack, and a host of other factors influence the inflation process as well and can offer some insights into where inflation is likely to be in the future.

In evaluating these factors, the news has been reasonably encouraging. For starters, take inflation expectations. Over time, inflation expectations help to anchor the inflation process; that is, inflation tends to return to its expected rate.

There are a variety of ways to measure inflation expectations based on surveys of consumers, professional economists, and businesses; implicit measures of inflation derived from financial markets; and combinations of the two. Most of these measures show that longer-term inflation expectations have been roughly stable for some time (figure 10).

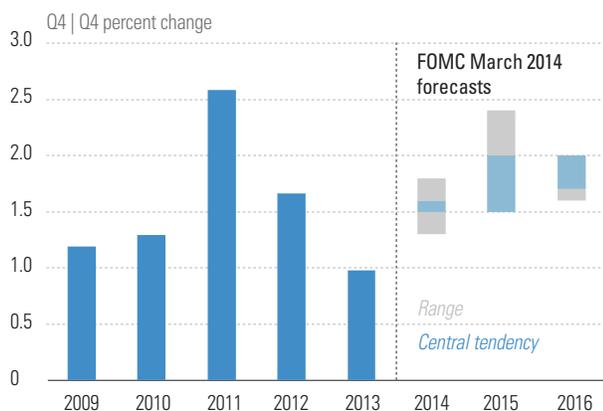
The Cleveland Fed's longer-term inflation expectations series had been running at low levels throughout 2012 and the first part of 2013. But more recently, these inflation expectations have moved closer to 2 percent. The relative stability of long-run inflation expectations provides one reason to think that the recent low inflation readings are likely to be temporary.

A second factor likely to lift inflation going forward is a generally improving economy. The economy has grown at a moderate pace since the end of the recession, but this steady growth has reduced the amount of idle resources and general slack in the economy. The labor market continues to recover from the recession, and over the course of 2013 the unemployment rate fell by more than 1 percentage point and nonfarm businesses' payrolls expanded by more than 2 million workers.

With inflation expectations remaining stable, the economy continuing to grow, and some of the transitory factors that weighed on inflation in 2013 unlikely to be repeated, most forecasters call for a gradual rebound in inflation over the next few years. In their assessment in March 2014, participants on the FOMC forecasted that PCE inflation would likely step up by the end of 2014 and continue to rise in 2015 and 2016 until it neared the FOMC's longer-run inflation objective of 2 percent (figure 11).

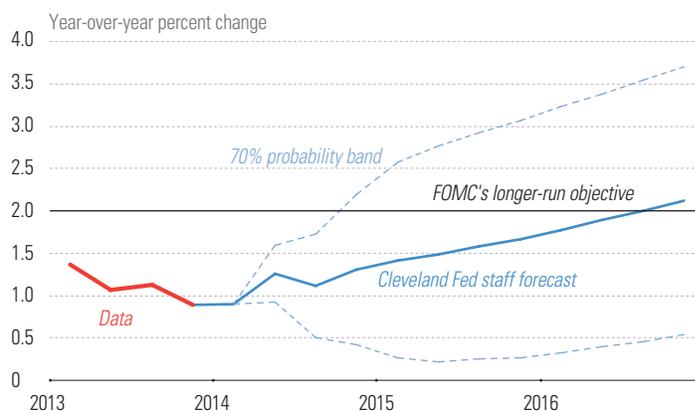
Thus, the most likely outcome for inflation is not further disinflation or outright deflation, but rather a gradual increase in the rate of inflation. Because inflation in the future depends partly on monetary policy decisions today, such a projection suggests that policymakers believe that today's policy settings are appropriate to return inflation to the level that the FOMC has determined is most consistent with the goal of price stability.

Figure 11. The FOMC forecasted that PCE inflation would likely rise until it neared 2 percent



Sources: Federal Reserve Board; Bureau of Economic Analysis.

