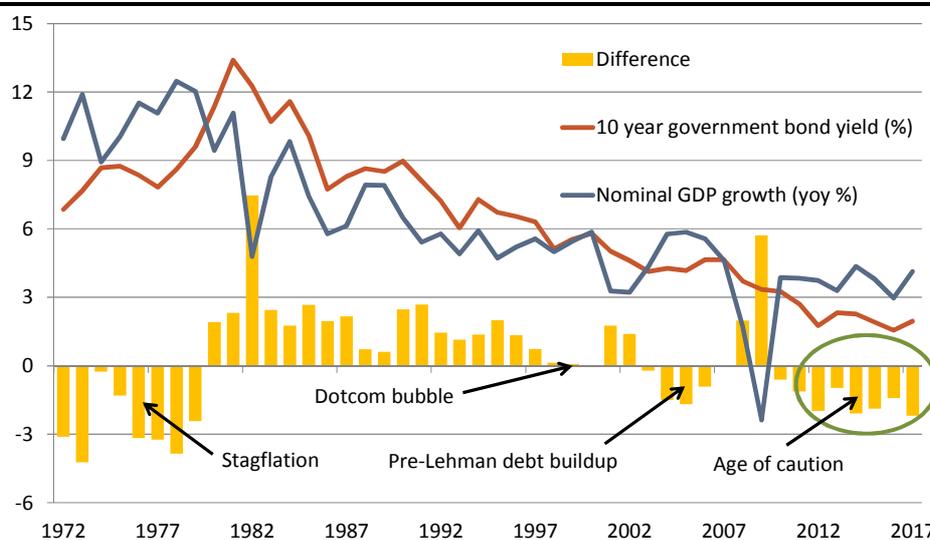


## Conundrum: what if bond yields stay too low again?

Although the recent rise in benchmark bond yields has triggered some financial market turbulence, higher borrowing costs that mostly reflect stronger economic conditions need not be a major economic concern. In this report, we analyse the major trends in long-term benchmark yields and the economic consequences of their recent uptick. We draw four major conclusions.

- The economic risks from rising bond yields are low:** The modestly higher sovereign bond yields for advanced economies reflect the recent acceleration in economic growth, they pose no serious threat to it. In the same vein, a gradual central bank policy tightening that simply matches the positive trend of rising demand for investment need not weigh on economic momentum either.
- A key long-term risk – yields do not rise by enough:** Although changes in the central bank policy rate have strong effects on the short end of the yield curve, market forces play a larger role at the long end. During the past few rate hike cycles, rising global savings kept benchmark bond yields low even when central banks were raising short-term rates. To the extent that this impairs the transmission of a change in policy rates to the real economy, central banks must be ready to deploy other instruments such as reducing the stock of asset holdings to influence aggregate demand in the desired way.
- Watch out for excesses:** Low risk-free rates relative to nominal GDP growth can help economies recover quickly from balance sheet recessions. This held true for the post-Lehman period, until recently. History shows that episodes when the difference between sovereign bond yields and nominal GDP growth was persistently negative have been associated with excesses. This includes the high inflation in the 1970s, the dotcom bubble at the turn of the millennium, and in the run-up to the financial crisis during the 2000s (Chart 1).
- Central banks should not repeat the mistakes of the 2000s:** Because of their large balance sheets, global central banks now have a greater and more direct capacity to influence benchmark borrowing costs than in the 2000s. Therefore, if rate hikes over the coming years are not fully transmitted along the yield curve due to a still-high demand for safe assets in the global economy, central banks could consider unwinding their balance sheets faster than currently planned in an effort to raise long-term borrowing costs and prevent an excessive overheating of the economic upswing.

Chart 1: Nominal GDP growth versus 10-year government bond yields (US, Germany, UK)



Quarterly data. Source: Federal Reserve Board, ECB, BoE. Data are weighted: US (75%), Germany (14%), and UK (11%)

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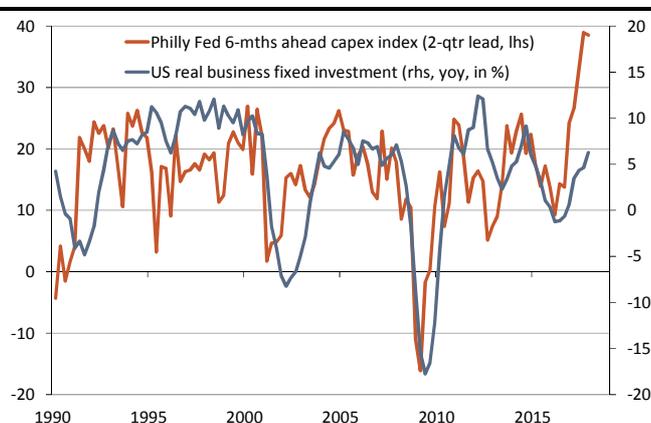
5 March 2018

## The case for tighter monetary policy

After seven years of caution, 2017 marked the partial return to normal cyclical dynamics for the developed world. The current upswing is broad-based across regions. Production, investment and trade are all turning up strongly. In the US and in the Eurozone, consumption and investment are gaining healthy momentum. Measures of company and household confidence point to further sustained gains ahead (Chart 2 and 3).

