

Investment strategy insights

The neutral state vs. the business cycle: Why does it matter?

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Jason Draho, Head of Asset Allocation Americas, jason.draho@ubs.com; Justin Waring, Investment Strategist Americas, justin.waring@ubs.com

- The "neutral" state concept may sound unfamiliar, but most investors have considered it, at least implicitly. That's because it's vital and necessary for evaluating the business cycle and long-term investments.
- An economy that goes through cycles must be oscillating around long-term trend lines, proxies for the neutral state. Formally, it refers to an economy operating at its long-run sustainable equilibrium. The economy can't be perpetually away from the neutral state since market forces will push it back to equilibrium.
- Three variables summarize the neutral state: potential growth (g^*); the natural rate of interest (r^*); and the non-accelerating inflation rate of unemployment (NAIRU). These values are unobservable, difficult to estimate, and change over time.
- We use the neutral state values as reference points for the cycle indicators in our **Bull Market Monitor**, which helps gauge if the economy is "hot" and if financial conditions are "tight."
- How and why the neutral state has and will evolve is also valuable for strategic asset allocation because it reflects long-term economic trends.

Figuring out where we are in the US business cycle is essential for asset allocation. It's why we created our [Bull Market Monitor \(BMM\)](#) to track the cycle's evolution and the risk of a recession. The BMM uses a selection of indicators to gauge if the economy is overheating or if financial conditions are restricting growth. While the current status of these indicators is obviously necessary to make this assessment, equally important are the "neutral" state values of growth, unemployment, and interest rates. This begs two questions: What is the neutral state? And why does it matter?

The "neutral state" might sound like a foreign concept, but it is implicitly embedded in the way that investors think about market cycles. If an economy goes through cycles, then by definition it must be oscillating around a long-term trend line. This trend line is a proxy for the neutral state, which is determined by the economy's structural properties. Formally, the neutral state refers to the economy operating at its long-run sustainable equilibrium – it's growing neither too fast nor too slow to cause inflation to accelerate or fall. The economy can't be perpetually away from the neutral state since market forces will push it back to equilibrium, giving rise to the economic cycle.

Thus, we can't properly evaluate the current economic expansion without also examining the neutral-state values. These values are reference points for the BMM indicators to determine whether the economy is overheating and if monetary policy is accommodative or restrictive. They are also inputs to the Federal Reserve's policy-setting process. The challenge is that the neutral state is not directly observable. The good news is that – despite the economy's complexity – a few variables adequately summarize it: potential growth (g^*), the natural rate of interest (r^*), and the non-accelerating inflation rate of unemployment (NAIRU). The bad news: these variables are difficult to estimate and they change over time.

Yet examining the neutral state is worth the effort. Doing so provides helpful context for reading the cycle tea leaves and disentangling cyclical trends in the data from an evolving neutral state. It's also valuable to understand why the neutral state has changed because it can provide insight into how the economy evolves from here. That in turn matters for the medium-term outlook of this unusual business cycle, as well as for strategic asset allocation decisions.

The neutral-state concept

Equilibrium is a fundamental concept in economic analysis. The equilibrium price in a competitive market is set where supply equals demand. If demand exceeds supply, the price will rise to induce more supply and demand will fall, and vice-versa when supply exceeds demand. Market forces get prices back to equilibrium if they've deviated for some reason. This argument applies to the economy as a whole. At a macro level, equilibrium entails aggregate demand for all goods and services equaling aggregate supply, and aggregate savings equal aggregate investment, which determines the market interest rate.

The economy in equilibrium is the neutral state, with a caveat: the economy isn't static; it grows and evolves over time. Thus, the neutral state refers to the economy growing at a sustainable pace – i.e., aggregate demand and aggregate supply grow at the same rate. That way, big price adjustments aren't necessary to clear markets. In other words, inflation is stable: not too high, not too low. The inflation rate in the neutral state is a byproduct of these variables mentioned – potential growth, the natural rate of interest, and NAIRU – as well as the target rate set by central banks.

g^* : Potential growth

An economy's potential growth rate – also called potential output – is the rate at which it can grow sustainably without causing inflation to rise or fall. An economy grows for two reasons: more people are working to produce goods and services; and workers become more productive, with higher output per unit of labor. Formally, g^* is the sum of labor force growth and productivity growth.