Figure 12. The most likely PCE inflation rate by the end of 2015 will be around 1.7 percent



Sources: Bureau of Economic Analysis; Federal Reserve Bank of Cleveland.

Of course, forecasts are inherently uncertain, and this is especially true for inflation. What could occur that would generate a higher or lower inflation trajectory? One possibility is a supply disruption in a major oil-producing economy that causes the price of oil to soar, producing much higher inflation than what is currently anticipated. A sharp pick-up in the pace of economic growth could also produce higher inflation, as firms become more confident in their ability to raise prices to offset rising costs of production.

But shocks are also possible that would drive inflation lower than anticipated, such as a renewed downturn in the economy from a collapse in consumer confidence. One Cleveland Fed forecasting model suggests that the most likely inflation rate by the end of 2015 will be around 1.7 percent, but the uncertainty surrounding this projection is high: The model suggests there is a 70 percent probability that inflation will be between 0.25 percent and 3 percent (figure 12). So clearly policymakers will have to watch the data closely to see that inflation actually does evolve in the desired fashion.

### A symmetric inflation objective

The range of possible outcomes in figure 12 makes clear that inflation could either sharply accelerate or remain at very low levels for some time; in other words, the risks to the inflation outlook are two-sided. Either of these scenarios would likely warrant a monetary policy response. Recent post-meeting statements show that the FOMC is committed to mitigating deviations of inflation on both sides of its

longer-run objective, consistent with a symmetric inflation objective.

With the federal funds rate target already set to the range of 0 to  $\frac{1}{4}$  percent, providing additional monetary accommodation to combat fears of further disinflation would likely require using other policy tools. One possibility could be asset purchases—beginning a new program of purchases of long-term assets if the current program has ended or picking up the pace of purchases if the current program has not yet ended. Alternatively, monetary policymakers could impose strong forward guidance on the target for the federal funds rate, suggesting that the target would not change until inflation returns to a certain level. Imposing such an inflation “floor” could add accommodation automatically if the inflation outlook were to weaken, which would help stimulate the economy and bring inflation back toward the floor.

At the same time, the FOMC is prepared to remove accommodation quickly to combat a surge in inflation, if that were to become necessary. Thus far, the historically large size of the Federal Reserve’s balance sheet has failed to cause high inflation rates, an experience shared over a longer time span by the Bank of Japan. But a large balance sheet can complicate the process of raising policy rates. To this end, the FOMC has new tools—such as the term deposit facility, fixed-rate overnight reverse repurchase agreements, and the payment of interest on excess reserves—to assist in the withdrawal of monetary accommodation at the appropriate time and pace in order to help achieve its goals of maximum employment in the context of price stability.

This essay has explained why low inflation can turn into “too much of a good thing.” Our analysis suggests that today’s low inflation is primarily the result of the economy taking a long time to recover from the severe recession of 2007-2009. Over the long run, the Federal Reserve has the tools to keep inflation from running too high as well as too low. And over the past 30 years, it has a solid history of doing just that. These factors, along with the progressively improving economy, lead us to conclude that inflation is on a course to gradually reach the FOMC’s 2 percent objective.

*All data cited in this essay are as of March 27, 2014.*

For more analysis of the research mentioned in this essay, visit Inflation Central at [www.clevelandfed.org/inflation-central](http://www.clevelandfed.org/inflation-central). There, you can also find up-to-date estimates of inflation expectations and much more.

“Behind Recent Disinflation: 2010 Redux?”

by Edward S. Knotek II and William Bednar

“Forecasting Implications of the Recent Decline in Inflation,”

by Todd E. Clark and Saeed Zaman

“Forecasting Inflation? Target the Middle,”

by Brent Meyer, Guhan Venkatu, and Saeed Zaman

“The Future of Inflation,”

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“What’s Up in Inflation? Shelter and OER,”

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“When Might the Federal Funds Rate Lift Off? Computing the Probabilities of Crossing Unemployment and Inflation Thresholds (and Floors),”

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