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INFLATION: DEAD, OR JUST FORGOTTEN?

with Michael Hasenstab, Ph.D.

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Global Macro Shifts

Inflation: Dead, or Just Forgotten?

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Global Macro Shifts is a research-based briefing on global economies featuring the analysis and views of Dr. Michael Hasenstab and senior members of Templeton Global Macro. Dr. Hasenstab and his team manage Templeton's global bond strategies, including unconstrained fixed income, currency and global macro. This economic team, trained in some of the leading universities in the world, integrates global macroeconomic analysis with in-depth country research to help identify long-term imbalances that translate to investment opportunities.

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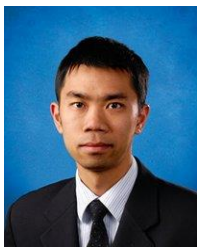

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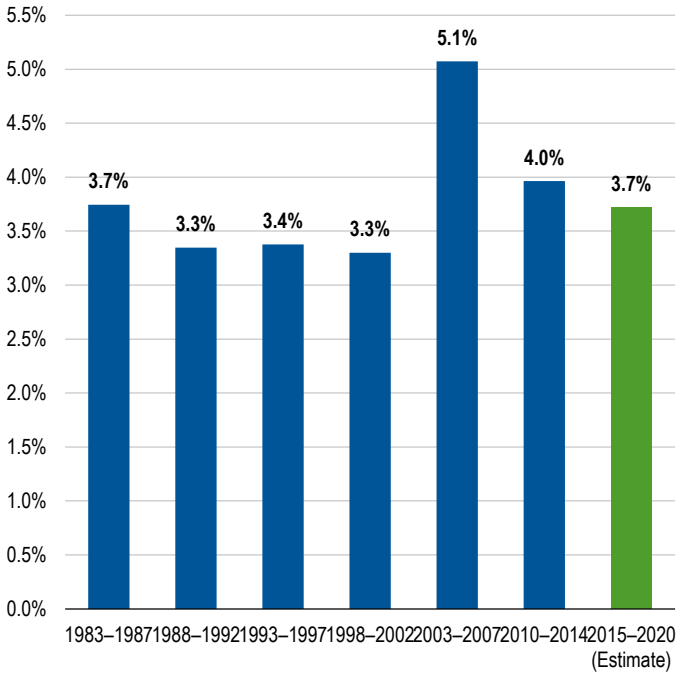
Overview

The US and global economy are six years into their post-Great Recession recoveries. Over these past six years, growth has proved resilient to a number of shocks, including the eurozone debt crisis, a variety of policy-induced mini-crises in the US (the debt ceiling, fiscal cliff and taper tantrum, to name just a few), and the beginning of an important shift in China's growth model. Average global growth during 2010–2014 compares favorably with the pre-global financial crisis (GFC) record—except for the exceptionally strong growth of 2002–2007; in the US, the unemployment rate has declined to 5%, bringing the labor market close to full employment.[1]

Global Growth Remains on Trend

Exhibit 1: Global GDP Growth (% Purchasing Power Parity)
1983–2020E



Source: International Monetary Fund, *World Economic Outlook* Database, 10/15.

However, a widespread and deep-seated pessimism remains. The International Monetary Fund (IMF) and other institutions have repeatedly lowered their growth forecasts; many observers feel that the pace of US economic growth remains disappointing; the slowdown in China and other emerging markets (EMs), and the attendant decline in commodity prices, have raised concerns over the health of the global growth outlook. Inflation pressures have remained muted in the US and a number of other advanced countries, and several economists and commentators have repeatedly flagged the risk of widespread deflation across the global economy.

Financial markets also reflect the conviction that we are now in a new world, characterized by permanently lower rates of economic growth and near-zero inflation, and where equilibrium interest rates will therefore be permanently lower than in the past. This conviction is shared, to some extent, by the US Federal Reserve (Fed): Federal Open Market Committee (FOMC) members forecast a lower equilibrium level of the fed funds rate than we have seen in previous cycles.

Larry Summers and others have articulated this pessimistic view by revisiting the Secular Stagnation theory originally proposed by Alvin Hansen in 1938.[2] In a nutshell, the Secular Stagnation hypothesis posits that the global economy suffers from a structural lack of aggregate demand and a chronic excess of desired savings over desired investment. Summers (2013, 2015) highlights the following factors:

- A decline in the rate of population growth, lowering the pace of demand and output growth;
- A slowdown in the pace of technological innovation and productivity growth, which also reduces economic growth and returns on investment;
- A substantial reduction in the relative price of capital, implying that a given increase in the stock of capital can be achieved with a smaller value of investment and borrowing;
- A reduced capital intensity in the economy, driven by the rise of digital services industries; and
- A rise in income inequality and in the capital share of income, both increasing the average propensity to save.

These factors combine to create a situation of low aggregate demand, low returns on investment and low actual investment, low inflation and low interest rates.

The Secular Stagnation view is often seen as complemented by the "savings glut" hypothesis, whereby large current account surpluses and precautionary savings by EMs (oil producers and Asian exporters) put further downward pressure on interest rates.

In a Secular Stagnation environment, monetary policy cannot stimulate growth by reducing real interest rates: The nominal interest rate cannot fall below zero, and weak aggregate demand caps inflation. Monetary policy can at best fuel financial bubbles—a temporary solution—or weaken the exchange rate—a zero-sum game at the global level. A well-designed fiscal stimulus becomes the only way out, within the constraints of long-term debt sustainability.

1. Final GDP growth data for 2015 are not yet available at the time of publication.
2. Source: Larry Summers (2013, 2015).

The pessimistic view encapsulated by the Secular Stagnation hypothesis underpins market expectations that both inflation and interest rates are set to remain at very low levels for the foreseeable future. We believe this view is misguided:

- Potential growth in the US and other advanced economies is indeed lower than was generally assumed during the credit-fueled pre-GFC expansion;
- However, EMs now account for a significantly higher share of the global economy, and they have substantially higher growth potential;
- Prevailing deflation/disinflation concerns give excessive weight to the decline in headline inflation measures driven by the sharp fall in commodity prices, a temporary phenomenon. Concomitantly, these concerns ignore the positive impact on aggregate demand in commodity importers that derives from lower commodity prices.
- While inflation dynamics are not perfectly understood, we believe inflation risks are now squarely tilted to the upside. Our view rests on three considerations: 1) US consumption remains robust, and wage pressures have started to rise; 2) a normalization in money velocity would trigger a significant rise in inflation; 3) last but not least, we believe hard-earned central bank credibility has been key to keeping inflation anchored since the 1980s; if monetary policy lags behind the curve at the same time as the disinflation impact of commodity prices fades, this credibility could be damaged, leading to a rise in inflation expectations.

In the remainder of this paper, we develop an extensive and detailed analysis of inflation determinants in the US and globally: recent inflation developments, a rising global and US output gap, the continuing tightening of a US labor market that is quickly reaching full employment, base effects from rock-bottom commodity prices, and the potential pressures from a massive monetary overhang and historically low velocity and money multipliers. The weight of this evidence suggests that it would take a set of heroic assumptions to believe that inflation will remain at the current extremely low levels. Our inflation forecasts, though not overly aggressive, are significantly above the Fed's forecast and, even more, above those priced by financial markets. In turn, we believe that widespread underestimation of future inflation, together with the prospective normalization in the relationship between long-term interest rates and nominal gross domestic product (GDP) growth, sets the stage for a significant correction in Treasury yields.

The rest of the paper is organized as follows: In Section 1, we assess recent inflation trends in both developed and emerging economies, and show that the global output gap plays an important role in driving inflation in individual countries. In Section 2, we provide a detailed analysis of the US labor market and wage trends, analyze the inflation process, and develop a structural model to forecast inflation four quarters ahead. In Section 3, we assess the risk posed by the monetary overhang created by quantitative easing (QE), and estimate the potential inflationary impact of a normalization in velocity and money multipliers. In Section 4, we provide a brief historical overview centered on the Great Inflation of 1965–1980. In Section 5, we discuss the Fed's policy normalization challenge and the likely response of US yields. We conclude this paper with a summary of our views.

1. Inflation, Deflation, Slowflation…

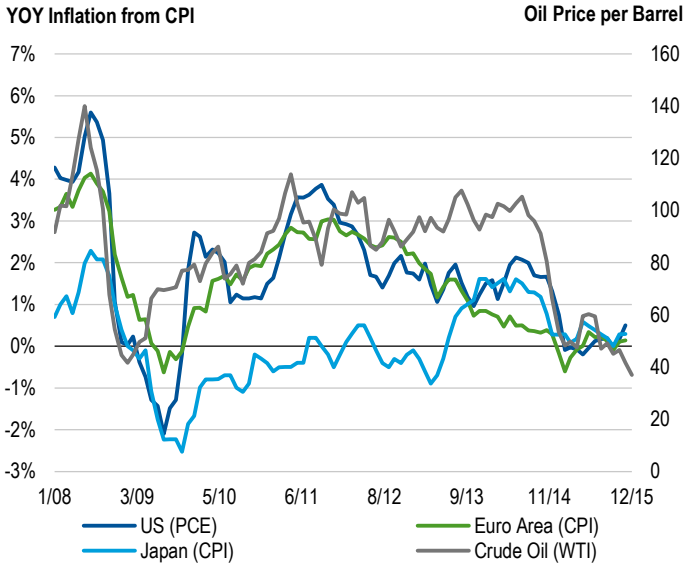
Over the past 12 months, many analysts and commentators have argued that we face a risk of global deflation. A close look at the numbers, however, quickly reveals these concerns appear to be far-fetched, an exaggerated reaction to the plunge in commodity prices.

1.1 Recent Inflation Trends in Developed and Emerging Economies

Headline inflation remains low in advanced economies, hovering close to zero in the US, the eurozone and Japan.

Headline Inflation Remains Low in G3 Economies

Exhibit 2: G3 Headline Inflation
January 2008–December 2015



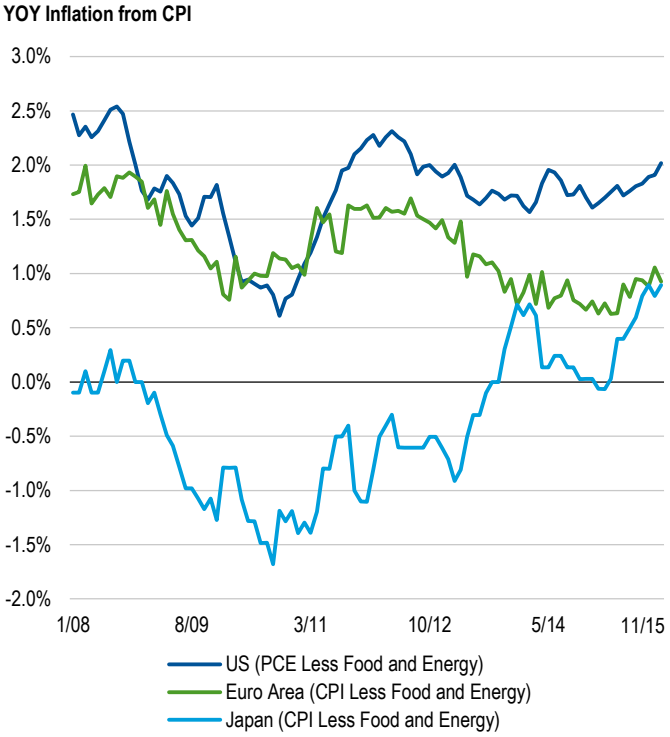
Source: US Bureau of Labor Statistics; Eurostat; Statistics Bureau, Ministry of Internal Affairs & Communication, Japan; Bloomberg. Japan figures adjusted for 4/14 2.1% consumption tax hike. PCE and CPI data through 11/15.

The chart above, however, shows clearly that all G3 economies experienced a simultaneous sharp drop in headline inflation coinciding with the massive decline in oil prices that started in mid-2014, and was accompanied by a less severe but significant decline in other commodity prices. Eurozone headline inflation had already declined gradually since early 2012, reflecting slower economic growth, but was also dragged sharply lower by the commodity price collapse into negative territory. The chart also shows that headline inflation rates in G3 economies stabilized over the latter part of 2015.

Core inflation measures, abstracting from energy and food prices, have remained stable, at around 1.5% in the US and around 1% in the eurozone. In the US, core CPI inflation clocked in at 2.0% in November 2015, with core personal consumption expenditures (PCE) at 1.3%. Other measures of underlying inflation have run at similar levels: The Dallas Fed trimmed[3] the PCE inflation rate at 1.6%, and the Cleveland Fed trimmed CPI at 1.9% and the weighted median inflation at 2.5%. There is no sign that the sharp drop in energy prices has fed into a broader deceleration in inflation. To the contrary, the chart below shows that core inflation has begun to rise in the G3 economies:

Core Inflation Is Rising in G3 Economies

Exhibit 3: G3 Core Inflation
January 2008–November 2015



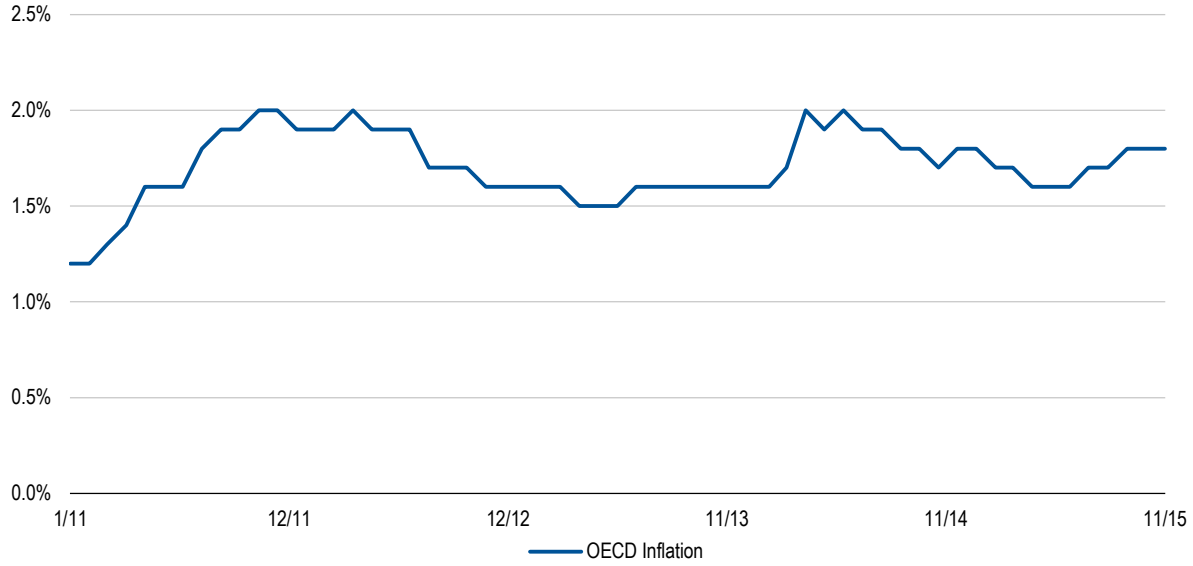
Source: US Bureau of Labor Statistics; Eurostat; and Statistics Bureau, Ministry of Internal Affairs & Communication, Japan. Japan figures adjusted for 4/14 2.1% consumption tax hike.

The same gradual rise of core inflation can be seen for the average of the 32 OECD member countries, which are mostly advanced economies.

3. Trimming is a process by which the Fed removes outlying data from the extremes to determine its final figures.

Core Inflation Is Gradually Rising in OECD-Member Countries

Exhibit 4: OECD Core Inflation YOY
January 2011–November 2015



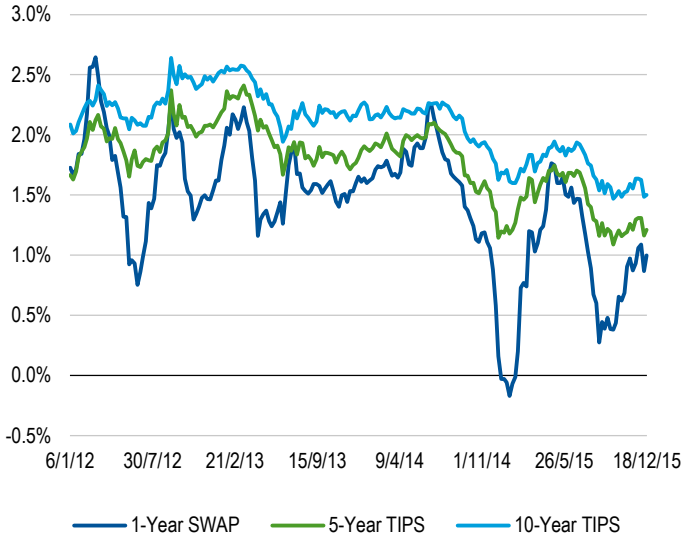
Source: OECD Inflation CPI Indicator Database, accessed 1/16.