Potential growth differs from how actual economic activity is measured. Gross domestic product (GDP) is the sum of consumption,

Three variables adequately summarize the neutral state: potential growth (g^*), the natural rate of interest (r^*), and the non-accelerating inflation rate of unemployment (NAIRU)

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- 2) workers become more productive, with higher output per unit of labor.

investment, government spending, and net exports, and their annual aggregate growth is GDP growth. Economists have reasonably accurate data for these GDP components and how they grow over time. By contrast, g^* is an economic concept, not an observable number, and must be estimated. Labor force growth is relatively steady and predictable, but measuring and forecasting productivity growth is difficult and far less certain.

r^* : Natural rate of interest

The natural rate of interest r^* is the real short-term interest rate that would prevail when the economy is growing at g^* and inflation is stable. While central banks set short-term interest rates, r^* is a result of long-term economic factors beyond their influence. However, the equilibrium federal funds rate does equal the sum of r^* and the target inflation rate. It also provides an anchor for the behavior of interest rates more generally, once cyclical or other factors have died out.

The determinants of r^* are reasonably well understood, but formal models of these relationships are at best an approximation. There is a clear positive relationship between r^* and g^* , primarily due to productivity growth. An economy capable of growing faster will require a higher r^* to keep inflation stable. Demographics also impact r^* because they affect aggregate savings. When the desire to save is high, the economy will require a lower r^* to equate savings and investment. This can happen as the population ages and saving for retirement takes on greater urgency.

NAIRU: Non-accelerating inflation rate of unemployment

NAIRU is the level of the unemployment rate below which inflation will start to accelerate. It evolved from the concept of the natural rate of unemployment, which is the long-run equilibrium rate determined by the structure of the economy and labor markets, and is independent of monetary policy and inflation. Like potential growth and the natural rate of interest, it's not observable. But it lacks the theoretical grounding of the other two, which is the basis for estimating their values.

By contrast, NAIRU is an empirical observation based on the Phillips curve – the inverse relationship between the unemployment rate and inflation. By definition, inflation is steady when unemployment is at NAIRU, but below this rate inflation should rise at an accelerating pace the further unemployment falls. Evidence during recent decades suggests the Phillips curve is now quite flat, calling into question the relevance and even the existence of NAIRU. But it's premature to proclaim the demise of NAIRU – the Fed hasn't – as the results depend on the exact data used.

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The current neutral state

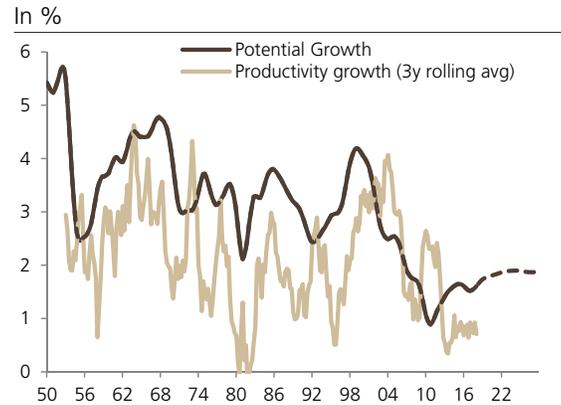
Estimating the neutral-state variables isn't easy, and after starting with g^* the task gets progressively harder. Thus, all estimates should be viewed with some circumspection. Potential growth is at least based on observable and somewhat predictable data. By contrast, estimating r^* may require difficult-to-measure variables such as the intertemporal elasticity of substitution in consumption – i.e., how willing individuals are to consume in the future versus now. NAIU's lack of any theoretical guidance, and dependence on many possible factors, results in the widest confidence band around the estimate.

Estimates for US potential growth vary, but most are within a few tenths of the Congressional Budget Office's current estimate of 1.6%. This is a slight improvement from a few years ago, but it's less than half the 3.6% average from 1950 to 2000 (see Fig. 1). The low level isn't just a post-financial-crisis problem, since the decline began in the early 2000s, and labor force and productivity growth both contributed to the fall. The labor effect was at least predictable; it was known that baby boomers would start to retire in large numbers in the late 2000s. Consequently, labor force growth averaged only 0.6% from 2004 to 2014, down from 1.6% from 1994 to 2004, and is expected to grow even slower from 2014 to 2024 (see Fig. 2).