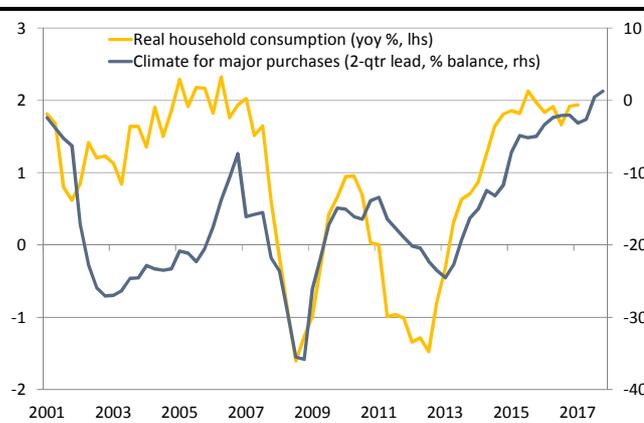
For now – with the exception of the Brexit-stricken UK – core consumer price inflation remains close to or below the 2% rates that central banks deem desirable. But solid growth at low inflation can not last forever. Over time, strong demand gains will put strains on available resources, strengthening firms’ pricing power. Tightening labour markets are already causing a modest acceleration in wage growth. After demand surprised to the upside in 2017, higher-than-expected inflation is a risk to watch in the coming years.

**Chart 2: US Philly Fed capex versus real business fixed investment**



Quarterly data. Source: Bureau of Economic Analysis, Federal Reserve Bank of Philadelphia

**Chart 3: Eurozone confidence versus consumption (yoy %)**



Quarterly data. Source: European Commission, Eurostat, Berenberg calculations

The recent rise in benchmark yields corresponds to stronger growth and inflation expectations, and in turn, higher expected central bank policy rates. As benchmark rates rise, the cost of borrowing for corporates and household will probably rise too. Is this a cause for concern? No. The stronger economic growth has boosted risk appetites. Over time, this will translate into higher demand for credit and risky investment, and lower precautionary saving. But with stronger growth in revenues and wages, firms and households now have the means to fulfil their higher demand for risk. As part and parcel of the normalisation, borrowing costs need to therefore rise to prevent economies from overheating and keep them on an even keel.

Central banks will not put the brakes on the upswing with excessive rate hikes, but simply ensure that monetary policy remains broadly neutral – as opposed to becoming easier – as economic conditions improve. Because the party is only at an early stage and inflation risks still remain modest, central banks have signalled they will exit their expansionary policies only slowly. For now, central banks have no need to overreact to a gradual return to more normal rates of wage growth and inflation.

At present, benchmark bond yields are low relative to the market’s expectations for growth and inflation. Standard textbook economics would argue that the current low government bond yields reflect easy monetary policies and that they will rise over time in proportion to central bank tightening. The current market worries seem to focus on the risk that this process could happen too quickly.

A sharp rise in bond yields towards more historically consistent levels would jar markets in the short run. This would be undesirable. However, benchmark yields that remained persistently too low relative to central bank policy and the pace of demand growth will shorten the length of the economic expansion. An economic upswing that ends prematurely would ultimately be worse for markets. Through tweaks in their forward guidance, expect major central banks to gradually try to ease markets back into the new (old) stance of monetary policy over the coming months and years.

If markets began to fear a significant impact on economic momentum, the adjustment to this new expectation would partly act like a self-correction to the initial overshoot. Upon anticipating the hit to economic growth, markets would predict a slowdown in the pace of monetary policy tightening. This would slow the rise in yields and pace of tightening in financial conditions for the real economy and in markets.

We are mostly interested in a long-term risk that monetary policy makers could undershoot rather than overshoot when it comes to tightening in the coming years. History shows that structural factors can dampen the transmission mechanism of monetary policy, weakening the punching power of rate hikes. We assess whether these factors are present this time around, and if so, what steps can central banks take to address them?

## What determines bond yields?

As a starting point, it is worth outlining the most important factors that influence benchmark government bond yields, along with the drivers of those factors. Generally speaking, sovereign bond yields integrate and add together three economic phenomena: (1) the expected path of short-term central bank interest rates; (2) the expected path of inflation; and (3) term and risk premia.

All of these three factors have contributed both to the gradual decline in government bond yields since the 1980s and the especially low yield environment during the post-Lehman period.

- **The expected path of short-term interest rates** fell dramatically after the financial crisis as central banks lowered their policy rates and promised to keep them low to stimulate aggregate demand. This lowering of short-term interest rates encouraged market participants to shift further along the yield curve, toward longer-dated paper, in search of higher yield. By encouraging higher demand for long-term assets, cutting the policy rate leads to the bidding-down of long-term rates.
- **The expected path of inflation:** Because rates of underlying inflation since 2009 have been unusually low – barring the two temporary oil price shocks – and critically, were widely expected to remain low, lenders did not require much compensation for the only small expected loss in purchasing power. This caused the inflation component in nominal benchmark yields to fall.
- **Term premia:** This is the extra compensation lenders require for holding a long-term security over a series of short-term ones. Two main factors drive term premia: the expected risk of holding long-term securities and changes in demand for different classes of investment (risk premia). Market participants have become more risk averse than before the financial crisis. Preferring the high level of safety that government bonds provide over riskier asset classes, market participants have required a much lower level of compensation than before on long-dated government bonds. Indeed, for German bunds, up to 10 years and beyond, yields were negative during mid-2016; investors were willing to pay for the security that such assets provided.