Financial markets have so far shrugged off this incipient rise in core inflation measures: break-even inflation (BEI) measures at 5 and 10 years suggest that the Fed and the European Central Bank (ECB) will likely continue to undershoot their inflation targets; a similar signal emerges for Japan, abstracting for the expected temporary boost from a planned 2017 VAT hike.

Recent trends in EMs are even less supportive of the global deflation hypothesis. True, China's producer prices have been declining for a prolonged period, reflecting both lower commodity prices and excess capacity in industry, but in many EMs headline inflation rates have already been running above target, and accelerating: across Latin America (with the notable exception of Mexico), and in countries such as Malaysia, Russia and Ukraine, driven in part by significant exchange rate depreciations.

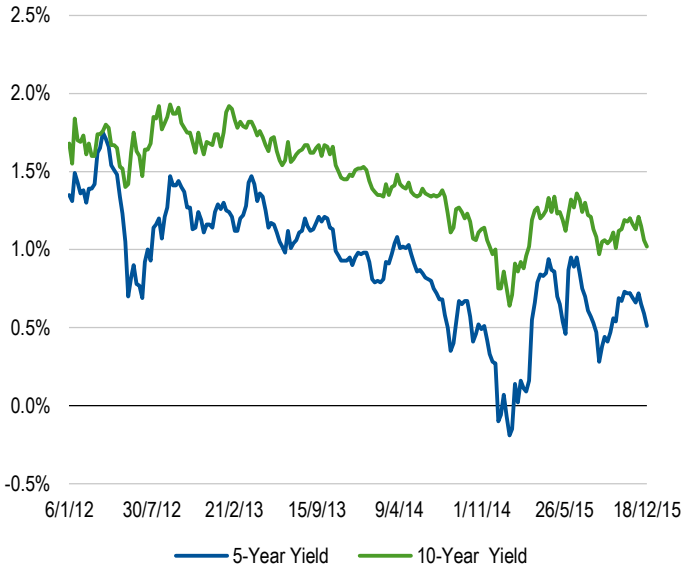
Breakeven Inflation Rates Remain Subdued

Exhibit 5: US Breakeven Inflation
6 January 2012–18 December 2015



Source: Bloomberg. Breakeven yields are calculated by subtracting the inflation-linked bond yield from the nominal risk-free bond yield. The 1-year breakeven yield is calculated using the 1-year swap. The 5-year and 10-year breakeven yields use US Treasury notes.

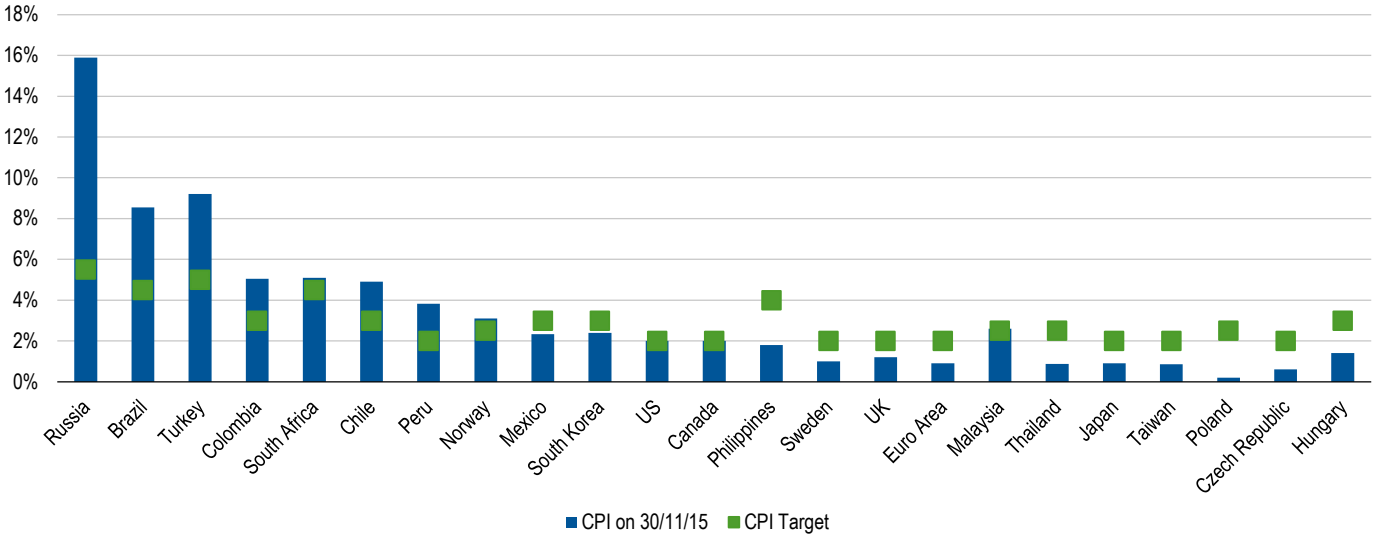
Exhibit 6: Germany Breakeven Inflation
6 January 2012–18 December 2015



Source: Bloomberg. Breakeven yields are calculated by subtracting the inflation-linked bond yield from the nominal risk-free bond yield.

Headline Inflation Has Been Running Above Targets in Several EMs

Exhibit 7: CPI Target
As at 30 November 2015



Source: Bloomberg.

To sum up, inflation in a number of EMs already runs high; in advanced economies, headline inflation remains at low levels, having been pushed sharply down by a sudden correction in commodity prices, but core inflation has remained stable and now shows some signs of increasing. Recent trends offer little support for the hypothesis of a global deflation scenario.

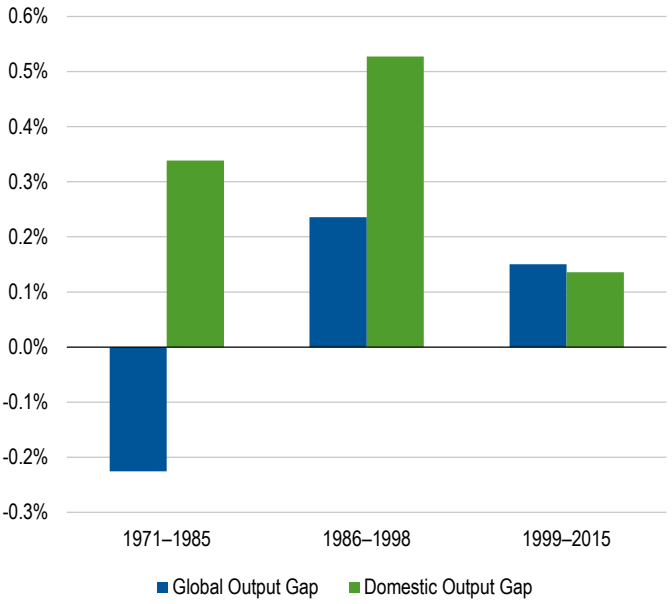
1.2 Global Determinants of Inflation Trends

The global view is important because econometric studies based on a principal component analysis (PCA) have traditionally found that inflation trends have a strong global component.[4] In other words, inflation trends in individual countries are strongly influenced by global factors. In this subsection, we have updated and extended the analysis developed by Borio and Filardo (2007)[5]:

We have built an OECD output gap measure based on the OECD GDP dataset and the St Louis Fed dataset; we have then used this measure to test the relative importance of domestic and international (OECD-wide) output gaps in driving inflation trends in OECD countries. Our analysis indicates that inflation in the sample countries tends to respond more to the international output gap than to the domestic output gap, confirming the findings of previous studies that global trends play a primary role in driving inflation trends at the individual country level.

Global Output Gap Has Driven Inflation at the Country Level

Exhibit 8: Coefficients of Output Gaps
As at 30 June 2015



Source: Calculations by Templeton Global Macro using data sourced from US St. Louis Fed and OECD, GDP Indicator Database, accessed 1/16.

4. Principal component analysis (PCA) is a statistical technique used to analyze a set of variables that could be correlated—for example, inflation rates in different countries are influenced by common factors such as commodity prices. PCA converts the original variables into a new set of variables, which are not correlated with each other, and are ranked so that the first principal component accounts for the largest share of the fluctuations in the original variables.
5. Source: Claudio Borio and Andrew Filardo, "Globalisation and Inflation: New Cross-Country Evidence on the Global Determinants of Domestic Inflation," Bank for International Settlements Working Paper, 5/07.

Our OECD output gap measure, which turned deeply negative in 2009 and again dipped into negative territory in 2012, reflecting the eurozone's double-dip recession, is now trending upward, pointing to a stronger contribution to domestic inflation pressures in the individual countries.

OECD Output Gap Is Positive and Rising

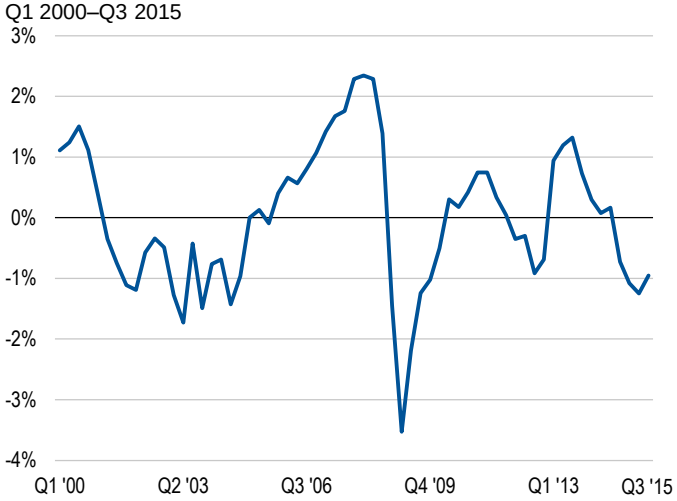
Exhibit 9: Output Gap (OECD Countries)
Q1 1999–Q1 2015

Source: Calculations by Templeton Global Macro using data sourced from US St. Louis Fed and OECD, GDP Indicator Database, accessed 1/16.

Note also that while the OECD-country output gap is positive and rising, the EM output gap is negative, and therefore reduces the global output gap (encompassing both developed and emerging economies); this is in line with recent growth trends, which have seen large advanced economies enjoying stronger, above potential growth, while a number of EMs have suffered a significant deceleration.

EM Output Gap Is Negative and in Decline

Exhibit 10: Output Gap (EMs)
Q1 2000–Q3 2015



Note: Weighted average of the output gap of 20 EM countries, including Brazil, China, India, South Korea, Mexico, Turkey and South Africa.

Data Source: Calculations by Templeton Global Macro using data sourced from Thomson Reuters Datastream, Bloomberg, IMF and US St. Louis Fed.

We expect EM growth to bottom out in the first part of 2016, followed by a stabilization in growth in the latter part of the year and into 2017. With growth in developed markets still running above potential, an acceleration in EMs should give further support to the global output gap, and thereby contribute to stronger inflation pressures in individual countries.

A stabilization in EM growth should also support demand for commodities, reducing the chances of another downward correction in commodity prices over the next 12 months. Commodity price cycles tend to be long-lived. Over the medium term, the slump in prices that began in mid-2014 should exert a negative impact on investment in the commodities sectors, resulting eventually in reduced supply and a turning point in the price cycle.

To summarize, the analysis developed in this section indicates that:

1. Current price trends show no convincing evidence of a global deflation trend: Many EMs exhibit elevated headline inflation rates; in developed markets, the decline in headline inflation has been driven by the plunge in commodity prices, while core inflation rates have remained stable.

2. Inflation trends have a strong global component, with country-specific inflation responding more to the global output gap than to domestic output gaps. The global output gap is on a rising trend, which appears set to continue.

The analysis therefore suggests that the global economy should experience rising inflation rates in the years ahead.

In the next section, we will focus our analysis on the US, for three reasons: First, the US is still the largest driving force in the global economy, and US trends will therefore play an important part in driving global trends; second, understanding why wage and price pressures in the US have remained muted so far can help cast better light on the global outlook; and third, US inflation developments will influence Fed policy, with important repercussions on the global economy and global financial markets.

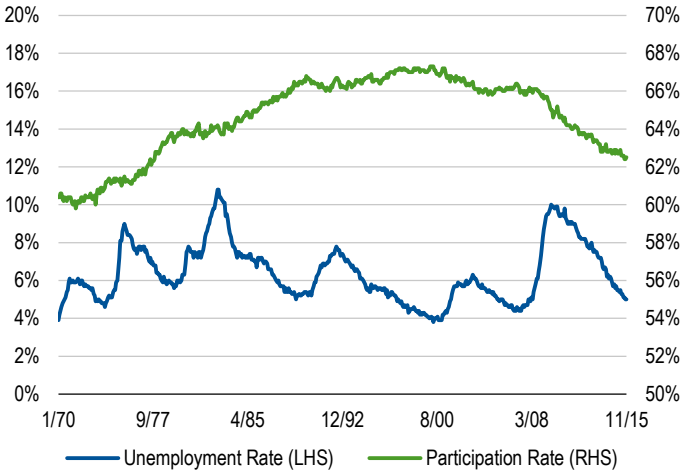
2. US

The US economic recovery has been slow and gradual, but also sustained and resilient. Slack in the labor market and in the economy at large seems to have been mostly reabsorbed.

2.1 The US Labor Market Has Almost Healed

The US Is Close to Full Employment with Decline in Unemployment Rate

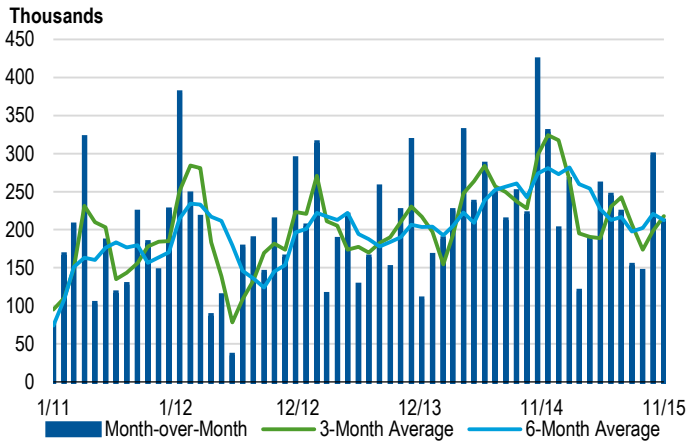
Exhibit 11: Unemployment Rate
January 1970–November 2015



Source: US Bureau of Labor Statistics.

US Nonfarm Payroll Growth Remains Strong

Exhibit 12: Nonfarm Payroll Growth
January 2011–November 2015



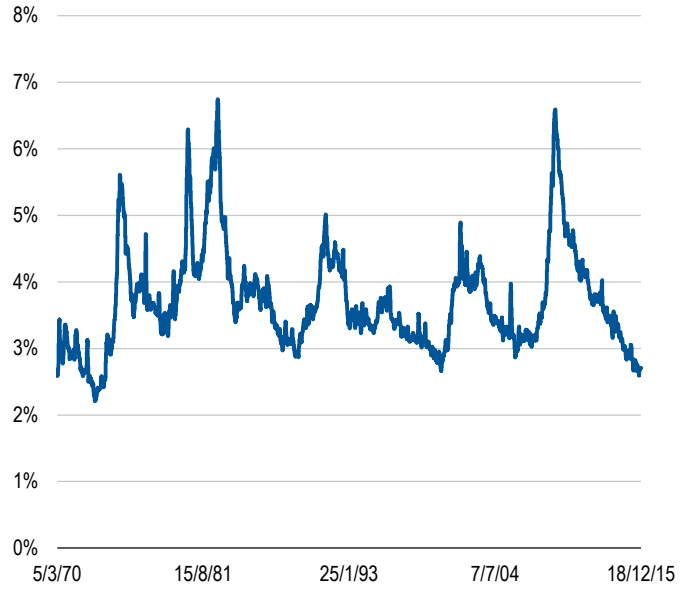
Source: US Bureau of Labor Statistics.

- The unemployment rate (U3) has fallen to 5% from a peak of 10%; while broader measures of unemployment (U6)[6] suggest that some amount of slack remains, most observers believe we are now close to full employment—an assessment shared by the Fed; U6 unemployment also dropped from a peak of 17.1% to 9.9%, about 100 bps away from its pre-crisis average.
- Some have argued that the decline in the unemployment rate has been accelerated by the participation rate falling to excessively low levels during the recession, and that the participation rate should now recover, requiring higher job creation to keep unemployment stable.[7]
- The Bureau of Labor Statistics (BLS) estimated that the participation rate dropped by only 0.6 percentage points during the 2008–2009 recession.[8] This can be seen as the cyclical component of the decline in participation. The BLS has noted that this cyclical impact is small compared to a trend decline in the participation rate that has been ongoing since 2000, driven by structural demographic factors. This makes a sharp increase in the participation rate very unlikely.
- Given that the US economy has been in a recovery for over six years, it seems likely that this cyclical impact has already been reabsorbed, at least in part. Assume instead this 0.6 percentage-point decline still needs to be reversed. This would drive the participation rate up to 63.2% from its December 2015 level of 62.6%. Keeping the unemployment rate steady at 5% would then require job growth of around 230,000 per month, not very different from its current pace.
- If instead the participation rate remains steady at current levels, just over 110,000 in nonfarm payrolls (NFP) per month would suffice to keep the unemployment rate unchanged; the six-month average of NFP is currently running above 200,000; if NFP continued to run at about 200,000 per month, the unemployment rate would fall to 4.3% by end-2016, lower than any plausible measure of full employment. Indeed, most FOMC members project the unemployment rate to fall below 5% over the forecast horizon.