Productivity growth's fall from grace has been sharper and harder to explain. The less-than-1% average over the past five years is the worst stretch since the early 1980s. Nor is this a US-specific financial-crisis story. Productivity growth started falling in 2004 in almost all advanced economies. In fact, apart from a 10-year surge from 1995 to 2004, it has been mostly below 2% since 1980. Still, the recent decline is puzzling, given the technological disruption that should presumably generate productivity benefits. While those gains could be mismeasured – or truly less than hoped for – low levels of private and public investment have likely weighed on productivity. Without new capital, it's hard for workers to be more productive.

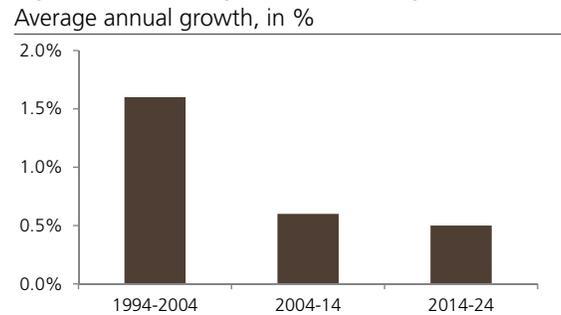
The decline in r^* – at least the Fed's estimate – has been going on since the late 1990s, accelerating around the financial crisis, with the current estimates ranging from 0–0.5% (see Fig. 3). This is consistent with the downward trends in g^* and productivity growth, aided by the tailwind of falling inflation, and especially inflation volatility. Either way, the rate is far lower than it was for the second half of the 20th century, which has major consequences: it shifts down the entire yield curve, significantly reducing the returns investors can expect from fixed income generally, while lifting equity valuations.

Fig. 1: Potential growth and productivity growth are near multi-decade lows



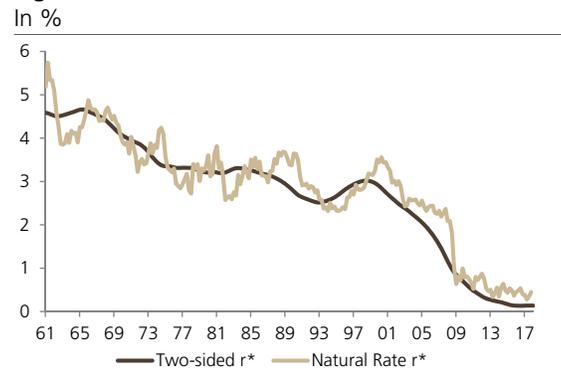
Source: Congressional Budget Office, UBS, as of 6 June 2018

Fig. 2: Labor force growth is slowing



Source: Bureau of Labor Statistics, UBS, as of 6 June 2018

Fig. 3: r^* estimates are close to zero



Source: Federal Reserve, UBS, as of 6 June 2018

NAIRU has also fallen over the past four decades, and the Fed currently puts it at 4.6%. But the difficulty of estimating NAIRU is evident in Fig. 4. The long-term decline was interrupted after the financial crisis, when NAIRU rose for about two years before resuming its decline. The rationale at the time was that structural impediments in the labor market and the possibility of unemployed individuals becoming unemployable would lead to a permanently higher unemployment rate. But with the US economy consistently producing about 200,000 new jobs each month for the past six years, and with the unemployment rate continually falling, it became clear that NAIRU was too high. But the correct number remains elusive. Some Fed officials have publicly speculated that NAIRU is actually much lower, around 3.5%.

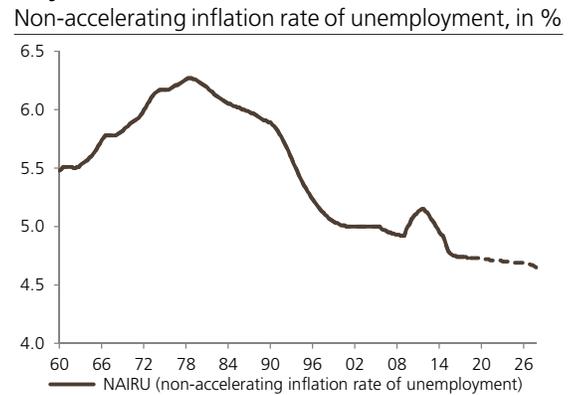
A decline in g^* and r^* over the past decade was probably unavoidable. Harvard economists Kenneth Rogoff and Carmen Reinhart have shown that it takes six to seven years on average for an economy to fully recover from a financial crisis. Deleveraging, repairing balance sheets, and redeploying assets to more productive uses are growth impediments. This effect is clearly evident in GDP growth, which inflected lower around the financial crisis (see Fig. 5). Yet now that these structural headwinds have largely abated, the question is whether the weak recovery – and the impact on g^* and r^* – was due primarily to a temporary cyclical phenomenon or to long-lasting structural changes to the US economy. Demographics clearly fall mostly in the latter camp, but it's hard to be as definitive on other factors.