Although changes in the central bank policy rate have strong effects on the short end of the curve, market forces play a larger role further down the curve. Long-dated benchmark rates are determined as much by the balance of supply and demand for savings and investment in the wider economy as central bank policy. Demand for investment is positively correlated with the expected return on capital, with investment demand rising and falling along with ups and downs of the economic cycle. When investment demand is weak, lenders must offer attractive (low) borrowing costs in order for the supply of savings to clear.

In the post-Lehman age of caution, expected real returns on capital have been low. Meanwhile, demand for precautionary saving has been unusually elevated. Real equilibrium interest rates have thus fallen in order to clear the excess supply of savings relative to the lower demand for investment. This process would have partly happened even without central bank intervention.

## Trends in long-term bond yields

Despite their recent uptick, yields on government bonds remain close to historically low levels in major parts of the western world. Although new factors since the most recent crisis have weighed on long-term benchmark yields, the downward trend in yields far pre-

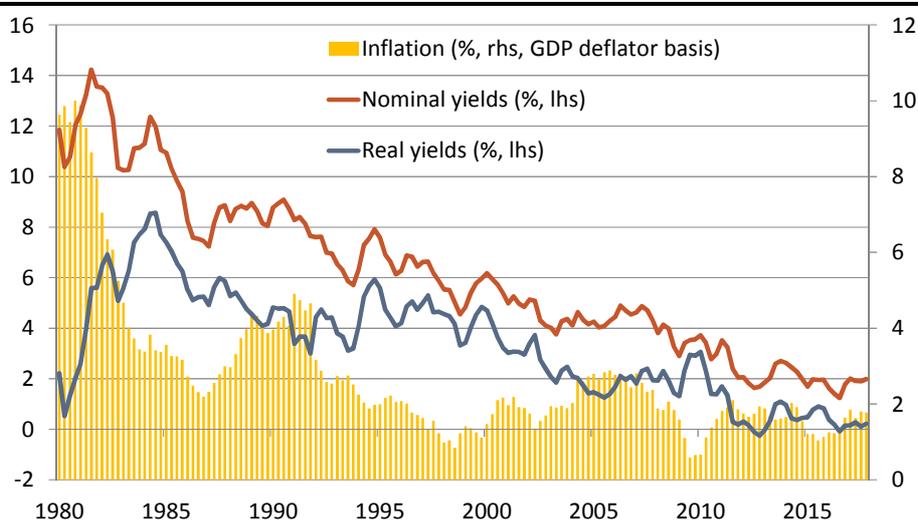
dates the post-Lehman period. Yields on the major western benchmark assets, such as the US, the German and the UK's 10-year government bonds peaked in the mid-teens during the 1980s. Today, they are nowhere near these levels.

Four major factors have contributed to this downward trend in rates.

## Declining inflation

Chart 4 shows our benchmark 10-year government bond yield for the western world, made up of a weighted average of US, German and UK government bonds. It shows data on both a real and nominal basis, with the difference, inflation, highlighted. One might argue simply that inflation targeting has been a success. Headline consumer price inflation has declined from above 10% in the 1980s to 2% during the past 15 years or so; 2% headline inflation is the common inflation target of the Federal Reserve (Fed), the European Central Bank (ECB), and the Bank of England (BoE).

**Chart 4: Nominal versus real 10-year bond yields (% , weighted average of US, Germany and UK)**



Quarterly data. Source: Federal Reserve Board, Bureau of Economic Analysis, ECB, Deutsche Bundesbank, BoE, Office for National Statistics, Berenberg calculations. Weights: US (75%), Germany (14%), and UK (11%)

In the 1970s, rising inflation triggered initially by a sharp rise in the oil prices was badly exacerbated by excessively loose monetary policy, combined with a substantial expansion of public welfare spending and major wage increases. At the time, central bankers thought they need not worry about high inflation during periods of rising unemployment. This proved to be a mistake.

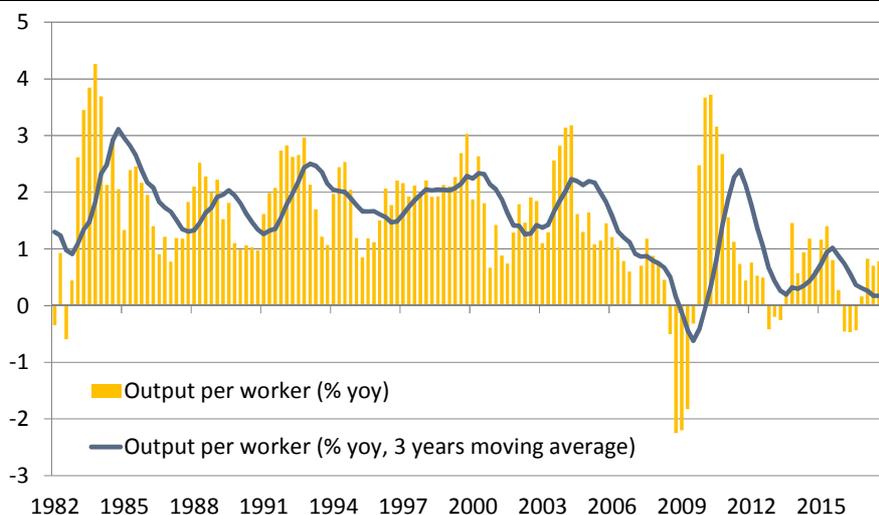
Central banks learned that the Phillips curve (the relationship between unemployment and inflation) can shift. When inflation expectations rise, both inflation and unemployment can increase together. By learning from these past mistakes, and by committing to low and stable inflation, central banks have managed to reduce inflation rates to low and sustainable levels in the past 30 years.