6. U3 is the official unemployment rate, defined as the ratio of total unemployed to the total civilian labor force; U6 is a broader measure, defined as the total unemployed plus all persons marginally attached to the labor force, plus those employed part time for economic reasons, as a share of the civilian labor force plus all persons marginally attached to the labor force. "Marginally attached" are people who are currently neither working nor looking for a job, but indicate that they want and are available to work, and have looked for work at some point in the previous 12 months.
7. The participation rate is defined as the number of people either working or looking for work, as a percentage of the population of working age. Thus an increase in the participation rate would lead to more people looking for work; unless these people do find employment, this in turn would cause a rise in the unemployment rate.
8. Source: US Bureau of Labor Statistics, "Labor Force Projections to 2022: The Labor Force Participation Rate Continues to Fall," *Monthly Labor Review*, 12/13.

Insured Unemployment Rate Is Historically Low

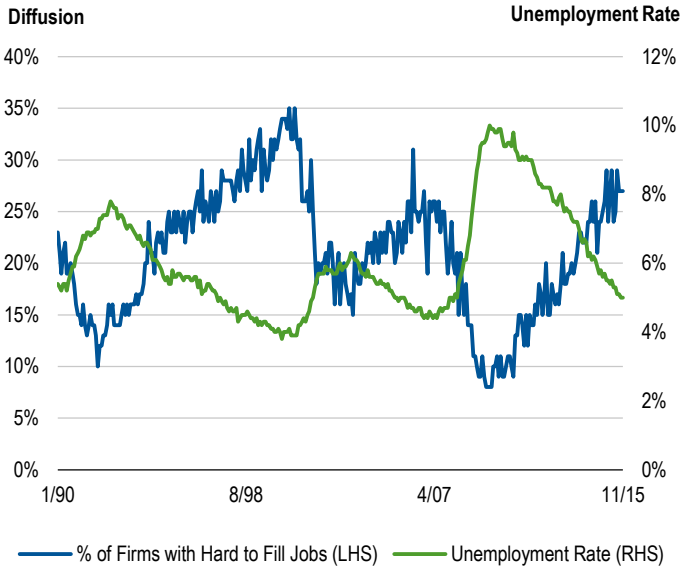
Exhibit 13: Insured Unemployment Rate
5 March 1970–18 December 2015



Source: US Bureau of Labor Statistics.

Hard to Fill Job Level Has Increased

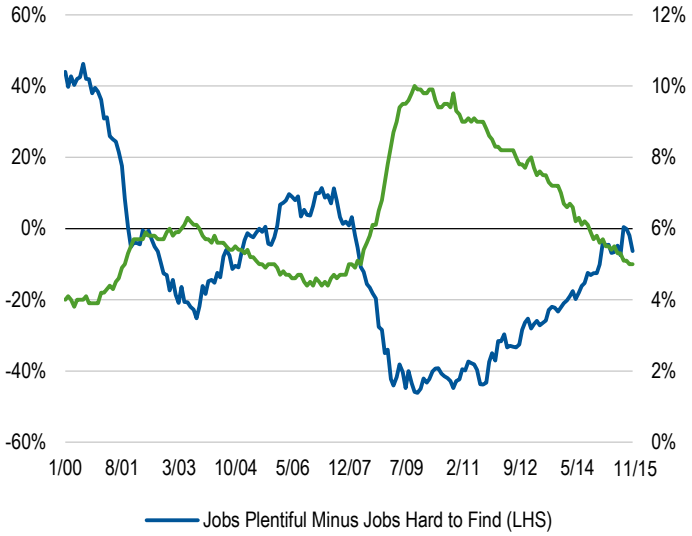
Exhibit 14: National Federation of Independent Business Hard to Fill Jobs
January 1990–November 2015



Hard to Fill Jobs Data Source: Thomson Reuters Datastream, National Federation of Independent Business. Unemployment Rate Data Source: US Bureau of Labor Statistics.

Availability of Jobs Has Improved from GFC Levels

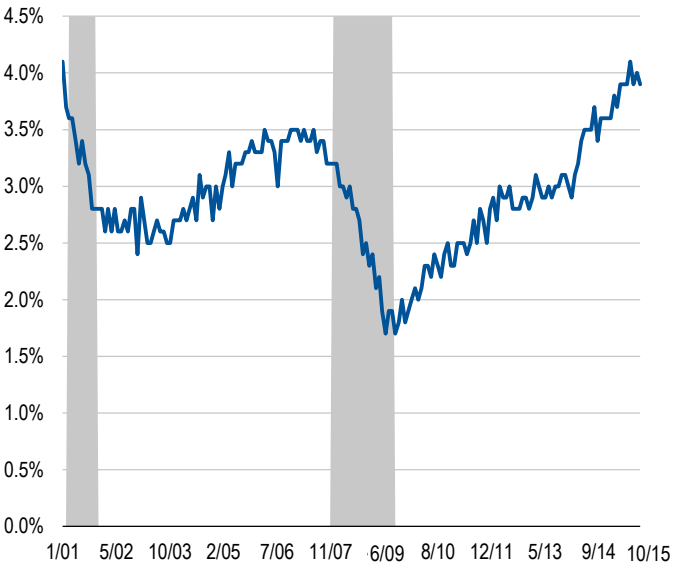
Exhibit 15: Conference Board Consumer Confidence Survey: Job Market Prospects
January 2000–November 2015



Source: US Bureau of Labor Statistics and The Conference Board.

Job Openings Have Been Increasing Significantly

Exhibit 16: Job Openings
January 2001–October 2015



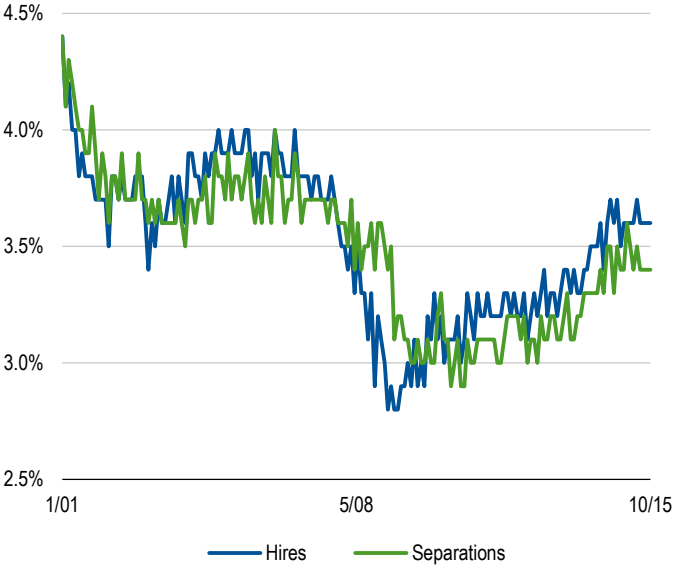
Source: US Bureau of Labor Statistics. As determined by the National Bureau of Economic Research, there were two recessionary periods from 1/01 to 1/16; they occurred from 3/01 to 11/01, and 12/07 to 6/09. Shaded areas represent approximate recessionary periods.

- Unemployment claims and the insured unemployment rate (continuing unemployment claims as a share of eligible employees) are at historical low levels; firms are reporting greater difficulty in filling jobs, while workers are reporting less difficulty in finding jobs. Indeed job openings have increased to very high levels.

- An additional sign of health of the labor market is the rise in the number of "quits," or voluntary employment separations. This normally reflects workers who resign from their current job because they have found a better opportunity, or are confident that they will find one.

Hire and Separation Rates Have Increased

Exhibit 17: Hire and Separation Rates
January 2001–October 2015



Source: US Bureau of Labor Statistics.

Labor Market Turnover Rates Have Increased

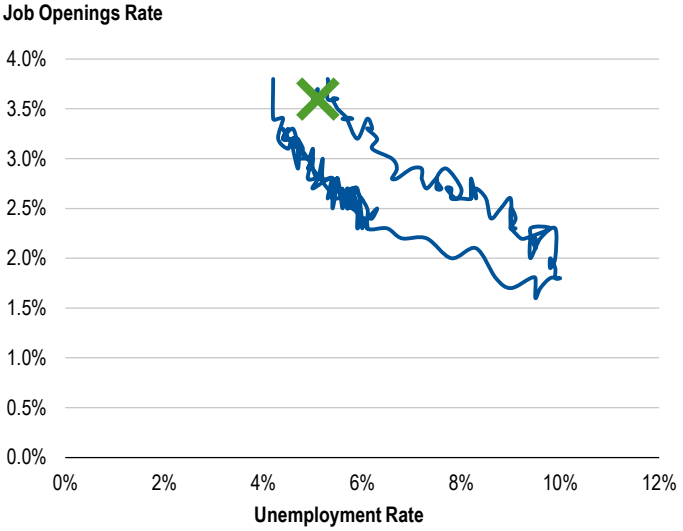
Exhibit 18: Estimates of Labor Market Churn
February 2001–August 2015

Source: Calculations by Templeton Global Macro using data sourced from US Bureau of Labor Statistics.

- One additional reason why employers might be having a harder time filling jobs could be a change in the skills that are required. In other words, we might be observing an increased "skills mismatch," whereby a larger number of the people currently unemployed do not have the skills that are needed by employers. This seems to be supported by the shift to the right in the Beveridge curve. The Beveridge curve shows the number of job openings against the level of unemployment. A shift of the curve to the right implies that the same level of job openings is now consistent with a greater number of people unemployed—another indication of a tighter labor market.

Greater Job Openings per Level of Unemployment Indicates a Tight Labor Market

Exhibit 19: Beveridge Curve
January 2001–October 2015



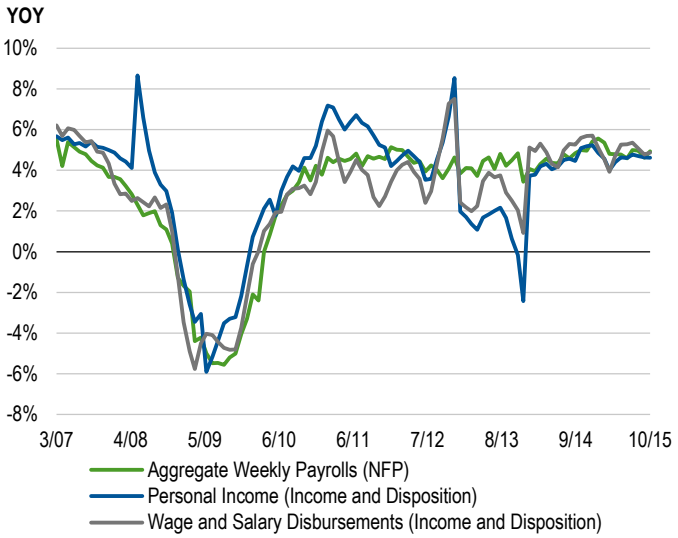
Source: US Bureau of Labor Statistics.

2.2 Wage Dynamics: Puzzle or Moot Point?

Wage growth has remained subdued, and this is often taken as further evidence that we are now in a structurally lower inflation environment (though growth in aggregate private payrolls has been more robust, at 4.5%, supported by the increase in employment, and has helped sustain household income growth and consumption). The Fed has also often emphasized the importance of wage dynamics in its assessment of the inflation outlook.

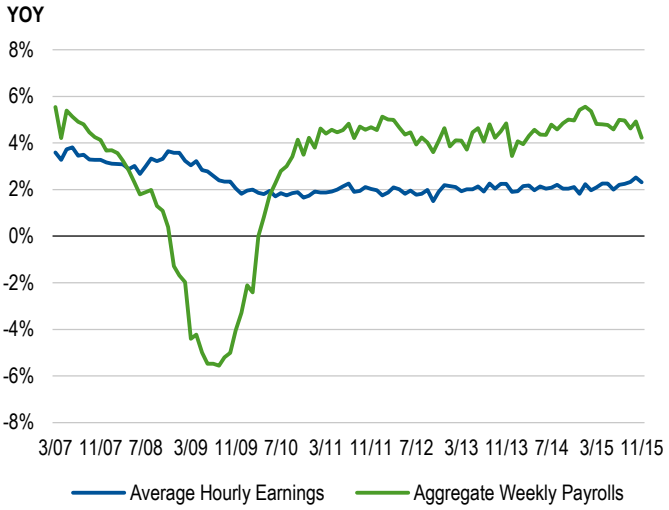
Wage Growth Has Remained Subdued

Exhibit 20: Nominal Income Annual Growth
March 2007–October 2015



Source: US Bureau of Economic Analysis and US Bureau of Labor Statistics.

Exhibit 21: Aggregate Private Payroll vs. Average Hourly Earnings
March 2007–November 2015



Source: US Bureau of Labor Statistics.

Econometric studies, however, demonstrate that wages are a poor predictor of goods and services inflation. Rhys Bidder ("Are wages useful in forecasting price inflation," FRBSF Economic Letter 2015-33, 2 November 2015) provides a review of the relevant literature and concludes "the literature suggests that wages do not provide significant additional information beyond what can already be gleaned from other sources, including prices themselves." The fact that wage pressures have remained muted, therefore, does not guarantee that inflation will remain low.

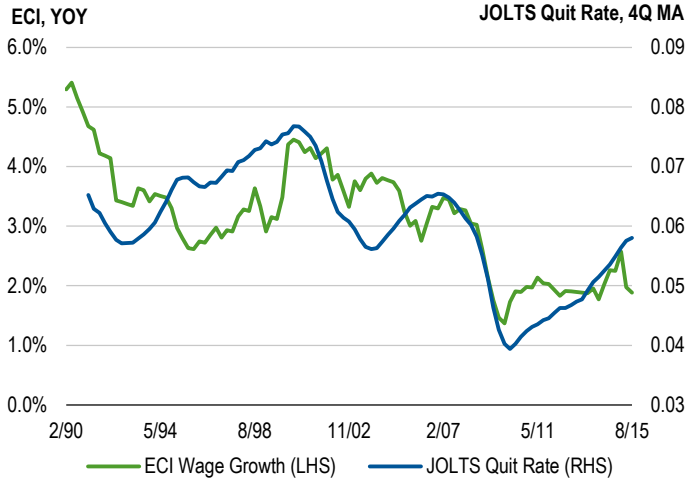
It is nonetheless important to gain a better understanding of why wage growth has remained slow, and whether it is likely to stagnate or accelerate.

We have noted above that most indicators suggest further ongoing tightening in labor market conditions. In particular, increasing labor market churn, notably quits, points to stronger labor demand.

Growth in the Employment Cost Index (ECI) exhibits a particularly strong correlation with quit rates, as the two charts on the next page show.

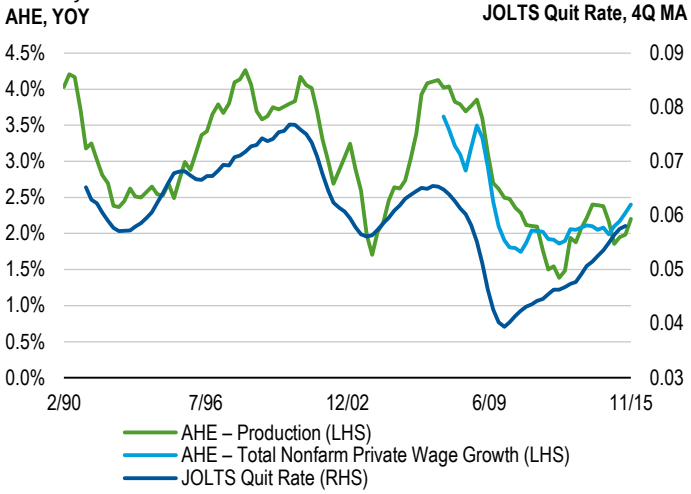
Quit Rates and Wage Growth Are Positively Correlated

Exhibit 22: Quit Rate and ECI Wage Growth
February 1990–August 2015



Source: Calculations by Templeton Global Macro using data sourced from US Bureau of Labor Statistics and National Bureau of Economic Research Working Paper, "Labor Market Flows in the Cross Section and over Time." by Steven J. Davis, R. Jason Faberman, and John C. Haltiwanger. JOLTS Quit Rate data begin 2/91.

Exhibit 23: Quit Rate and AHE Wage Growth
February 1990–November 2015



Source: Calculations by Templeton Global Macro using data sourced from US Bureau of Labor Statistics and National Bureau of Economic Research Working Paper, "Labor Market Flows in the Cross Section and over Time." by Steven J. Davis, R. Jason Faberman, and John C. Haltiwanger. JOLTS Quit Rate data begin 2/91 and ends 8/15. AHE – Total Nonfarm Private Wage Growth data begin 5/07.