The future neutral state

How the US economy functions has changed over the past decade, due to technological disruption, demographic trends, and rising inequality. Quantifying that impact on the neutral state is tricky. But what really matters for our BMM evaluation, for the Fed, and for investors wondering if r^* has permanently changed, is where the neutral state is headed and how quickly it gets there. According to CBO and Fed analysis, the secular declines in g^* and r^* have already been halted and are forecast to increase very modestly over the next five to 10 years. By contrast, the CBO expects NAIRU to continue declining because of an aging population that shrinks labor force participation.

Permanent changes to the neutral state – whether positive or negative – matter a great deal for investing. Optimistically, faster productivity growth that raises g^* could elongate the cycle by mitigating the risk of overheating due to a tight labor market and capacity constraints. By extension, it could also lift r^* , which would increase the number of rate hikes necessary before monetary policy becomes restrictive. The unpleasant scenario is that g^* and r^* stay at their current low levels despite policymakers' best efforts. In this case, actual GDP growth should trend down to 1.5%, or top out there after a recession, while interest rates could retest their record lows.

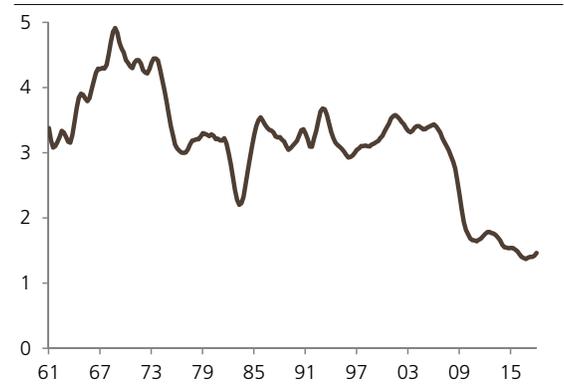
Fig. 4: Estimated NAIRU has been falling, which may continue



Source: Federal Reserve, UBS, as of 6 June 2018

Fig. 5: US GDP growth has been structurally lower post-GFC

10-year rolling average quarterly GDP growth, annualized, in %



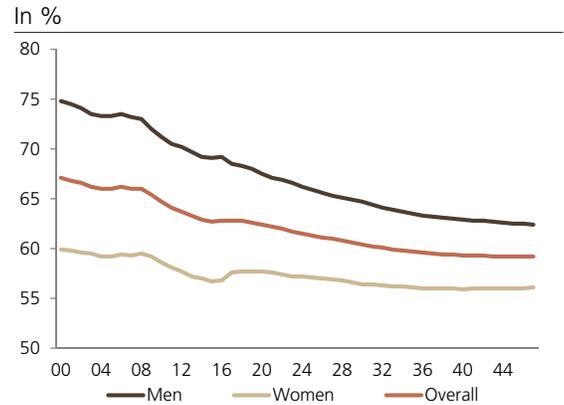
Source: Bloomberg, UBS, as of 6 June 2018

Thus, the future neutral state hinges on getting potential growth higher, and quickly. Barring an unexpected change in the willingness to work, this won't happen because of greater labor force participation. The Bureau of Labor Statistics forecasts a continually declining rate because of an aging population, which will be difficult to reverse with policy actions (see Fig. 6).

This puts the onus on productivity growth, which is very difficult to forecast with any confidence. The optimistic case is based on three arguments:

1. Productivity growth may actually be higher than estimated because it's being mismeasured. If true, that would immediately raise potential growth, alleviating some overheating risk. While technological progress seems to be evident everywhere but in the productivity data, measurement error is unlikely to be large.
2. A surge in capital investment, triggered by corporate tax reform, could provide at least a modest boost to labor productivity. In recent years, corporate investment has barely exceeded depreciation (see Fig. 7). Increasing, not just replacing, the capital stock should make workers more productive. A 24% increase in capital sending reported by S&P 500 companies during the first-quarter earnings season suggests the trend is in the right direction. But it could take enormous investment to really move the productivity needle.
3. Since technological breakthroughs often take years to actually filter into business operations that improve productivity, it may be that those occurring in the past 10–15 years will only now start to be realized.