## Falling productivity growth

During the 1980s, 1990s and early 2000s, productivity growth was more or less stable on trend, along with real GDP growth rates and real wages. Worker output per hour growth averaged 1.7% pa amid the usual cyclical ups and downs (Chart 5). Ahead of the financial crisis, productivity growth rates in the western world began to slow dramatically around 2005. In our report, "[Can productivity growth keep inflation at bay?](#)", we discussed the potential underlying causes of the slowdown in productivity growth since the mid-2000s.

The slowdown in output-per-worker growth in the advanced world, dubbed the "productivity puzzle" in the UK, is dramatic. Average US, German and UK annual growth in output per worker has fallen to an average of 0.7% yoy since 2009. The declining rate of return on capital investment, reflected in the slowing productivity growth rates, has further contributed to the reduction in nominal government bond yields.

**Chart 5: Productivity - output per worker (yoy %, weighted based on US, Germany and UK )**



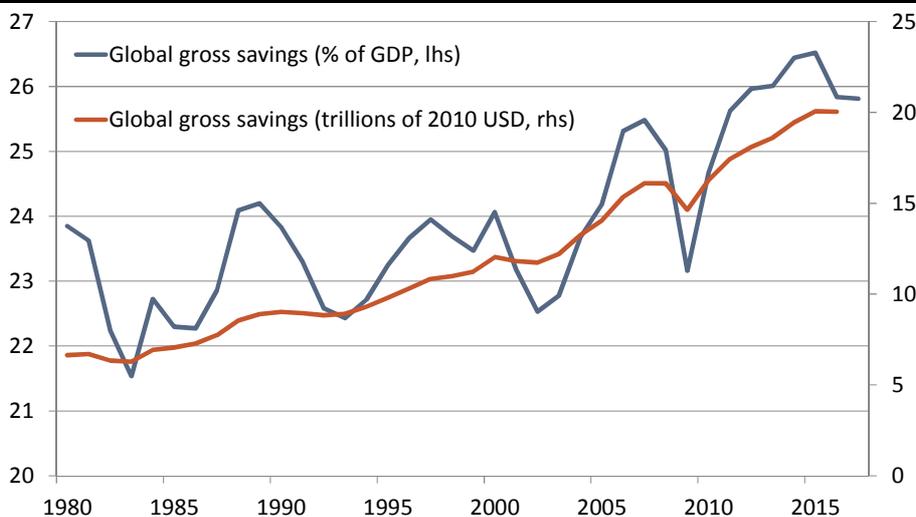
Quarterly data. Source: OECD, Bureau of Economic Analysis, Deutsche Bundesbank, Office of National Statistics, Berenberg calculations. Weights: US (75%), Germany (14%), and UK (11%)

## Rising global savings

The negative contribution of declining inflation and weak post-Lehman productivity growth to long-term benchmark rates is well known. The rise in global savings over the past 40 years is a third factor. As Chart 6 shows, global savings have risen from c21% of global GDP in 1983 to c26% in 2017. Measured in 2010 US dollars, global savings have nearly tripled over this period to now close to \$20trn.

The increasing openness of the global economy (especially between east and west) led to strong demand for the highly price competitive exports from emerging Asian economies – most notably China – and rising demand for energy from oil-producing economies. These surplus export-orientated economies needed a place to put their savings. Western government bonds have become the asset of choice. China and Japan are the major foreign owner of US treasuries, with each owning more than \$1trn of US government bonds. This rise in global demand for advanced countries’ sovereign debt has contributed substantially to the fall in real long-term benchmark rates since the 1980s.

**Chart 6: Global demand for savings has risen dramatically in the past 35 years**



Annual data. Source: IMF, World Bank, Berenberg calculations

Since the financial crisis, global demand for safe haven assets has increased dramatically. Scarred by the financial crisis, high precautionary savings by western corporations, relative to the even lower demand for investment amid the heightened caution, has contributed

further downward pressure on benchmark yields. The most recent uptick in yields reflects a partial reversal in this latter trend.

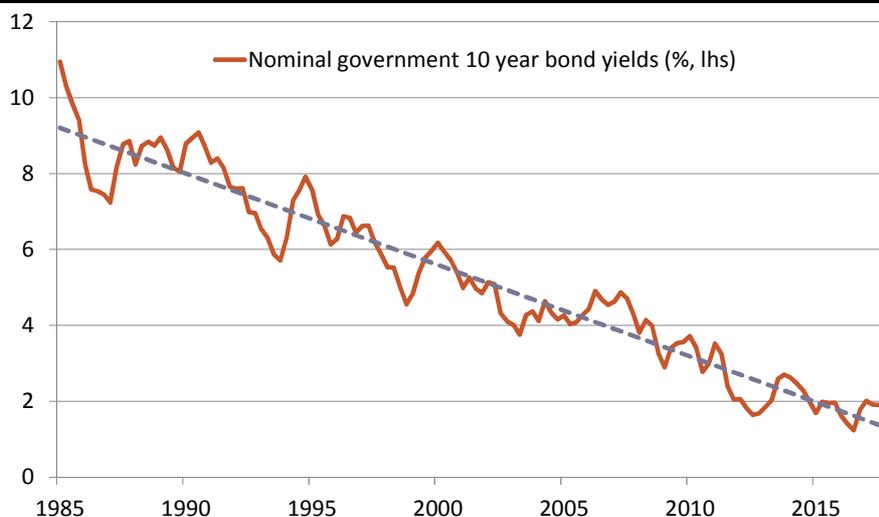
## Unorthodox central bank policies

Since the financial crisis, global central banks including the Fed, the ECB, and the BoE have undertaken massive bond buying schemes – quantitative easing (QE) – in an effort to lower long-term borrowing costs. QE offers central banks a much more direct steer on the curve for benchmark rates, and therefore, more direct influence on borrowing costs in the real economy and in financial markets.