Exhibit 24: Correlation of Quit Rate (at time = t) with ECI Growth and AHE Growth at Time Intervals (t+i)

ECI Growth (t+i)	AHE Growth (t+i)	i
0.686	0.644	0
0.719	0.708	1
0.729	0.758	2
0.726	0.781	3
0.721	**0.786**	4
0.712	0.779	5
0.702	0.762	6
0.689	0.743	7
0.680	0.713	8

t = current time of quit factor; i = time interval in quarters. Source: Calculations by Templeton Global Macro using data sourced from US Bureau of Labor Statistics and National Bureau of Economic Research Working Paper, "Labor Market Flows in the Cross Section and over Time." by Steven J. Davis, R. Jason Faberman, and John C. Haltiwanger. Data as at 8/15; calculations as at 11/15. Correlation measures the degree to which two investments move in tandem. Correlation will range between 1.00 (perfect positive correlation, where two items historically always moved in the same direction) and -1.00 (perfect negative correlation, where two items historically always moved in opposite directions).

We build on the historical relationship between the ECI and the quit rate, and augment it with the share of firms expecting to raise workers' compensation (from the National Federation of Independent Business [NFIB] survey) as a measure of labor demand (Exhibit 24). We use the resulting model to forecast future wage growth. The model predicts that the ECI growth rate should accelerate to 2.8% by Q4 2016.[9]

9. These forecasts are based on the subset of data already available for Q4 2015; on the basis of the last complete set of data, for Q3 2015, the model predicts ECI growth of 2.6% for Q3 2016.

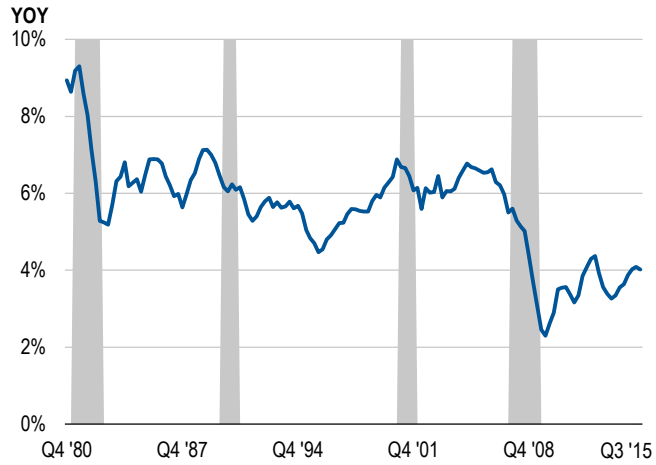
To take one step further, in order to obtain a broader measure of wage pressures, we constructed a *composite index* comprising average hourly earnings, nonfarm business compensation per hour and the employment cost index (see Exhibit 25).[10] We then investigated the structural relationship between our *composite index* of wage growth (Ex. 25), unemployment (Ex. 26), core PCE inflation (Ex. 27) and labor productivity (Ex. 28). The charts below plot the time series for the four variables, with shaded bars indicating the National Bureau of Economic Research (NBER)-defined recessions.

In the charts below, note that:

1. Wage growth (on our *composite* measure) appears to have recently bottomed out in Q3 2014 and has since been rising, though it remains below its long-term average;
2. Unemployment is now very near its historical low levels of 2000 and 2007;
3. Core inflation has been stable at close to 2%; and
4. Labor productivity is near an all-time low.

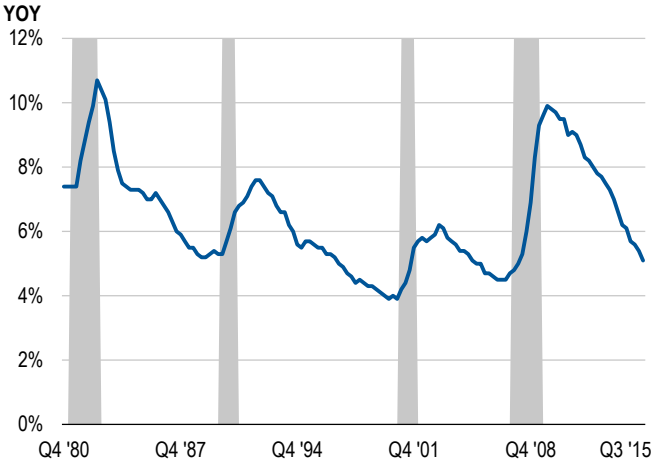
The Four Variables of Our Wage Growth Model

Exhibit 25: Growth of Composite Index of Wages
Q4 1980–Q3 2015



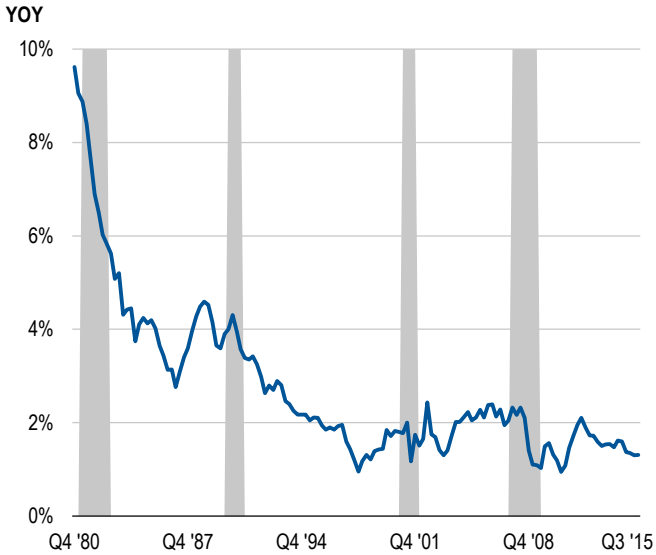
Source: US Bureau of Labor Statistics and US Bureau of Economic Analysis.

Exhibit 26: U3 Unemployment
Q4 1980–Q3 2015



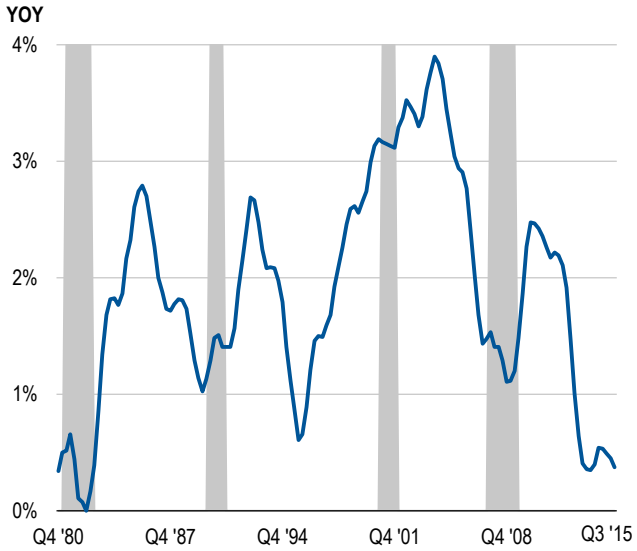
Source: US Bureau of Labor Statistics and US Bureau of Economic Analysis.

Exhibit 27: Core PCE
Q4 1980–Q3 2015



Source: US Bureau of Labor Statistics and US Bureau of Economic Analysis.

Exhibit 28: Labor Productivity
Q4 1980–Q3 2015



Source: US Bureau of Labor Statistics and US Bureau of Economic Analysis.

10. With equal weights, as suggested by a principal component analysis over Q1 1980–Q3 2015.

We have estimated a model forecasting wage growth using our *composite* measure, and based on unemployment, labor productivity and PCE core inflation. The model suggests that wage growth should be running near 2.7%, similar to the rate predicted by the ECI. As wage pressures appear to have picked up, we would expect wage growth to gradually close the gap with the model's predicted rates. Moreover, it seems likely that productivity will eventually pick up from its current record-low levels; this should give an additional boost to wage growth.

It is also worth noting that while the current debate has tended to focus on the slow pace of *nominal* wage growth, *real* wage growth is actually running above its long-term trend, reflecting low headline inflation.

One could in fact argue that real wage growth is already high enough, particularly given the modest pace of productivity gains.

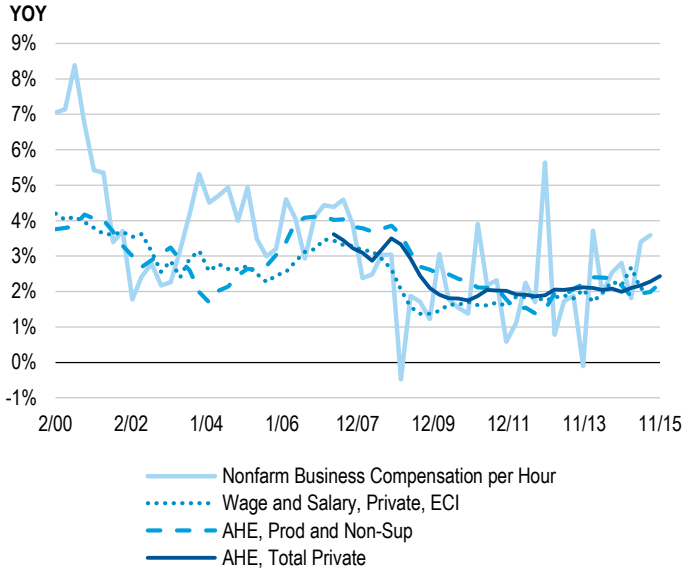
The analysis we developed above points to more robust wage dynamics ahead. Wage growth is in fact beginning to accelerate: Private average hourly earnings rose 2.5% in December 2015 from 2.0% in June; the annual growth rate of nonfarm business compensation per hour has reached the highest levels since Q4 2012; our *composite index* of wage pressures shows an incipient rise in wage pressures in the most recent period.

Moreover, changes in the mix of workers' age, experience and industries of occupation may be biasing measured wage growth downward. The Atlanta Fed computes a wage growth measure that tracks the same individuals through time; this measure runs significantly above average hourly earnings. In other words, "true" wage growth might already be somewhat higher than the officially measured one. And the fact that the labor market keeps tightening while wage pressures show some sign of strengthening suggests that wage growth is likely to accelerate, particularly as any remaining degree of slack gets squeezed out of the labor market.

As we noted above, wage dynamics are not a good predictor of consumer price inflation, contrary to what is commonly believed. We are therefore not arguing that a pickup in wage pressure would automatically translate to higher inflation. However, stronger wage dynamics would continue to support private consumption and aggregate demand, which other things equal should be supportive of consumer prices. We now turn to a direct analysis of price pressures to obtain a more direct prediction.

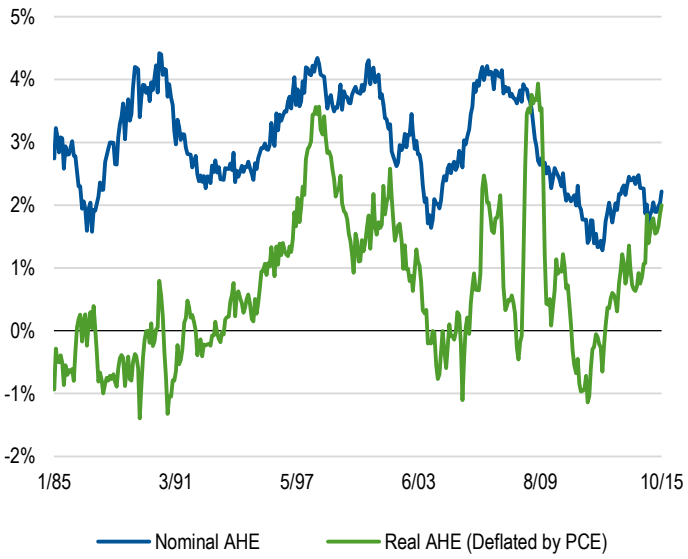
Strong Real Wage Growth Reflects Low Headline Inflation

Exhibit 29: Average Hourly Earnings, Employment Cost Index and Nonfarm Business Compensation
February 2000–November 2015



Source: US Bureau of Labor Statistics. AHE, Total Private data begin 5/07. Wage and Salary, Private, ECI and Nonfarm Business Compensation per Hour data through 8/15.

Exhibit 30: Average Hourly Earnings: Production and Nonsupervisory Employees
January 1985–October 2015



Source: US Bureau of Labor Statistics and US Bureau of Economic Analysis.

2.3 The US Phillips Curve Has Steepened, Not Flattened

Proponents of the global lower inflation hypothesis argue that Phillips curves have flattened since earlier decades. The Phillips curve describes an inverse relationship between the unemployment rate (on the horizontal axis) and inflation (on the vertical axis). A flatter Phillips curve would therefore mean that a given reduction in the unemployment rate now has a much smaller impact on inflation. To test this hypothesis we have estimated the US Phillips curve over two periods: 1985–2005 and 2006–present.[11] Our analysis shows that the US Price Phillips curve has steepened, not flattened. This result holds for both a traditional Phillips curve and a Phillips curve augmented by an inflation expectations component. With the labor market essentially back to full employment, this should therefore set the stage for increasing inflation pressures.

2.4 Central Bank Credibility Is Key

Next, we have broadened our framework to a single-equation estimation of a New Keynesian Phillips Curve, which encompasses expected inflation as well as the output gap.

Our estimates suggest that past inflation and inflation expectations matter more than either wage growth (consistent with the literature reviewed in Rhys Bidder, mentioned above) or the output gap. Central bank credibility, earned with the painful disinflation effort of the 1980s, plays a key role in anchoring inflation expectations.

The estimates from our New Keynesian Phillips Curve highlight the risk implicit in allowing headline inflation to run above target: This would have the double adverse effect of raising the influence of past inflation and possibly un-anchoring inflation expectations if central bank credibility is undermined. We believe this point is worth bearing in mind, because many hold the view that the Fed should take greater risks on the higher inflation front to establish a stronger recovery and exorcise the risk of deflation. We will come back to this point in Section 4, which provides a brief history of US developments and Fed policy.

2.5 Commodity and US-Dollar Pass Through

We have seen in Section 1 that core inflation is running substantially above headline inflation, and in fact very close to the Fed's target. Headline inflation, however, has been compressed by the sharp decline in commodity prices—notably energy—and by the pass-through from the US dollar (USD) appreciation. Could these same factors continue to keep headline inflation below target?

A. Oil Price Impact

Crude oil prices have fallen sharply over the past year and a half. By January 2015, the reference price for US crude oil, West Texas Intermediate (WTI), had dropped to US$48 per barrel, 47% below the 2014 average. Oil prices fell further during August–September last year and then again in November–December, to about US$37 per barrel. Overall, the average WTI price in 2015 was 46% below the 2014 average.

The US Phillips Curve Has Steepened

Exhibit 31: Phillips Curves
Q1 1985–Q4 2015

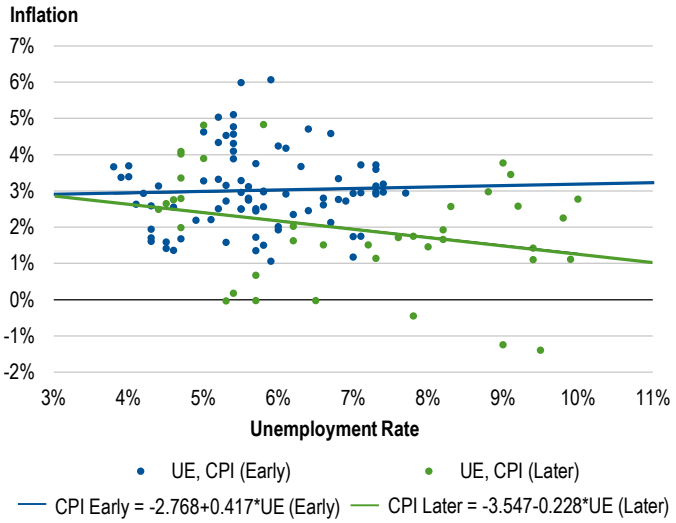
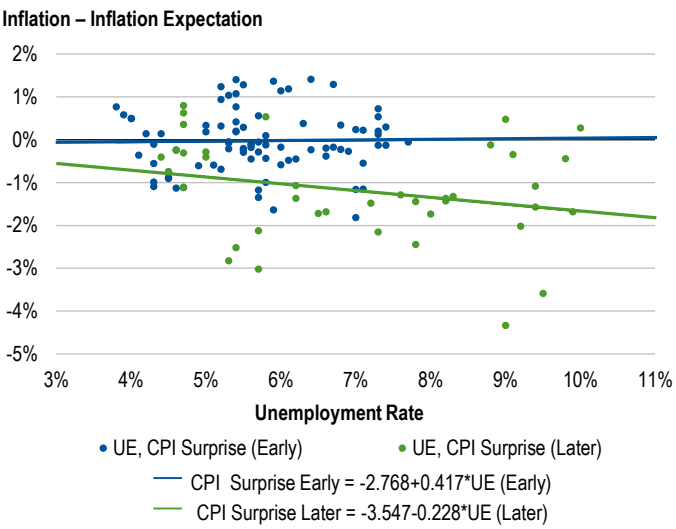


Exhibit 32: Augmented Phillips Curves
Q1 1985–Q4 2015



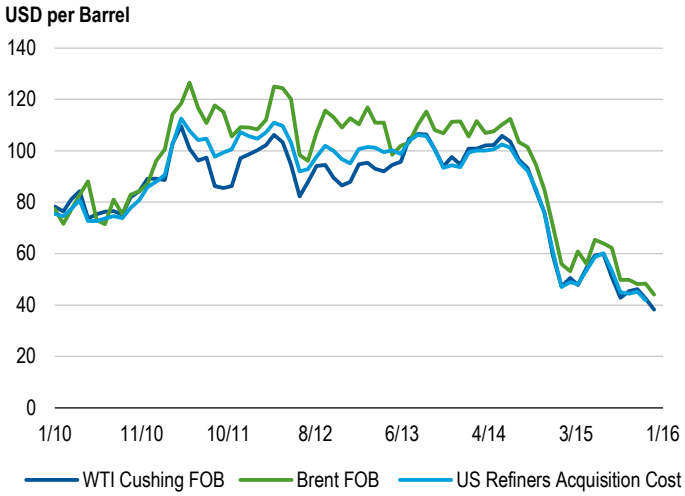
Early = Q1 '85–Q4 '05 and Later = Q1 '06–Q3 '15. CPI surprise computed as the difference of the observed quarter-over-quarter log rise minus the University of Michigan's 1-year ahead inflation expectation. Lines indicate OLS regression results for each period. In economics, the Phillips curve is a historical inverse relationship between rates of unemployment and corresponding rates of inflation. According to the Phillips curve, the lower an economy's rate of unemployment, the more rapidly wages paid to labor increase in that economy.