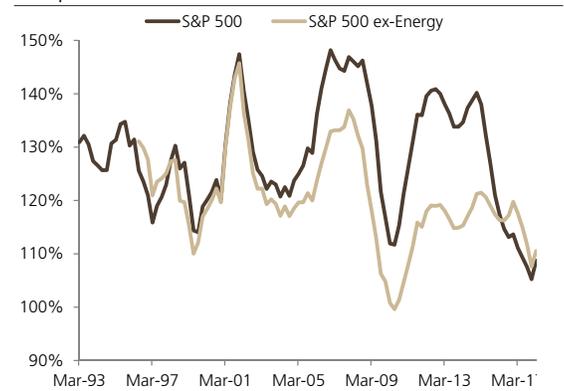
Fig. 6: Labor force participation rates should continue declining



Source: Congressional Budget Office, UBS, as of 6 June 2018

Fig. 7: Capital spending has barely kept up with depreciation in recent years

Capital expenditure divided by depreciation, S&P 500 companies



Source: Factset, UBS, as of 6 June 2018

The neutral state in the Bull Market Monitor

The neutral-state variables are key inputs to our Bull Market Monitor, which is designed to evaluate the cycle's evolution, how long the expansion can last, and when a recession may start. The BMM is based on indicators (GDP growth, the labor market, inflation) to gauge whether the economy is overheating and if financial conditions (monetary policy, yield curve, credit availability) are restricting growth (see Fig. 8). Where applicable, the neutral-state values are the midpoint for assessing whether the indicators are signaling an overheating economy or restrictive financial conditions. Inflation doesn't have an inherent neutral-state level, and instead corresponds to the Fed's inflation target of 2%.

To start, we compare current and forecasted GDP growth to potential growth. The economy can grow faster than potential for only so long before capacity constraints bind and inflation risks rising well above the 2% target. As weak as this expansion has been, the 2.15% average growth over 2010 to 2017 is above potential (see Fig. 9). This persistent outperformance was possible because of significant slack in the economy post-crisis, but that's been worked off and the output gap is now closed.

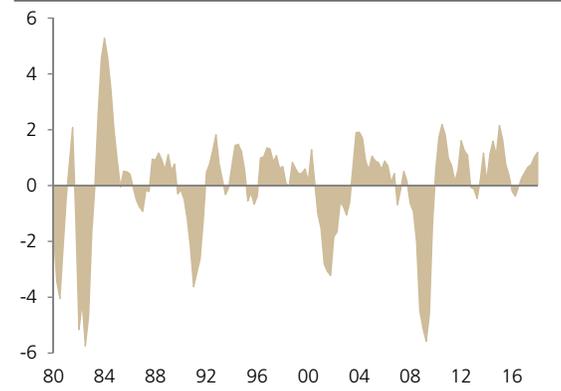
The labor market is also part of the evaluation for economic overheating. The 3.8% unemployment rate is well below a NAIRU of 4.6%, also suggesting a "hot" economy (see Fig. 10). In past cycles, the rate didn't stay this far below NAIRU for long before a recession began. But wage growth was also much higher at comparable unemployment rates – average hourly wage growth is now around 2.7% versus over 4% in prior cycles. To this point in the cycle, high unemployment enabled job growth to exceed long-run labor supply trends, helping to suppress wage growth. But wage growth will presumably accelerate given the tightness of the labor market, unless a productivity growth spurt dampens this effect.

The natural rate r^* is the reference point for the Fed's monetary policy stance: it's restrictive, neutral, or accommodative when the real federal funds rate is below, at, or above r^* . Based on an r^* estimate of 0.5%, and with inflation close to the 2% target, the neutral fed funds rate is about 2.5%. That's more than three Fed rate hikes away from the current effective fed funds rate of 1.7%, so policy is currently accommodative (see Fig. 11). We reach the same conclusion comparing the federal funds rate to the Fed's 2.8% "dot plot" estimate of the long-run neutral fed funds rate. Only once the fed funds rate gets above 3% is policy likely to become restrictive for growth.

But that depends on where the neutral state is in the coming years. If labor market slack is greater than currently assumed, NAIRU may actually be below 3%. Likewise, if capital spending accelerates and finally assumes its typical cyclical pattern, productivity growth could spurt because labor has been starved of new capital investment. The resulting rise in g^* and r^* could go a long way in extending the cycle. For these reasons, monitoring the neutral state is a critical step in evaluating the cycle.