But have central banks driven benchmark long-term yields to “artificially low” levels, as one often hears, and thus distorted markets? Not much, no. While central banks have probably succeeded in lowering long-term bond yields a little, maybe 20-30bp, such yields would have probably fallen anyway thanks to trends driving demand for these assets, while lowering their expected yields, namely high precautionary saving, and falling inflation and productivity growth.

QE merely added to the already elevated demand for these bonds. Chart 7 illustrates this point well. We note that the rate of fall in the yield on our benchmark index of US, German, and UK 10-year government bond yields did not accelerate as QE came along after 2009, but instead broadly followed the trend that had persisted for almost 20 years, with the usual ups and downs. While QE has probably boosted the prices of risky assets via portfolio rebalancing effects, its contribution to the fall in long-term risk-free rates is probably exaggerated.

**Chart 7: Nominal 10-year bond yield – US, Germany and UK versus best fit line (%)**



Quarterly data. Source: Federal Reserve Board, ECB, BoE, Berenberg calculations. Weights: US (75%), Germany (14%), and UK (11%)

## Judging the stance of monetary policy

The discussion so far brings out the critical issue that a low or high central bank policy rate, by itself, cannot signal whether monetary policy is either loose or tight. In order to determine the “stance” of monetary policy, one needs to measure the real policy rate relative to the real rate that would otherwise balance the demand and supply of savings and investment; this is called the short-term real equilibrium interest rate.

During a recession, the central bank usually aims for a real policy rate that is below the equilibrium real rate. By encouraging less saving and lowering the costs of capital, central banks can stimulate demand growth. Conversely, during the boom phase of the economic cycle, the central bank would typically aim to overshoot the equilibrium rate to prevent an overheating by encouraging more saving and less consumption.

A key challenge for a central bank is to determine the stance of its own policy. Although the short-term policy rate is known and inflation can be measured, the short-term real equilibrium interest rate cannot be measured in any reliable sense. This latter issue could

justify a lengthy piece of standalone analysis – suffice to say that, in the cases where central bankers and economists disagree on the appropriate monetary policy action, such as the pace at which to cut or raise the policy rate, it is often because they have differing views on where the real short-term equilibrium rate is.

During a downturn, the real interest rate required to balance demand for investment with the supply of savings can be highly negative. As central bankers are limited in how far they can reasonably lower their policy rates into negative territory, depending on inflation, sometimes they are simply unable to lower their real policy rate far enough to boost aggregate demand. During deep recessions, monetary policy can be still too tight even when nominal central bank policy rates are reduced to zero. This constraint at the lower bound is the main reason why central major banks decided to undertake unorthodox policies since 2009 such as quantitative easing (QE) and other types of asset purchase programmes. After cutting rates as far as they could go, policy makers sought other channels through which they could stimulate demand.

As a final point on monetary policy, it is worth stressing that the best way for central banks to ensure that long-term benchmark rates remain as low and stable as possible is by following a prudent policy. Suppose, for instance, that as the economy enters the boom phase of the cycle, central banks decided to keep their policy rates low rather than hike them. Would that ensure borrowing costs remained low? No. Instead, by keeping its policy rate too low relative to economic conditions, the central bank would foster excess demand growth. In turn, this would drive up demand for consumption and investment relative to the supply of savings. Long-term yields would rise. However, by hiking rates according to rising demand growth during the upswing to prevent an overheating, central banks actually do the most they possibly can to maintain low nominal borrowing costs. It is precisely because central banks ran excessively loose monetary policy in the 1970s that nominal borrowing costs skyrocketed during the period.

## A long-term risk: benchmark yields may not rise enough

US nominal 10-year treasury yields reached a low of c1.3% in July 2016. German nominal 10-year bund yields bottomed at -c0.2% in August 2016; UK nominal 10-year gilt yields hit a low of c0.5% in the same month. Government bond yields in the advanced world have risen modestly since these lows, reflecting the positive trend of building cyclical momentum in the global economy, healthy profit growth and increasing expected returns on capital. Since mid-2016, US yields have risen by c160bp, German yields have increased by c90bp, and UK yields have risen by c110bp.

While the current upward trend in yields appears substantial in the context of recent years' subdued yield environment, relative to the economic backdrop of strong nominal demand growth and modest but growing inflation risks, benchmark yields and the costs of credit are still very low. In 2017, nominal GDP growth in the US was 4.1%, while the nominal 10-year yield was 2.3%; in Germany, nominal growth and yields were 4.1% and 0.5% respectively; and in the UK, 4.5%, and 1.2% respectively.