Source: Calculations by Templeton Global Macro using data sourced from US Bureau of Labor Statistics, Thomson Reuters/University Michigan Surveys of Consumers.

11. We do not go further back than 1985 because inflation was much higher and more volatile over the 1965–1985 period.

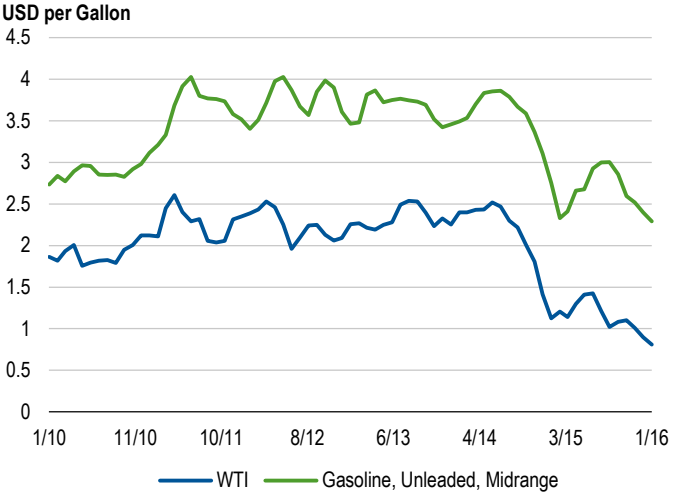
The Decline in Oil Prices Was Quickly Passed to Consumer Energy Prices

Exhibit 33: US Crude Oil Prices
January 2010–January 2016



Source: Energy Information Administration (US Energy Dept.). US Refiners Acquisition Cost data through 11/15.

Exhibit 34: Crude Oil and Gasoline Price
January 2010–January 2016

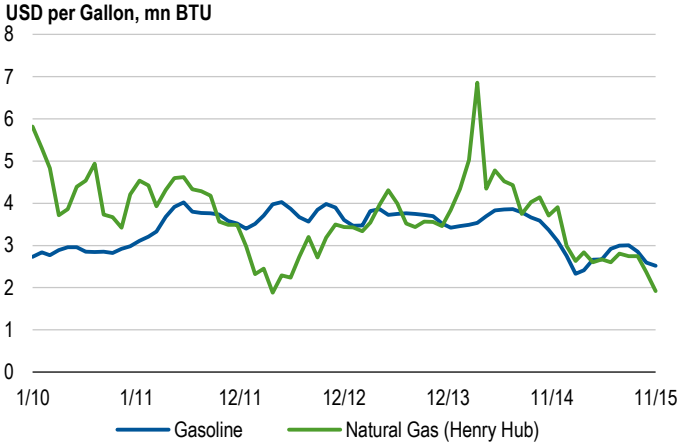


Source: Energy Information Administration (US Energy Dept.).

Oil prices tend to pass through rapidly into consumer energy prices, mostly through a quick adjustment in gasoline prices at the pump (see Exhibits 33–35).

How important is the impact on consumer prices? A study by Bart Hobijn (2008)[12] finds that a 10% change in oil prices translates into a 0.29 percentage point change in PCE inflation and a 0.14 percentage point move in core PCE inflation. The impact is concentrated in household energy prices, household operations and transportation. Based on these elasticities, the sharp decline in oil prices lowered average headline inflation by about 1.3 percentage points and core inflation by about 0.6 percentage points in 2015.

Exhibit 35: Gasoline and Natural Gas Prices
January 2010–November 2015

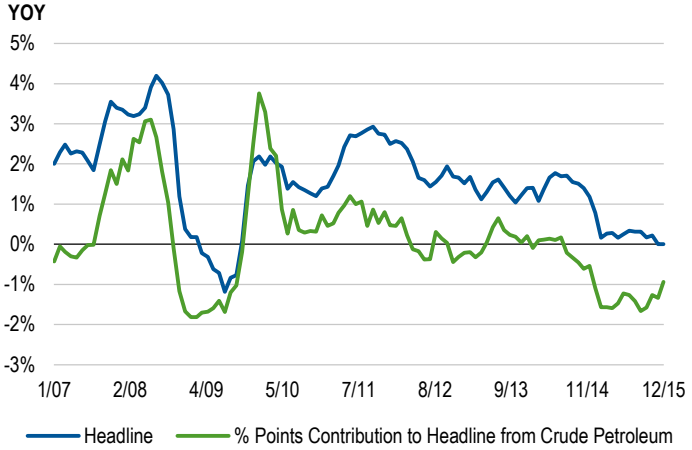


Source: Energy Information Administration (US Energy Dept.).

12. Source: Bart Hobijn, "Commodity Price Movements and PCE Inflation," *Current Issues in Economics and Finance*, 11/08, Volume 14, Number 8.

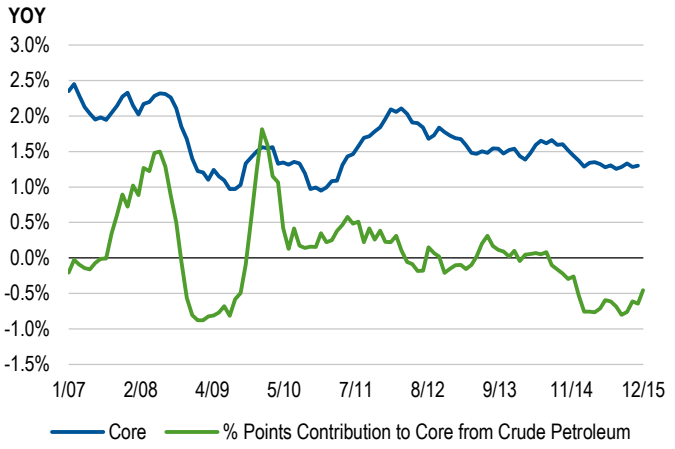
Headline Inflation Declined with Energy Prices while Core Inflation Remained Stable

Exhibit 36: US: Headline Inflation and Energy Prices
January 2007–December 2015



Source: US Bureau of Economic Analysis and US Bureau of Labor Statistics. Headline data through 11/15.

Exhibit 37: US: PCE Core Inflation and Energy Prices
January 2007–December 2015



Source: US Bureau of Economic Analysis and US Bureau of Labor Statistics. Core data through 11/15.

The impact of a one-off decline in oil prices on inflation is temporary: If oil prices stabilize at a higher level, the base effects disappear, and the impact on consumer inflation fades away as consumer prices also stabilize at a higher level.

Oil prices, however, fell further in January 2016, with WTI trading as low as US$30 per barrel at the time of writing. If prices were to remain at this lower level through 2016, the average oil price for 2016 would be 38% lower than the 2015 average. This would lower average headline inflation by 1.1 percentage points and core inflation by 0.5 percentage points this year (see Exhibit 38).

Potential Impact of Today's Low Oil Prices on Inflation

Exhibit 38
As at January 2016

	Headline 2015	Headline 2016	Core 2015	Core 2016
Inflation Impact				
Year-End	-0.88%	-0.52%	-0.43%	-0.25%
Average	-1.31%	-1.08%	-0.63%	-0.52%
	2015	**2016**		
Oil Price Change				
Year-End	-30%	-18%		
Average	-46%	-38%		

Source: Calculations by Templeton Global Macro using data sourced from Bloomberg.

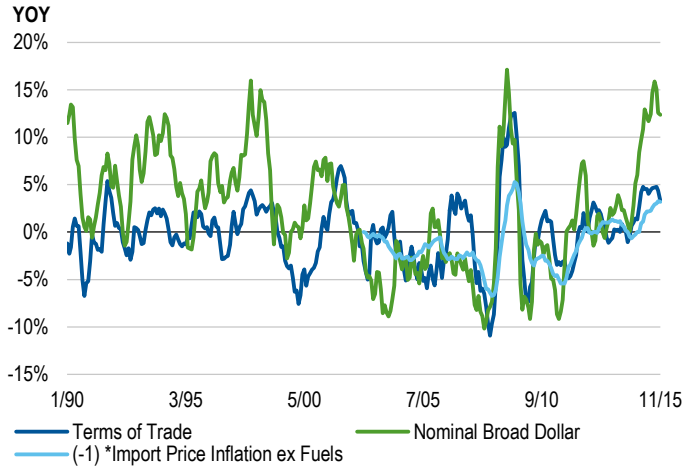
We think the latest decline in oil prices to US$30 per barrel is likely to be an overshoot. It seems to have been driven in part by fears of a deeper downturn in China's economy, which we believe will turn out to be unjustified, for reasons we have discussed in detail in a previous edition of Global Macro Shifts. We continue to believe that as the oil market finds a new equilibrium, healthy global growth will eventually drive a recovery in oil prices, reversing some of the current disinflationary impact. If, for example, by February 2016 WTI were to revert to the November 2015 level of about US$42 per barrel—before the latest wave of China-driven concerns—and remain at that level for the remainder of the year, the negative impact on average headline inflation would be less than 0.5 percentage points and on core inflation just 0.2 percentage points.

Should oil prices remain closer to US$30 per barrel for part of 2016, the eventual recovery in prices would be delayed but would also probably be sharper, starting from a lower base (as lower prices would have a stronger adverse impact on investment and supply).[13] In the analysis above we have described the impact of oil prices on PCE inflation. Assuming a similar impact on CPI inflation, at the end of this section, we will demonstrate the impact of US$30 oil on our forecast for inflation this year (Exhibit 41). In conclusion, we would note that any oil price forecast is subject to a high margin of uncertainty, but given how far and how fast prices have fallen, inflation risks from oil seem increasingly tilted to the upside.

13. We would note that the International Energy Agency (IEA), in its latest *World Energy Outlook*, expects the oil price will recover to about US$80 per barrel by 2020 in its central scenario.

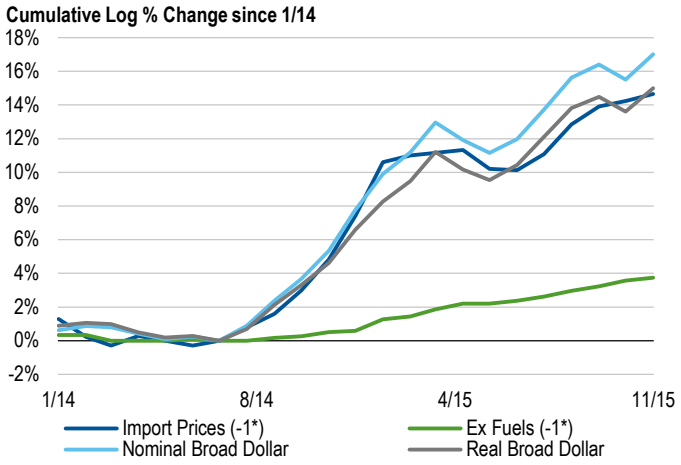
The Strengthening US Dollar Has Had Only a Modest Effect on Import Prices ex Fuel

Exhibit 39: Broad Dollar and Terms of Trade
January 1990–November 2015



Source: US Federal Reserve and US Bureau of Labor Statistics. (-1) *Import Price Inflation ex Fuels data begin 12/02.

Exhibit 40: Import Prices and the USD
January 2014–November 2015



Source: US Federal Reserve and US Bureau of Labor Statistics.

B. US Dollar Impact

The nominal broad dollar index appreciated by 18.1% between July 2014 and December 2015, and the real dollar index by 15.8%. The pass-through from the exchange rate into non-fuel import prices is estimated at about 40%;[14] this implies a reduction in non-fuel import prices on the order of 4.8%–6.2%. How much of an impact would that have on the overall CPI? The US is a relatively closed economy: Total gross merchandise imports of consumer goods, automotive, industrial supplies and food account for just 13% of total consumption; therefore, a reduction in non-fuel import prices of 6.2% (the top end of our pass-through estimate) would lower CPI inflation by less than 0.8 percentage points, with most of the impact playing out within a year.

Now note that between July 2014 and October 2015, non-fuel import prices fell 3.8%, implying that about 60% of our maximum estimated impact from past appreciation has already played out. The question is how much further dollar appreciation still lies ahead of us. The real USD currently trades 4.2% above its long-term average against major trading partners and 14% above its long-term average against its trade weighted basket, suggesting it is already overvalued in real terms. As the Fed has embarked on a tightening cycle while the ECB and the Bank of Japan (BOJ) are still in easing mode, we are likely to see further dollar appreciation in 2016; the appreciation, however, is likely to be significantly more limited than we have seen so far, and more concentrated against specific currencies. This would have a much smaller impact on overall CPI inflation. For example, if the USD were to reach parity against the euro from its current 1.09 level, this would lower CPI inflation by just 0.1 percentage points; similarly, a 10% USD appreciation against China's yuan (CNY) would lower CPI inflation by 0.1 percentage points.

In sum, any further drag on inflation from USD appreciation seems likely to be minimal, whereas the base effects from commodity prices are already getting less intense and will gradually reverse, pushing headline inflation back toward core. Indeed, if oil prices have now undershot long-term equilibrium levels, there is an increasing risk that an eventual rebound could push both headline and core inflation significantly above policy targets.

2.6 Where Is US Inflation Headed?

The analysis developed above indicates that US headline inflation will pick up as the disinflationary impact of commodities fades, and that additional USD appreciation is likely to exercise only a minimal negative effect on price pressures. To get a more precise forecast of how quickly inflation is likely to rise, we tested seven different alternative specifications of a Phillips curve relationship. The right hand side of the models included combinations of the current quarterly inflation rate, the overall U3 unemployment rate, and 1- and 10-year ahead inflation forecasts from the Philadelphia Fed Survey of Professional Forecasters.

We chose the best forecasting model by minimizing the root mean squared error of the forecasts compared to the realized values of inflation. We found that the best-performing specification included the current unemployment level, the current inflation rate, and both the 1- and 10-year ahead inflation expectations models.

Using our preferred specification to forecast the four-quarters ahead inflation rate, we project that, based on current fundamentals, headline CPI inflation should be greater than 2% by end-2016—significantly sooner than both the Fed's and the

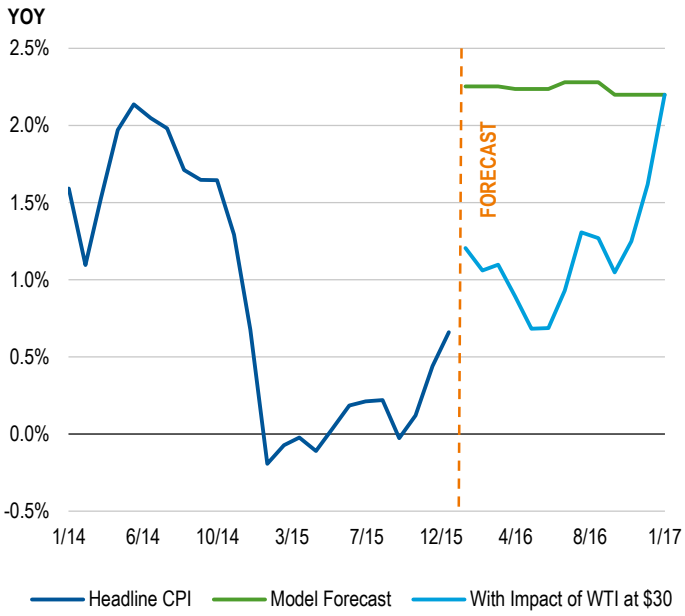
14. Source: Diego Valderrama, "Does a Fall in the Dollar Mean Higher US Consumer Prices?", Federal Reserve Bank of San Francisco Economic Letter, 8/04; and Giovanni P. Olivei, "Exchange Rates and the Prices of Manufacturing Products Imported into the United States," *New England Economic Review*, 2002.

market's expectations. The chart below takes our model forecasts and incorporates the impact of the oil price decline over the course of last year, and further assumes that oil prices do not recover from the US$30 per barrel level.[15] In particular, note that the base effects from oil at US$30 per barrel will fade completely by January 2017, with a faster pick-up in inflation should we see oil prices recover sooner.