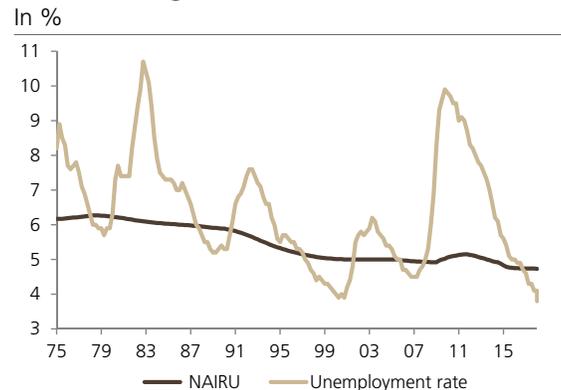
Fig. 8: Actual GDP growth has exceeded potential for most of the past decade

Actual quarterly GDP growth (year-over-year) minus potential growth, in %



Source: Bloomberg, Federal Reserve, UBS, as of 6 June 2018

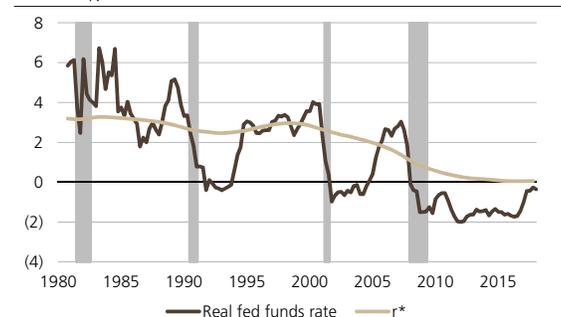
Fig. 9: The unemployment rate doesn't stay below NAIRU for long



Source: Bloomberg, Federal Reserve, UBS, as of 6 June 2018

Fig. 10: Monetary policy is still accommodative

Real fed funds rate, r^* (estimate of the natural rate of interest), in %



Source: Bloomberg, UBS, as of 6 June 2018

The asset allocator's dilemma: what's cyclical vs. a change to neutral?

The ultimate goal of evaluating the business cycle and the neutral state is to make smarter asset allocation decisions. It matters greatly for the allocation if, for example, the expansion is close to ending, or if r^* stays permanently low. The first scenario is relevant for making tactical tilts to the portfolio, while a secular outlook of continued low interest rates will influence strategic asset allocations. The challenge to assessing the data and our BMM indicators is disentangling cyclical trends from potential secular changes in the neutral-state variables since many factors affect both.

Recent inflation data illustrates this challenge. Actual inflation repeatedly fell short of expectations in the first half of 2017, suggesting there was still ample slack in the economy. But this outcome could have also reflected the disinflationary effect of new technologies offsetting a normal cyclical rise in inflation. Then there's the possibility that this simply reflected month-to-month randomness of inflation data, and was not indicative of either cyclical or secular forces. All of these explanations could be valid, but it's impossible to discern their relative magnitudes.

Looking ahead, distinguishing cyclical versus secular (or neutral state) developments is unlikely to get any easier. After a decade of unprecedented developments – e.g., the massive expansion of central bank balance sheets, China's growing influence on the global economic cycle, historically low interest rates – that already confounded cycle monitoring, the global economy is pivoting on a number of important fronts. The central bank "put" is fading as monetary policy gradually tightens, while fiscal policy is becoming expansionary. The globalism of recent decades that fostered relatively unfettered capital and trade flows across borders is confronting rising protectionism. Within countries, radical populism and nationalism could lead to large-scale wealth redistribution, nationalization of key industries, and attacks on central bank independence. Any of these can affect the economy's long-run sustainable equilibrium, and simultaneously the cyclical trends around it, which is why it's absolutely critical to monitor both the neutral state and the business cycle.

Fig. 11: The Bull Market Monitor

Overall: mid-to-late cycle



Overheating indicators

Growth (relative to potential)



Labor market



Inflation (relative to 2%)



Financial indicators

Monetary policy



Yield curve



Credit conditions



Source: UBS, as of 6 June 2018

Further reading

Blanchard, O. "Should we reject the natural rate hypothesis?" Peterson Institute of Economics and MIT, November 2017.

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Holston, K., T. Laubach, and J. Williams. "Measuring the Natural Rate of Interest: International Trends and Determinants," Federal Reserve Bank of San Francisco, December 2016.

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Appendix

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