Since risk-free rates should capture expected rates of real return on capital, plus inflation and some term and risk premia, as a rule of thumb one might expect them to be at least as high as estimates of nominal GDP growth. Most of the time this holds true. In the 20 years to 2007, the average difference between our developed world benchmark for nominal GDP growth and 10-year bond yields (US, Germany and UK) is just 0.70bp. This close relationship is highlighted on Chart 1 on the cover page. And as might be expected, to account for the difference attributable to term premia, on average, nominal 10-year government bond yields are typically higher than nominal GDP growth. In this light, the post-Lehman experience of borrowing costs remaining significantly below growth is unusual.

Currently, even though nominal GDP growth in the advanced world is rising towards 5% and the post-Lehman caution is fading, benchmark 10-year yields remain below 3% in the US and below 2% for the major European economies. Low borrowing costs relative to nominal output growth can be helpful when economies need to recover from balance sheet recessions – this held true for the post-Lehman period, until recently. However, we highlight in the next section that, historically, episodes where borrowing costs have been low relative to nominal GDP growth have been associated with a build-up of dangerous excesses.

Too easy financing conditions relative to output growth, typified by a persistent, and often large, negative gap between nominal bond yields and nominal GDP growth, provide fertile grounds for excesses to accumulate. Benchmark yields are used to price loans, measure risk and discount cash flows. Relative to strong economic growth, low financing costs can make a range of economic endeavours look more attractive than they would be if interest rates were set more appropriately.

## The risk of excesses

So far during the post-Lehman upswing, we do not yet see major signs of new excesses. Following the rise in debt and a misallocation of capital ahead of the crisis, households and firms have gone through a long and difficult period of balance sheet strengthening over the past eight years because they had no other choice. However, this process is coming to an end. As economic momentum in the advanced world normalises in the coming years and caution fades further, we need to watch out for these risks just as carefully as in the past. If current conditions are maintained for too long, excesses could easily build up again.

When it comes to identifying excesses, just like all other problems in economics, the science is not clear cut. In the past, when economies were less open and financial systems were less sophisticated, the signs of excess were more obvious. A sudden surge or drop in inflation would signal imbalances between demand and supply that needed to be corrected. But in advanced, internationally integrated, modern economies that depend much more on credit than before, and where capital and production can cross borders freely, excesses may show up much less in inflation than was the case in the past.

Because risks can build even when the central bank is consistently achieving its inflation target – the 2000s are a point in case – central banks must look to excesses in debt and credit, in production and capacity, and in the general climate for risk taking and speculative investment. Economies are prone to such excesses when borrowing costs are too low relative to GDP growth. Recent history gives three examples: excess inflationary pressures when demand growth runs ahead of supply growth (1970s inflation); discounted incomes on stocks that look more attractive than they are, thereby causing an excess bidding-up of equities prices (dotcom bubble); and most dangerously, debt dynamics that look more favourable than they are, leading to excess risk taking and malinvestment (2000s real estate bubble).

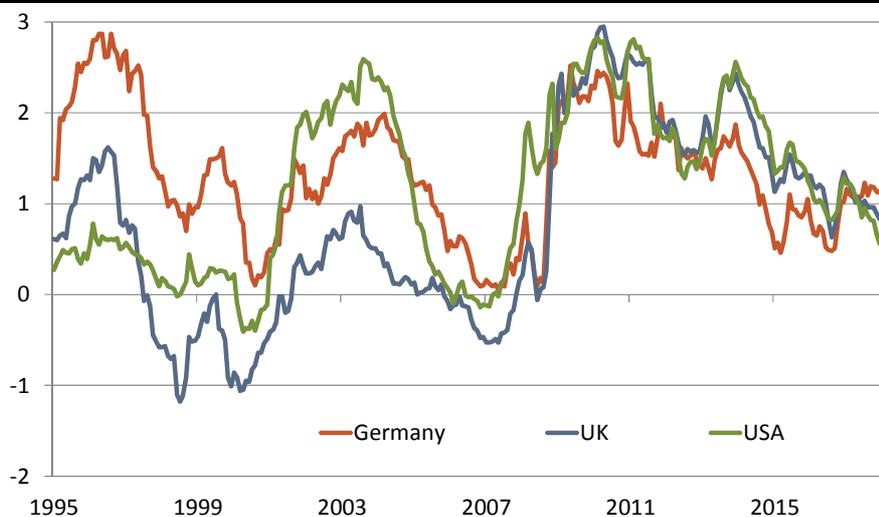
## The curious issue of yield curve inversion

Standard monetary theory shows that benchmark yields rise and fall in proportion to changes in the central bank policy rate and expectations for inflation. History, as is often the case, acts as a thorn in the side of theory. Back in the early 2000s, consistent rate hikes by the Fed, the ECB and the BoE did not cause a proportional rise in benchmark yields. In other words, financial conditions did not tighten by as much as central banks had intended. In the US, this was dubbed the “Greenspan conundrum”.

This “conundrum” is illustrated by the flattening, and eventual inversion of the yield curve (Chart 8). Because yields at the long end of the curve did not rise as the Fed and other central banks increased short-term rates, the difference between long-term and short-term rates declined until, eventually, the curve for government bond yields became inverted, with long-term rates below short-term rates.

Markets often look to the flattening yield curve as a signal that an economic expansion is coming to an end. In a way, this is right. The flattening yield curve served as a useful tip-off to the dotcom bubble and bust, and the real estate boom and financial crisis thereafter. But is the flattening of the curve the signal, or the cause or the recession? This is a critical question. Because the flattening curve is gradual, rather than sudden, it suggests a change in underlying fundamentals rather than a sudden change in expectations.