Oil Price Base Effects Fade by January 2017

Exhibit 41: Headline CPI Forecasts: Model vs. Model with Oil Price Effect

January 2014–January 2017E



Source: Calculations by Templeton Global Macro using data sourced from US Bureau of Labor Statistics.

To summarize, the analysis we developed in this section reveals that:

1. Wage growth is generally a poor predictor of inflation. The puzzle of subdued wage growth in the face of a tightening labor market might therefore be a moot point. Still, a closer look at a broader set of wage indicators suggests an incipient strengthening in wage pressures, with the attendant positive impact on aggregate demand.

2. We find that the US Phillips curve has steepened since 2005, not flattened. With the labor market close to full employment and tightening further, this points to stronger inflation pressures ahead.

3. We estimate that further USD appreciation is likely to exert only a modest negative impact on headline inflation, as the dollar is already overvalued and about 60% of the impact of its appreciation to date has already passed through into consumer prices.

4. Our estimates based on a New Keynesian Phillips Curve suggest that past inflation and inflation expectations matter more than either wage growth or the output gap. This underscores the importance of hard-earned central bank credibility, and the risks that losing such credibility would entail.

In the next section we tackle another important element of the picture: the monetary overhang created by several years of QE in G3 economies.

15. This is done following the Hobijn (2008) analysis discussed earlier in this section, and applying his estimates of the impact of oil price changes to our CPI inflation forecasts.

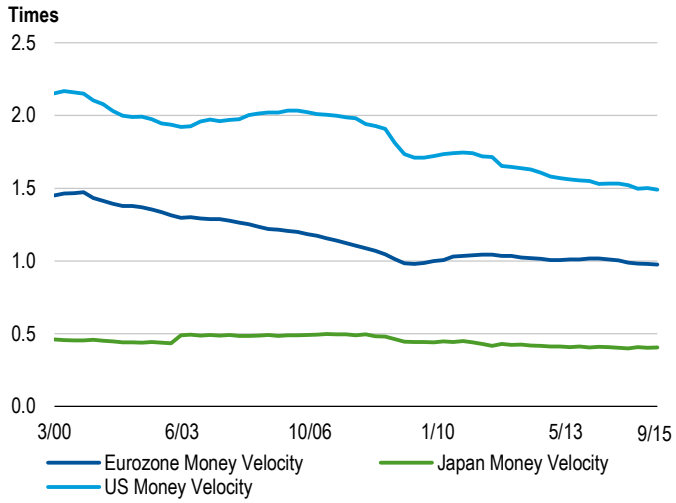
3. Money Velocity: The Ghost in the Machine

In the aftermath of the GFC, the Fed launched several rounds of QE. Other major central banks, including the BOJ and the ECB (as well as the Bank of England) also embarked on a substantial expansion of their balance sheets. At the same time, both money velocity (the ratio of nominal GDP to broad money) and the money multiplier (the ratio of broad money to the monetary base) declined sharply, reflecting sudden deleveraging and a freezing up of the financial system. Indeed, the massive expansion of central bank balance sheets was initially needed to counteract the sudden contraction in the rest of the financial system.

The declines in velocity and the money multiplier have followed somewhat different dynamics across the three economies. In the case of the US, a visible drop in 2009 was followed by a further gentler decline. In the eurozone, the money multiplier suffered a second sudden drop at the time of the 2012 eurozone debt crisis, followed by a partial recovery. In Japan, the money multiplier has been driven to new lows by the acceleration in QE under Abenomics. For all three countries, however, both velocity and the money multiplier currently sit at significantly lower levels than prior to the GFC (see Exhibit 44).

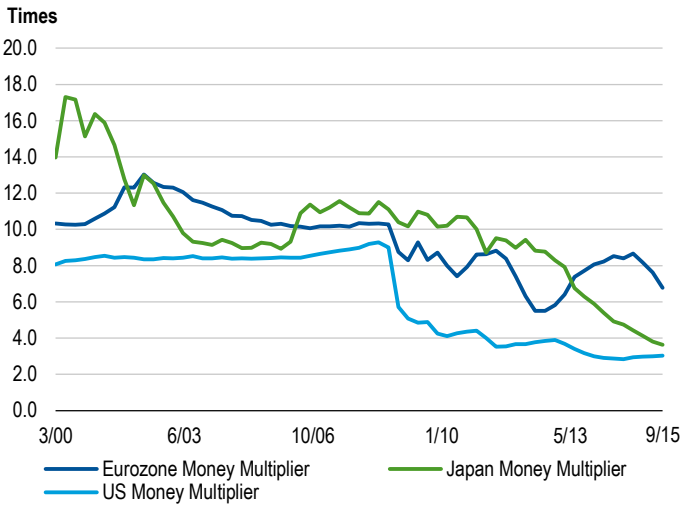
Money Velocity and Money Multipliers in the G3 Declined after the GFC

Exhibit 42: Money Velocity (Nominal GDP/Broad Money)
March 2000–September 2015



Source: Eurostat; European Central Bank; Cabinet Office, Japan; Bank of Japan; US Bureau of Economic Analysis; OECD Main Economic Indicators Database, accessed 1/16.

Exhibit 43: Money Multiplier (Broad Money/Monetary Base)
March 2000–September 2015



Source: European Central Bank; Bank of Japan; OECD Main Economic Indicators Database, accessed 1/16; US Federal Reserve.

Money Velocity and Money Multipliers Remain Below GFC Levels

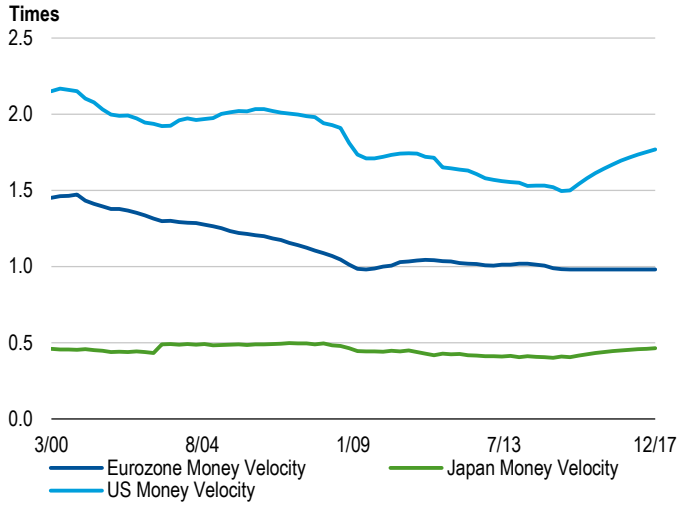
Exhibit 44: Price Regression
As at January 2016

	Eurozone	Japan	US
Monetary Multiplier (Broad Money/Monetary Base)			
Pre-2008	11.0	11.6	8.5
Whole Sample	9.6	10.1	6.5
Latest	7.6	3.8	3.0
Money Velocity (Nominal GDP/Broad Money)			
Pre-2008	1.3	0.5	2.0
Whole Sample	1.2	0.5	1.8
Latest	1.0	0.4	1.5
% Change Multiplier (Log)	-36%	-112%	-104%
% Change Velocity (Log)	-28%	-15%	-29%
Total Potential Price Impact	**64%**	**127%**	**133%**

Source: Calculations by Templeton Global Macro using data sourced from European Central Bank; Bank of Japan; OECD Main Economic Indicators Database, accessed 1/16; US Federal Reserve.

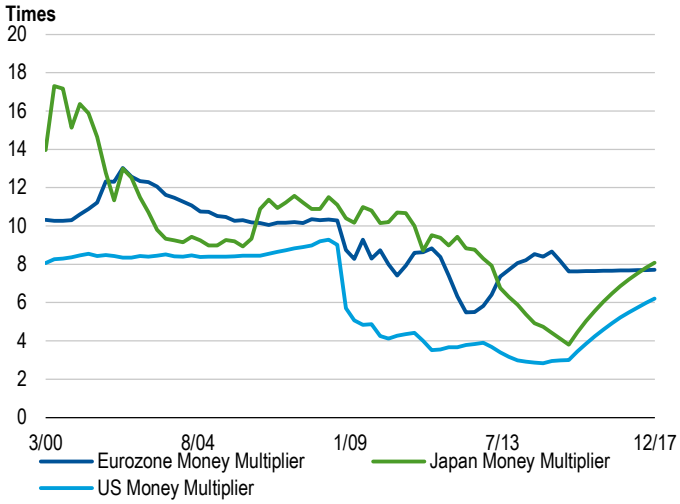
Money Velocity and Money Multipliers Are Forecasted to Rise

Exhibit 45: Money Velocity Forecast (Nominal GDP/Broad Money)
March 2000–December 2017E



Source: Calculations by Templeton Global Macro using data sourced from Eurostat; European Central Bank; Cabinet Office, Japan; Bank of Japan; US Bureau of Economic Analysis; OECD Main Economic Indicators Database, accessed 1/16. Estimates as at Q3 2015.

Exhibit 46: Money Multiplier Forecast (Broad Money/Monetary Base)
March 2000–December 2017E



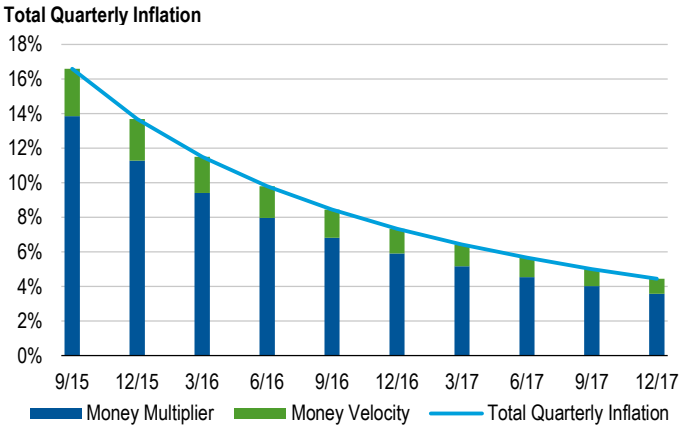
Source: Calculations by Templeton Global Macro using data sourced from European Central Bank; Bank of Japan; OECD Main Economic Indicators database, accessed 1/16; US Federal Reserve. Estimates as at Q3 2015.

The decline in velocity and the money multiplier explains (from a mechanical perspective) why the massive expansion in money supplies has coexisted with muted inflation rates. However, if velocity and money multipliers were to return to their pre-GFC levels, this would necessitate a sharp rise in prices to restore balance in the money market. Alternatively, central banks would need to take equally abrupt action to reduce money supplies.

How large would the impact be? If both velocity and the money multiplier were to suddenly snap back to their pre-GFC levels, other things being equal, this would imply a more than doubling of price levels in the US and Japan, and an over 60% rise in price levels in the eurozone.

Even a Gradual Adjustment in Money Velocity and Money Multipliers Would Impact US Inflation

Exhibit 47: US Inflation Impact
September 2015–December 2017E



Source: Calculations by Templeton Global Macro using data sourced from OECD Main Economic Indicators Database, accessed 1/16, and US Bureau of Economic Analysis. Estimates as at Q3 2015.

We are not suggesting that such a sudden jump in prices is even remotely plausible. For one thing, even if the full effect were to materialize, it would take place gradually. The charts above simulate a gradual normalization path, extending into 2017.

Even this gradual adjustment, however, would imply a substantial impact on inflation, illustrated in the chart below on a quarterly basis for the case of the US.

Again, we are not suggesting that we should brace for double-digit inflation in the near future. We do, however, want to highlight that several years of unprecedented monetary base expansion have created massive imbalances and dislocations that are not fully understood and will need to be reabsorbed with care. In this case, a correction of velocity and money multipliers toward pre-GFC levels could put additional pressure on inflation, complicating the normalization of monetary policy.

4. A Bit of History

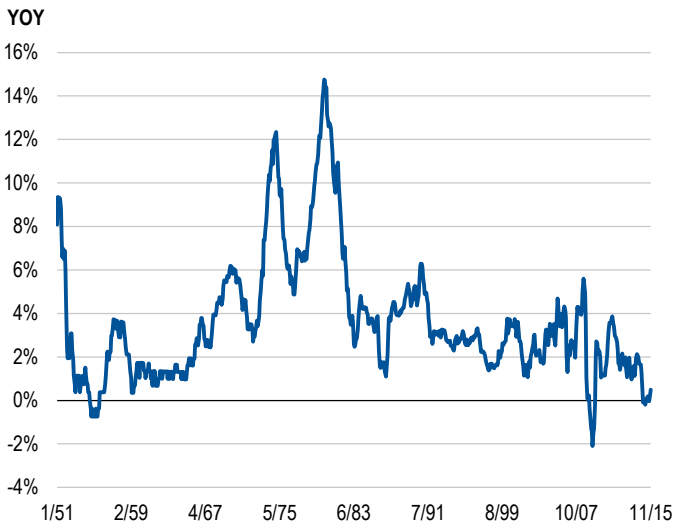
New Normal and Secular Stagnation—the catchphrases that have dominated the economic debate in the last few years suggest that we have entered a new state of the world, unlike anything that we have experienced before, and that it is destined to last a very long time. Slower US economic growth is considered by some inevitable, a *fait accompli*. And to younger generations of financial market participants, the idea of high inflation in advanced economies must seem quaint, a reference to something they might have heard about but have never experienced. After all, the GFC came on the heels of the Great Moderation, which was also characterized by low inflation rates in developed markets.

Forgetting the lessons of history carries risks. We think it is useful, therefore, to provide a brief historical overview. The purpose of this section is threefold: 1) to illustrate how the US has already alternated between extended periods of low inflation and extended periods of faster and stubborn price growth; 2) to analyze the key drivers of previous bouts of high inflation, as well as the strategies adopted and the costs involved in bringing inflation back down to lower levels; and 3) to draw potential lessons for the years ahead.

US consumer price inflation was low and stable at around 1.0%–1.5% during the late 1950s and through the mid-1960s. It accelerated in 1965 and reached 6% by 1969. After a brief decline, it spiked into double digits by 1974; after another partial downward correction it spiked again to nearly 15% in 1980. It was then brought sharply down during the first half of the 1980s.

US Inflation Since 1951

Exhibit 48: US CPI
January 1951–November 2015



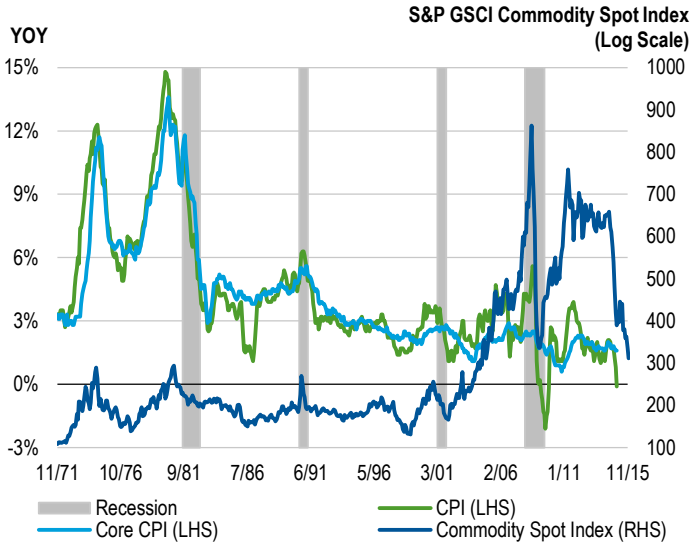
Source: US Bureau of Labor Statistics.

The period of high and rising inflation from 1965 to 1980 is commonly known as the "Great Inflation." It is worth considering in some detail because by the early 1960s inflation seemed to have been brought fully under control, and because reducing consumer inflation back to low levels proved difficult and costly in terms of lost economic activity.

The Great Inflation was caused by a combination of factors. Adverse supply shocks played an important role: The OPEC oil price shocks of 1973 and 1979 are well known, but the US economy also suffered a significant adverse shock to food prices in the early 1970s; fiscal policy turned expansionary in the late 1960s; productivity suffered a structural downshift around 1970; and wage and price controls under the Nixon administration in 1971–1974 caused additional volatility.

The Period of "Great Inflation" through the "Great Moderation" and up to the Present

Exhibit 49: US Headline and Core Inflation vs. Commodity Prices
November 1971–November 2015



Source: Bloomberg. Recessionary periods from 7/81–11/82, 7/90–3/91, 3/01–11/01 and 12/07–6/09.