The flattening yield curve makes it more difficult for the central bank to tighten monetary conditions sufficiently to stabilise the hot phase of the cycle with standard policy rate change alone. After a time, cheap credit and strong growth allow excesses to build up that eventually lead to a recession. This fits with our argument that market forces – especially global demand for savings – matter just as much for benchmark yields, if not more, than central bank policy. If history is to repeat itself, our chief concern in the coming years should be that borrowing costs in the advanced world rise by too little as central banks tighten. This would be visible in the further flattening of benchmark yield curves as growth momentum is maintained and central banks raise rates.

**Chart 8: The shape of the curve (spread of 10- and two-year government bond yields, ppt)**


Monthly data. Source: Federal Reserve Board, ECB, BoE

The risk we discuss here is decidedly different from the market's current worry that long-term yields could rise too much and jar the upswing by raising household and company borrowing costs too quickly. If higher bond yields reflected a fall in the credit worthiness of sovereigns or a central bank attempt to slow down demand growth below trend, that should indeed be a concern for markets. But this is not the case. The rise in bond yields reflect the much broader trend of advanced economies and their financial markets returning to the old (pre-Lehman) normal with stronger earnings and income growth that will offset the modest rises in borrowing costs.

Historical experience and economic logic would suggest the key risk is actually the other way around in the long run – put plainly, that borrowing costs stay too low for too long as growth remains above trend. After all, the economic conditions that lead to the central bank “conundrum” in the 2000s are present now more than ever: low and stable inflation, improving but still-subdued productivity growth, and crucially, a high level of global saving. Together these factors could weigh heavily on the longer-dated benchmark yields, thereby counteracting somewhat central banks' efforts to tighten monetary conditions through rate hikes.

## Central banks – outlook and implications

The Fed was the first of the major western central banks to begin the exit from its extraordinary post-Lehman monetary policy when it hiked its funds rate for the first time in December 2015. Having raised rates by a total 125bp since the first rate hike, taking the current funds rate to 1.25-1.5%, we expect four hikes from the Fed this year, two next year. In the background, we expect the Fed to gradual and consistently unwind its balance sheet made up mainly of US treasuries and private sector assets such as mortgage-backed securities.

For the ECB, we look for an end to QE late this year, followed by an increase in the 0.0% main refinancing rate in June 2019, a further 25bp rate hike in December 2019 and roughly three more similar hikes in 2020. Given that the Eurozone cycle is some two years behind the US upswing, due to the 2010/11 Eurocrisis-induced pause, we do not expect the ECB to begin to unwind its balance sheet until probably two years after the first rate hike.

After hiking once by 25bp in November 2017, we expect two hikes from the BoE in 2018 followed by one more in 2019. According to the BoE's guidance on its balance sheet, the bank does not plan to unwind QE until the bank rate is high enough to be cut during a “normal” downturn without the need for more QE. Historically, the BoE has cut the bank rate by 200bp during an average downturn. We therefore expect the bank rate to rise to 2.5% before the BoE begins to signal any plans to unwind QE. Given the likely path for rate hikes, say 1-2 per year the BoE probably will not be planning an unwind until 2020 at the earliest.

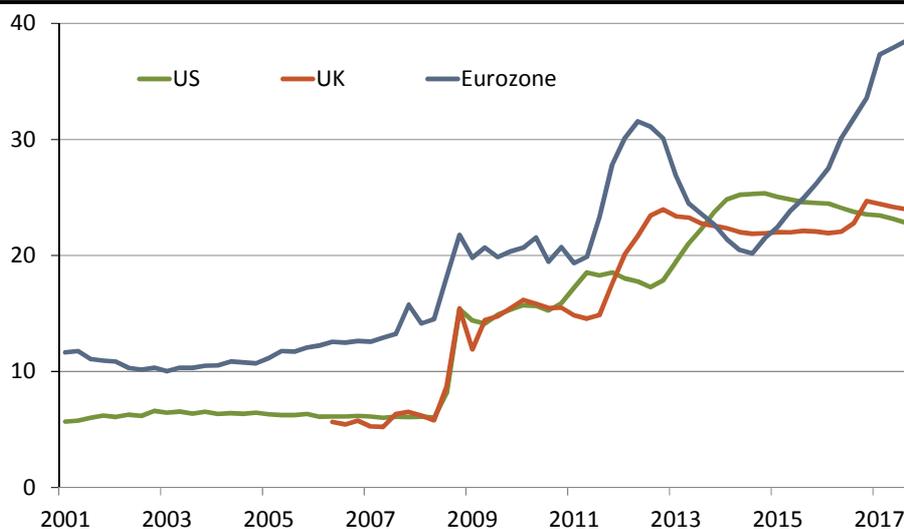
Unlike the 2000s when central banks could do little more than try to talk up the yield curve through their forward guidance, global central banks now have a much larger and much more direct capacity to influence the shape of the yield curve after accumulating such a large stock of benchmark paper during the post-Lehman recovery (Chart 9). Therefore, if central bank tightening over the coming years does not transmit into a large enough rise in borrowing costs through the real economy, and the 2000s conundrum is repeated, central banks could consider selling off their stocks of public and private assets at faster rates.