A notable feature of the Great Inflation, however, is that consumer inflation started accelerating before the food and oil price shocks hit, and continued accelerating for about 15 years, with only two partial and temporary corrections. Levin and Taylor (2010) show that inflation expectations, which had been firmly anchored during the late 1950s and early 1960s, "rose markedly during the late 1960s, remained elevated at that plateau through the mid-1970s, and then rose at an alarming pace from 1977 until mid-1980."[16] Importantly, the Fed effectively monetized the government's debt during the 1960s as it attempted to mop up the excess Treasury securities that

16. Levin and Taylor consider both survey-based and market-based measures of inflation expectations. Source: Andrew Levin and John B. Taylor, "Falling Behind the Curve: A Positive Analysis of Stop-Start Monetary Policies and the Great Inflation," National Bureau of Economic Research Working Paper, 2010.

were flooding the market as a result of President Lyndon Johnson's efforts to finance the Vietnam War.

Levin and Taylor show that the evolution of the CPI growth rate during the Great Inflation is consistent with a Taylor rule, with the Fed's implicit inflation target rising by about 2 percentage points on two separate occasions, in Q2 1970 and in Q1 1976. Levin and Taylor note that these two break points are consistent with anecdotal evidence of significant political pressure on then-Fed Chairman Arthur Burns. Overt political pressure resulting in a more expansionary monetary policy stance would have persuaded the public that the Fed had a higher tolerance for inflation, triggering a rise in inflation expectations.

As our New Keynesian Phillips Curve analysis in Section 2 showed, inflation expectations and past inflation play the greater role in determining current inflation. The loss of Fed inflation-fighting credibility would therefore emerge as a primary culprit for the Great Inflation.

Blinder and Rudd (2013) offer a different reading, and argue that adverse supply shocks played a significantly more important role than expansionary monetary policy. Even under this interpretation, however, the rise in inflation expectations would seem to support the hypothesis that Fed credibility had been undermined. The loss of credibility might well have been exacerbated by the two Fed attempts to bring inflation back down, as in both cases the tighter monetary stance was abandoned and reversed before inflation had been brought fully under control, showing that the Fed could not tolerate the reduction in the pace of economic activity needed to tame inflation.

US monetary policy changed pace with the appointment of Paul Volcker as Fed chairman in late 1979. The Fed changed operating procedures and drove an unprecedented spike in the fed funds rate and a wider range of short-term interest rates. This time the Fed maintained a strongly disinflationary stance even as the US economy contracted by nearly 2% in 1982. Long-term inflation expectations started falling by late 1980, and inflation came crashing down, from nearly 15% in March 1980 to 2.6% in June 1983. Levin and Taylor also note that Chairman Volcker received the open confidence of President Ronald Reagan, underscoring the operational independence of the Fed.

What lessons should we draw from the experience of the Great Inflation? First of all, we believe it highlights the dangers of assuming that a structural shift has taken the inflation risk permanently off the table. By 1964, low and stable inflation could be taken for granted. A few years later, inflation was heading into double-digit territory, driven by a combination of exogenous shocks and policy mistakes.

US policymakers have already demonstrated their ability to learn from past mistakes. The lessons of the Great Depression helped guide the policy response to the GFC, with successful results. Nonetheless, there is currently a chorus of influential voices arguing that the Fed would do well to tolerate—if not explicitly adopt—a higher inflation target, to support a faster recovery and position itself at a safer distance from the zero bound for interest rates. At the same time, the collapse in commodity prices has increased the risk of adverse supply shocks.

We believe a combination of adverse shocks and policy mistakes comparable to that of the late 1960s and 1970s is very unlikely. A more moderate version of it, however, is not totally implausible. Even after the first fed funds hike last December, the Fed maintains an extraordinarily loose monetary policy stance while GDP growth is running above potential and the labor market is close to full employment. Many influential voices are urging the Fed to proceed with extreme caution. The December FOMC statement still indicates "The federal funds rate is likely to remain, for some time, below levels that are expected to prevail in the longer run." Taken at face value, this statement flags a risk that the Fed will consciously place itself behind the curve, even as the same statement shows the FOMC is aware that an excessive delay in policy normalization could require a more abrupt and possibly contractionary policy response later on.

The Fed is tackling a difficult policy normalization challenge in a highly uncertain environment. At the moment, however, FOMC statements indicate that the Fed may want to see a clear pickup in headline inflation before it steps up the policy tightening pace. Given that monetary policy acts with a lag, in our opinion this suggests that if the US recovery remains on track, risks to inflation will tilt to the upside in 2016—based also on the analysis we have developed in previous sections.

5. Fed Policy Shift and Outlook for US Yields

The Fed hiked interest rates last December by 25 bps. The move, which had been pondered and discussed for a very long period, raised the policy interest rate above the zero bound after more than seven years, and was the first interest-rate hike since June 2006.

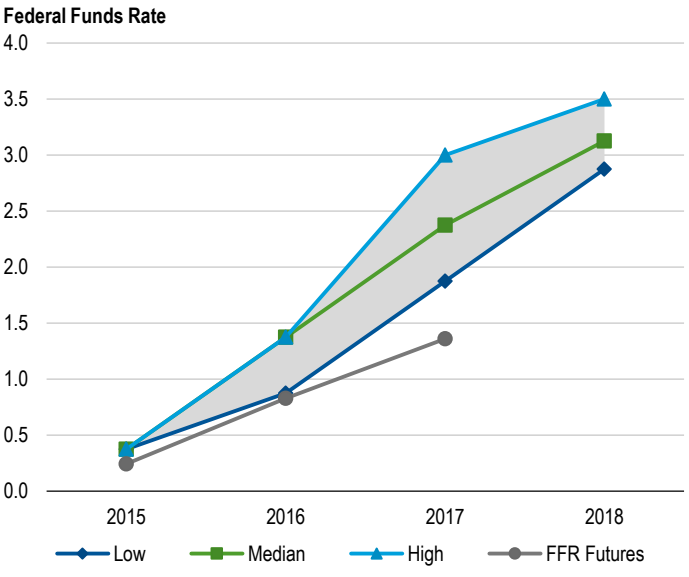
The immediate market reaction has been muted, partly because the rate hike had been fully anticipated, and partly because the Fed has been very careful to indicate that the monetary tightening path ahead will be prudent and gradual. The Fed has cautioned that monetary policy will be data-dependent, so that the pace of monetary tightening might accelerate or decelerate (and potentially even reverse) depending on incoming data on activity and inflation. However, as we noted in the previous section, the Fed has explicitly indicated that it expects to keep the fed funds rate below its equilibrium rate for quite some time. Moreover, FOMC members have over time reduced their estimate of the equilibrium policy interest rate, in a way that is conceptually consistent with the Secular Stagnation arguments.

Exhibit 50 shows the path of the fed funds rate as projected by the "dots," i.e., the levels where individual FOMC members expect the fed funds rate to be at the end of each of the next three years. The chart plots the median dot as well as the low and high ranges of the central tendency for each year, to give an indication both of the central tendency and the uncertainty around it—itself a measure of the divergence of views within the FOMC.

As Exhibit 50 shows, the median FOMC expectation points to four more 25-bp hikes over the course of 2016, with the fed funds rate rising to 3.3% by end-2018 before eventually reaching an equilibrium level of 3.5%. The chart also shows the current fed funds futures, which lie well below the FOMC median forecasts for both 2016 and 2017. In other words, markets expect that the pace of monetary tightening will be even more slow and moderate than the Fed. The next chart (Exhibit 51) also shows how the one-month fed funds futures implied yields have declined significantly over the past couple of years—except for a partial upward correction at the end of 2015, as the Fed made it clear that the first rate hike would occur in December.

The FOMC's Median Expectation Is Four 25-bp Rate Hikes in 2016

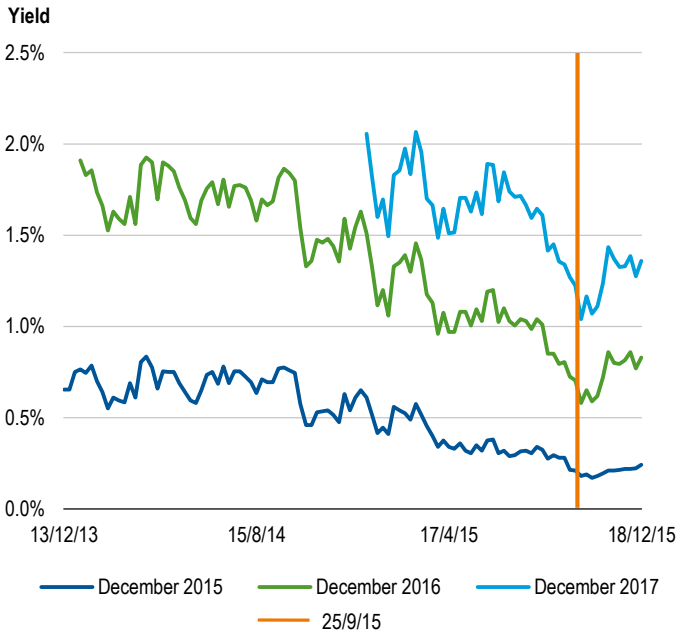
Exhibit 50: FOMC 16 December Dots Central Tendency
As at 16 December 2015



Source: US Federal Reserve Statements and Economic Projections, FOMC, 16/12/15.

Markets Currently Expect a Slower Pace of Rate Hikes than Previously Anticipated

Exhibit 51: 1-Month Fed Funds Futures Implied Yields
13 December 2013–18 December 2015



Source: Bloomberg. December 2016 data begin 1/14, December 2017 data begin 1/15. Estimates as at 12/15.

Markets, therefore, see the Fed's rate forecasts as excessively hawkish. Still, not only has the Fed explicitly stated that it will move with great caution, but its rate expectations are based on a set of economic projections that do not appear especially aggressive:

Fed Economic and Rate Forecasts

Exhibit 52: FOMC Economic Projections (Median)
As at September 2015 and December 2015

	SEPTEMBER 2015 PROJECTIONS				DECEMBER 2015 PROJECTIONS			
	2015	2016	2017	2018	2015	2016	2017	2018
Real GDP Growth	2.1	2.3	2.2	2.0	2.1	2.4	2.2	2.0
Unemployment Rate	5.0	4.8	4.8	4.8	5.0	4.7	4.7	4.7
PCE Inflation	0.4	1.7	1.9	2.0	0.4	1.6	1.9	2.0
Core PCE Inflation	1.4	1.7	1.9	2.0	1.3	1.6	1.9	2.0
Fed Funds Rate	0.4	1.4	2.6	3.4	0.4	1.4	2.4	3.3

Source: US Federal Reserve, FOMC.

As the table above shows, the Fed's December 2015 projections have GDP growth accelerating modestly in 2016, to 2.4%, and then slowing again toward 2%; the Fed projects that PCE inflation will (almost) reach the 2% target only by end-2017 at the earliest, in synchrony with core PCE inflation. As the pace of labor market improvement has so far surprised on the positive side, the Fed projects a further decline in the unemployment rate to 4.7% already by 2016.

In other words, the Fed forecasts that even as the labor market reaches full employment, the pace of economic growth will remain moderate, and inflation will rise extremely slowly toward its target.

Financial markets seem to be pricing in an even slower pace of inflation pick-up. We hold a different view. Our Phillips curve-based forecast developed in Section 2 projects that headline CPI should reach 2.3% by Q3 2016, with a rising tendency. Assuming that the gap between CPI and PCE would remain unchanged at its post-2000 average of 0.3 percentage points, this suggests that PCE will overshoot the Fed's year-end forecast already by September 2016.

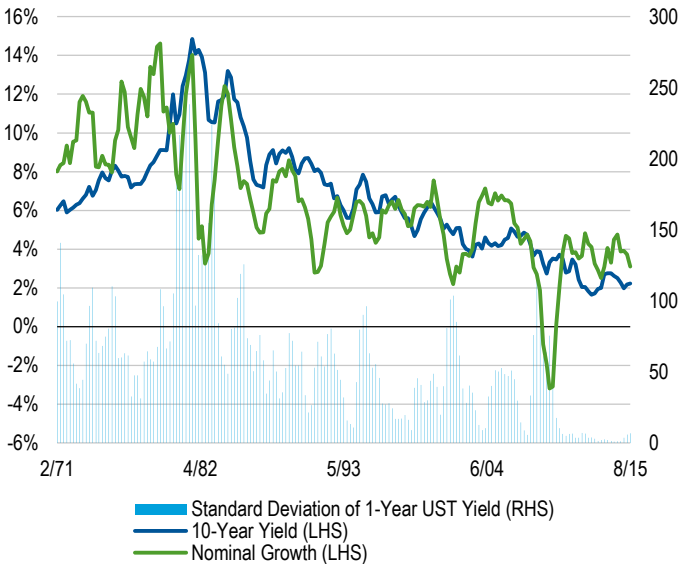
Our model therefore projects that inflation will recover somewhat faster than the Fed expects. This would open two possibilities: either 1) the Fed would respond to the faster recovery in inflation by accelerating the pace of tightening; or 2) the Fed would stick to the pace of tightening implied by the "dots" chart in Exhibit 50, leading markets to price in a risk of the Fed falling behind the curve and having to accelerate the pace of rate hikes down the road. In either case, this should lead to a more pronounced correction in yields.

5.1 Nominal GDP and Long-Term Yields

As the Fed carries out its policy normalization strategy, how are market yields likely to react? Economic theory tells us there is a link between nominal GDP growth and the long-term risk-free interest rate. In the chart below, we have illustrated this relationship for the US by plotting nominal GDP growth, the yield on 10-year constant maturity US Treasuries, and a rolling 1-year standard deviation of the 1-year Treasury yield to capture the degree of uncertainty on the path of short-term interest rates—and therefore the uncertainty on the path of monetary policy.

Long-Term Interest Rates Have Been Driven Below Nominal GDP Growth by QE

Exhibit 53: US: Long-Term Interest Rates and Nominal GDP Growth
February 1971–August 2015



Source: Calculations by Templeton Global Macro using data sourced from US Bureau of Economic Analysis and US Federal Reserve.

A simple visual inspection of the chart quickly reveals that:

1. Post-GFC, 10-year risk-free rates have remained significantly and persistently below the nominal GDP growth rate, reflecting the impact of QE and the overall exceptionally loose stance of monetary policy; and

2. Uncertainty on the path of short-term rates has been nearly eliminated, reflecting the impact of the Fed's forward guidance.

As the Fed normalizes monetary policy, the relationship between short-term interest rates, long-term yields and nominal GDP growth should also revert to historical norms. We are therefore interested in obtaining a more precise estimate of the likely path of 10-year Treasury yields based on nominal GDP growth.

To this purpose, we estimate a model of the 10-year Treasury yield as a function of 1-year nominal GDP growth and the volatility in the 1-year Treasury yield. To account for the high persistence in the two series, we use a Fully Modified OLS co-integrating vector estimation. We also adjust the standard errors using a Newey-West estimate of the long-run covariance matrix because the financial data exhibits significant conditional volatility. We run the model on quarterly data from Q2 1971 to Q3 2015. The table below summarizes the results of the estimation.

Significant Relationship Between Nominal GDP Growth and the 10-Year US Treasury Yield

Exhibit 54
Q2 1971–Q3 2015

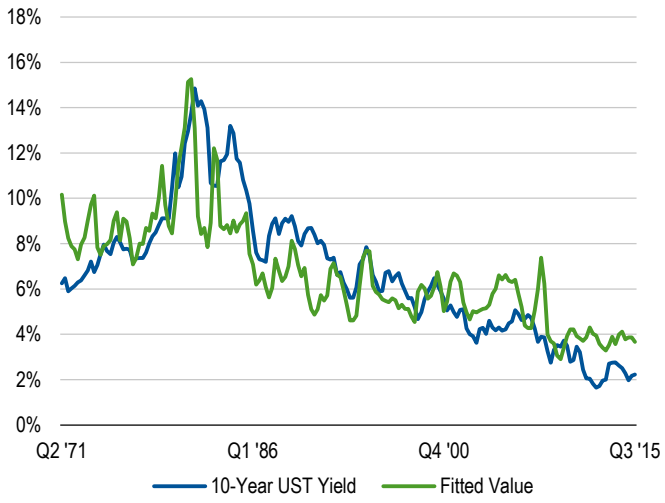
Variable	Coefficient	Std. Error	t-Statistic	Prob.
Nominal GDP	0.378771	0.084799	4.466669	0.0000
Constant	2.265925	0.600504	3.773373	0.0002
Standard Deviation of 1-Year Treasury	0.033716	0.005751	5.862613	0.0000
R-Squared	0.631989			
Adjusted R-Squared	0.627783			

Source: Calculations by Templeton Global Macro using data sourced from US Federal Reserve, as at 21/12/15.

The regression finds a robust relationship between nominal GDP growth and the 10-year yield, and the short-term volatility variable is highly significant: higher uncertainty on short-term interest rates leads to higher long-run nominal yields. The chart below plots the fitted value of the 10-year yield predicted by our model against the actual yield.

The Model's Fitted Value of the 10-Year US Treasury Yield Tracks with the Actual Yield

Exhibit 55: 10-Year US Treasury Yield vs. Fitted Value
Q2 1971–Q3 2015



Source: Calculations by Templeton Global Macro using data sourced from US Federal Reserve.

Between Q1 2010 and Q3 2015, the model overpredicts actual long-term yields by 130 bps on average. In other words, a combination of QE and forward guidance has kept long-term Treasury yields nearly 1.5% pp below the level that would be historically consistent with actual nominal GDP growth.

Our model indicates that going forward, long-term yields will be subject to three distinct upward pressures:

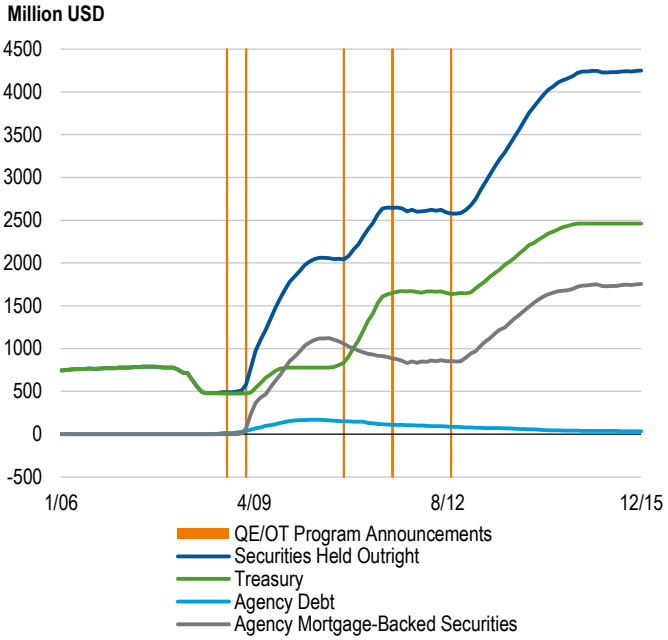
1. An acceleration in nominal GDP growth. Even if real GDP growth picks up only marginally in 2016, we are projecting a much more significant adjustment in inflation and therefore in nominal GDP growth;

2. An increase in short-term volatility. As the Fed normalizes policy, forward guidance is being replaced by a data-dependent stance. This should result in higher volatility, especially if—as we project—actual inflation developments outpace the Fed's and the market's expectations; and

3. A fading out of the outsized impact of exceptionally loose monetary policy on the Treasury market. This would accelerate once the Fed begins to also normalize the size of its balance sheet, phasing out its current policy of reinvestment of assets (see Exhibit 56 below).

The Fed's Demand for US Treasuries Fades as it Normalizes its Balance Sheet

Exhibit 56: Federal Reserve Balance Sheet and Unconventional Monetary Policy
January 2006–December 2015



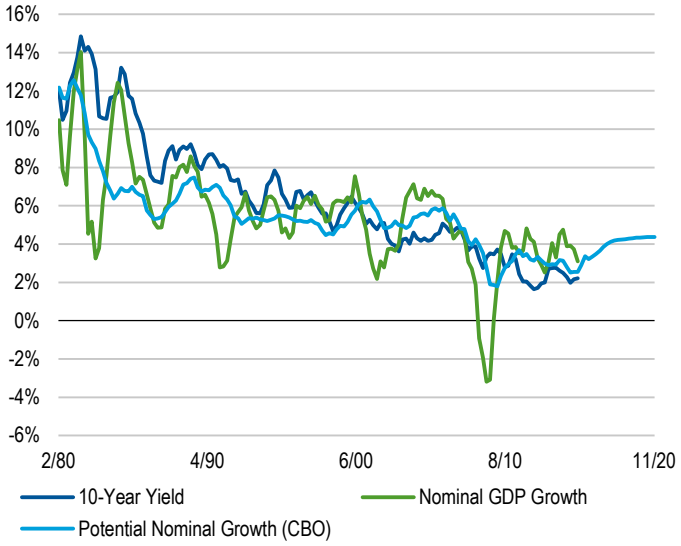
Source: US Federal Reserve.

In other words, going forward we expect that long-term yields should gradually recouple to nominal GDP growth (which would imply a rise of 130 bps at current levels). In turn, nominal GDP

growth would be boosted by a recovery in headline inflation. The chart below shows the path of potential nominal GDP growth projected by the Congressional Budget Office, indicating that over time long-term yields should move toward the 5% level as inflation, monetary policy and short-term interest-rate volatility revert to more normal levels.

Long-Term Yields Should Trend Back Toward 5% as Monetary Policy Normalizes

Exhibit 57: US Treasury 10-Year Yield, Nominal GDP Growth and Potential Nominal Growth
February 1980–November 2020E



Source: US Bureau of Economic Analysis, US Congressional Budget Office and US Federal Reserve. Data for 10-year yields and nominal GDP growth through 8/15. Estimates as at 8/15.

5.2 Is There Still a Global Savings Glut?

Is there a risk that excess desired savings at a global level might keep long-term yields at low levels, as during the last Fed tightening episode?

The global savings glut hypothesis was put forward by Ben Bernanke in 2005 as an explanation of Alan Greenspan's "conundrum," namely the fact that US long-term bond yields stagnated at relatively low levels even as the Fed hiked policy rates.[17]

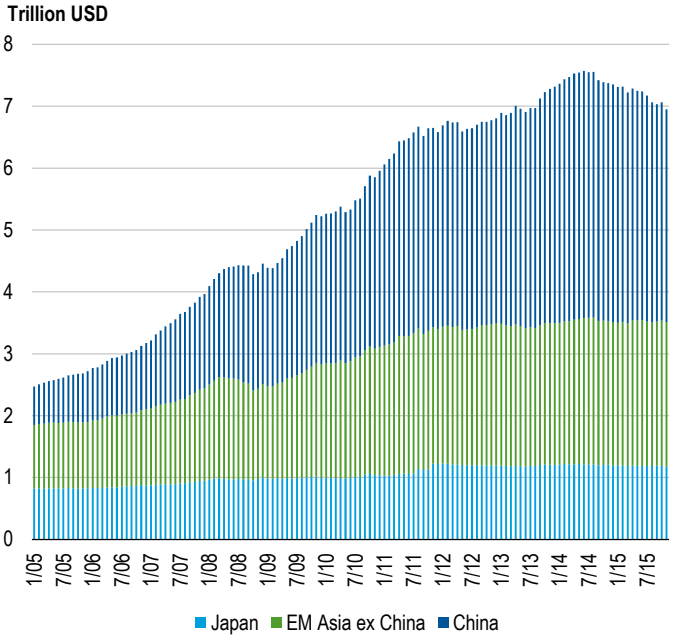
From the beginning of the past decade until the eve of the GFC, the key elements of the savings glut seemed to be in place: China ran a large current account surplus, accumulating FX reserves at a fast pace and investing them mostly in USD-denominated assets; other Asian EMs also accumulated large stocks of dollar assets, to build a cushion against the risk of a crisis; and the commodity price boom fueled significant asset accumulation by commodity-exporting countries.

The trends that drove excess global savings prior to the GFC, however, have now weakened or reversed: China is rebalancing its growth model toward domestic consumption (as we argued in a previous edition of our Global Macro Shifts); its current account surplus has declined from an average of 9% of GDP during 2006–2008 to 2% of GDP in 2014 and an estimated 3% of GDP in 2015. China's rebalancing is a long-term process, and it is both a strategic choice and a necessity, as an economy of China's size cannot rely on an export-driven growth model. China's stock of FX reserves has begun to decline.

Many other EMs, notably in Asia, already enjoy adequate FX reserves levels, and the pace of reserve accumulation has tapered off or stopped altogether. The appreciation of the USD has also eliminated the need to increase FX reserves as a means to prevent local currency appreciation and preserve competitiveness.

The Pace of FX Reserve Accumulation in Asia Has Tapered

Exhibit 58: FX Reserves in Asia
January 2005–November 2015



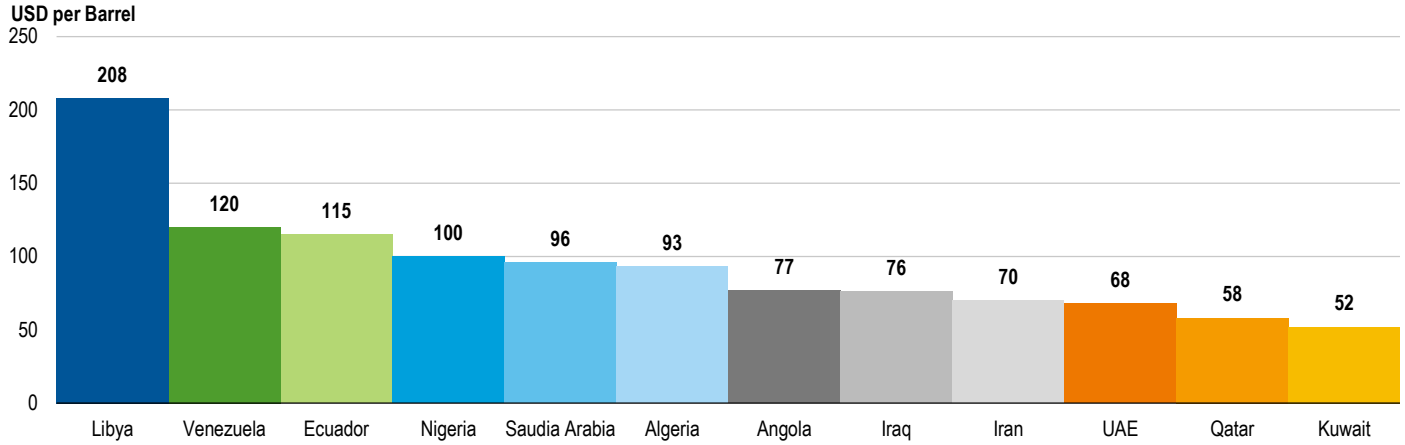
Source: Bloomberg.

The collapse in commodity prices implies that commodity producers are no longer in a position to accumulate reserves—to the contrary, many commodity exporters are now forced to decumulate savings in order to delay or smooth a downward adjustment in spending levels. Exhibit 59 illustrates the level of prices required in a variety of oil exporters to allow them to break even on their fiscal accounts. Clearly, most of these countries will be forced to burn through their accumulated savings, if not outright borrow to meet their fiscal commitments.

17. Source: Ben Bernanke, "The Global Saving Glut and the US Current Account Deficit," FRB, 2005.

At Today's Oil Prices, Several Oil Exporters Will Need to Finance their Fiscal Commitments

Exhibit 59: Fiscal Breakeven Oil Price
As at 31 December 2015



Source: Calculations by Templeton Global Macro using data sourced from IMF.

Finally, demographic trends also point toward reduced savings levels, as population aging in the US, most other advanced economies and China should lead to higher consumption and lower savings.

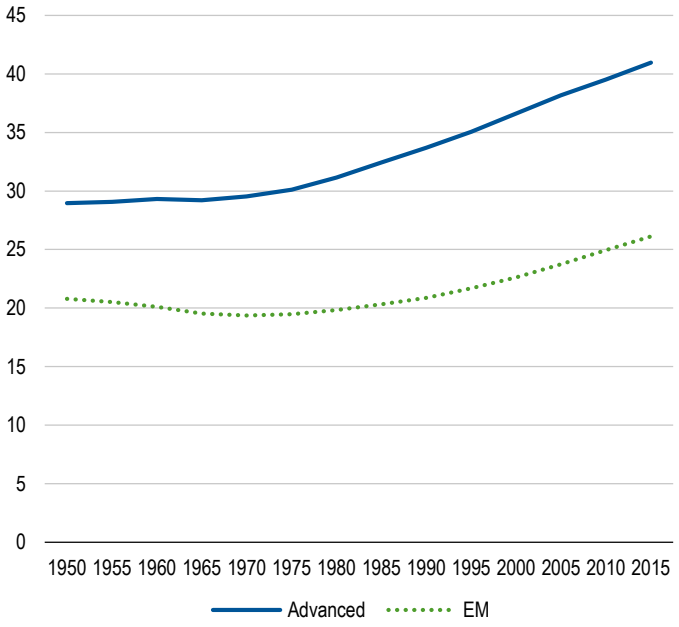
It seems therefore unlikely that global trends will once again cap US long-term yields.

Moreover, the US dollar appreciation which has allowed many emerging markets to maintain competitiveness is in itself a sign of a resilient US recovery. When the Secular Stagnation theory was re-proposed in late 2013, the US economy was expanding at a sub-par 1.5% and the unemployment rate was still at 7%. In the following two years, growth has accelerated to a relatively healthy 2.5% and the unemployment rate has dropped to just 5%.

Over the last two years, therefore, a resilient US economy with a rapidly improving labor market has negated the predictions of the Secular Stagnation theory, while the global savings glut has been unwinding. These developments, in our view, strongly support our scenario of a gradual normalization in both inflation and interest rates.

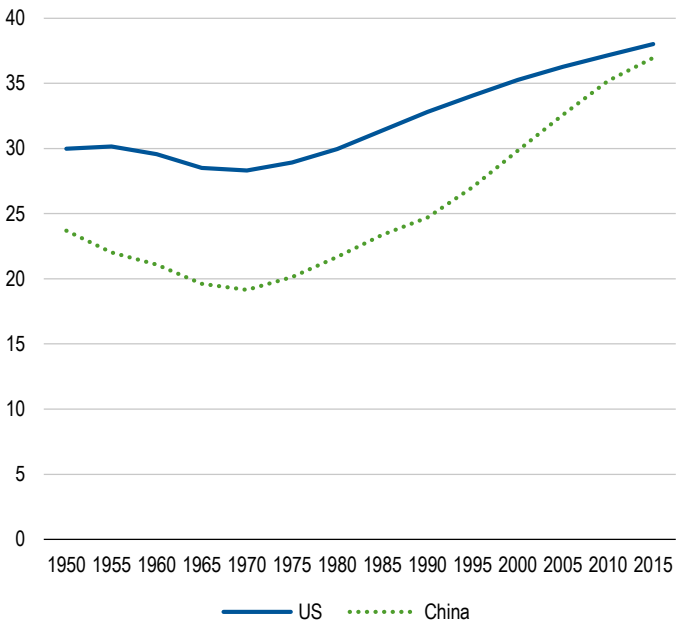
Population Aging Should Drive Consumption Up and Savings Down

Exhibit 60: Median Age: Advanced and Emerging Markets
1950–2015



Source: UN Population Survey, 7/15.

Exhibit 61: Median Age: US and China
1950–2015



Source: UN Population Survey, 7/15.

Conclusion

Six years into a relatively healthy global recovery, the economic debate is still often dominated by a deep-seated pessimism. Proponents of the Secular Stagnation hypothesis argue that global growth will be permanently lower, and that the global economy is at serious risk of stagnation and/or deflation.

The fact that inflation rates remain low across advanced economies after several rounds of QE has led many to assume that inflation has vanished forever. Yet, as the ECB's Peter Praet has recently warned, "If you print enough money, you will always get inflation. Always."[18] To be sure, when aggregate demand is weak, inflation will first show up in asset prices. But with the global economy expanding at a decent pace, sooner or later consumer prices will rise too.

In this paper, we have argued that many observers have given excessive weight to headline inflation temporarily depressed by the oil price collapse of the past 18 months. Inflation is already high in several EMs, and in the US and other developed markets, a recovery of commodity prices from the currently extremely low levels would quickly feed into higher headline inflation. The US labor market is essentially back to full employment, and our analysis suggests that wage pressures are set to increase. Wages are not a good statistical predictor of inflation, but higher wages do support household incomes and spending, which is consistent with rising prices. Moreover, our analysis has shown that the US Phillips curve has steepened, not flattened as many have argued—this implies that prices should respond more to a tightening labor market.

Assuming that inflation is dead can be dangerous. The Great Inflation of the 1970s was caused largely by a loss of central bank credibility, which un-anchored inflation expectations. The Fed has stated it wants to see a significant pickup in inflation before stepping up the pace of rate hikes—this might prove a dangerous gamble. The monetary overhang created by QE poses an additional risk: Should money velocity and the money multiplier start reverting to their long-run norms, they would put additional pressure on inflation, making the Fed's job even harder.

With all this, we believe financial markets are underestimating the potential for a rise in US yields—also because the key elements of the old "savings glut" are no longer in play. Our inflation forecasts, while not overly aggressive, are significantly above those of the Fed and the market. We believe widespread underestimation of inflation risks, together with the prospective normalization of the relationship between long-term interest rates and nominal GDP growth, sets the stage for a significant correction in Treasury yields.

18. Source: European Central Bank.

WHAT ARE THE RISKS?

All investments involve risks, including possible loss of principal.

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For Exhibits 1, 41, 45, 46, 47, 50, 52 and 57, there is no assurance that any estimate or projection will be realized.

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