For the ECB, this is not yet an issue. Because the euro crisis had interrupted the Eurozone recovery, the upswing is significantly less mature in the Eurozone than in the US and the UK, which have both achieved full employment. For the Fed and the BoE, which have started the process of raising rates already, reducing the stock of bonds they are holding could allow these central banks to raise bond yields to a level which more appropriately matches the strength of the economic expansion (US) or the balance between demand and Brexit-impaired supply (UK).

As a rule of thumb, benchmark yields that more closely reflect the strength of nominal demand growth – diminishing the negative gap we have discussed herein – would help to partly mitigate the build-up of excesses.

The lesson of history is clear: as monetary policy works with a lag, it is often too late to defuse the problem gently by the time the economy is overheating. Central banks thus need to watch out for the risks that monetary conditions are not tightening by as much as intended. If so, they need to be prepared to use all of their policy tools to attain the intended tightening.

**Chart 9: Central bank balance sheets as a % of GDP**



Quarterly data. Source: Federal Reserve Board, ECB, BoE

Before the financial crisis, the implicit policy of central banks, especially the Fed during the reign of Alan Greenspan, was that monetary policy makers should not intervene to try and prick bubbles. Instead, it should be ready to clean up the mess afterwards if required. As the financial crisis showed, that proved to be a mistake. However, that logic probably underpinned the low level of concern of central bankers amid the building signs of risk in the 2000s and the limited pass-through of their policy tightening through the interest rate channel (smaller-than-expected increases in bond yields). In response to such mistakes, central banks since the financial crisis have vastly expanded their remits, introducing new capacities to detect and treat financial stability risks, ie macroprudential tools.

The acid test for these new abilities will come if and when genuine excesses begin to show up. In an ideal world, policy makers will be ready to use all the tools at their disposal to delay the next boom/bust cycle for as long as possible, giving major economies extra time to fully recover from their recent financial crises.

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JOH. BERENBERG, GOSSLER & CO. KG

Internet [www.berenberg.com](http://www.berenberg.com)

E-mail: [firstname.lastname@berenberg.com](mailto:firstname.lastname@berenberg.com)

### EQUITY RESEARCH

#### AEROSPACE & DEFENCE

Ryan Booker +44 20 3753 3074  
Andrew Gollan +44 20 3207 7891  
Charlotte Keyworth +44 20 3753 3013  
Ross Law +44 20 3465 2692

#### AUTOMOTIVES

Cristian Dirpes +44 20 3465 2721  
Alexander Haissl +44 20 3465 2749  
Fei Teng +44 20 3753 3049

#### BANKS

Adam Barrass +44 20 3207 7923  
Stephanie Carter +44 20 3207 3106  
Michael Christodoulou +44 20 3207 7920  
Andrew Lowe +44 20 3465 2743  
Andreas Markou +44 20 3753 3022  
Alex Medhurst +44 20 3753 3047  
Eoin Mullany +44 20 3207 7854  
Peter Richardson +44 20 3465 2681

#### BEVERAGES

Javier Gonzalez Lastra +44 20 3465 2719  
Matt Reid +44 20 3753 3075

#### BUSINESS SERVICES, LEISURE & TRANSPORT

Roberta Ciaccia +44 20 3207 7805  
Najet El Kassir +44 20 3207 7836  
William Fitzalan Howard +44 20 3465 2640  
Stuart Gordon +44 20 3207 7858  
Annabel Hay-Jahans +44 20 3465 2720  
Josh Puddle +44 20 3207 7881  
Kate Somerville +44 20 3753 3081  
Joel Spungin +44 20 3207 7867

#### CAPITAL GOODS

Nicholas Housden +44 20 3753 3050  
Sebastian Kuenne +44 20 3207 7856  
Philippe Lorrain +44 20 3207 7823  
Rizk Maidi +44 20 3207 7806  
Jaroslaw Pominkiewicz +44 20 3753 3035  
Simon Toennesen +44 20 3207 7819  
Ethan Zhang +44 20 3465 2634

### EQUITY SALES

#### SPECIALIST SALES

##### AEROSPACE & CAPITAL GOODS

Cara Luciano +44 20 3753 3146

##### AUTOS & TECHNOLOGY

Edward Wales +44 20 3207 7815

##### BANKS, DIVERSIFIED FINANCIALS & INSURANCE

Iro Papadopoulou +44 20 3207 7924

Calum Marris +44 20 3753 3040

##### BUSINESS SERVICES, LEISURE & TRANSPORT

Rebecca Langley +44 20 3207 7930

##### CONSTRUCTION, CHEMICALS, METALS & MINING

James Williamson +44 20 3207 7842

##### CONSUMER DISCRETIONARY

Victoria Maigrot +44 20 3753 3010

##### CONSUMER STAPLES

Molly Wylenzek +44 20 3753 3064

##### HEALTHCARE

David Hogg +44 20 3465 2628

##### MEDIA & TELECOMMUNICATIONS

Julia Thannheiser +44 20 3465 2676

##### THEMATICS

Chris Armstrong +44 20 3207 7809

### SALES TRADING

#### PARIS

Vincent Klein +33 1 58 44 95 09  
Antonio Scutto +33 1 58 44 95 03

#### LONDON

Assia Adanouj +44 20 3753 3087  
Charles Beddow +44 20 3465 2691  
Mike Berry +44 20 3465 2755  
Joseph Chappell +44 20 3207 7885  
Stewart Cook +44 20 3465 2752  
Mark Edwards +44 20 3753 3004  
Tom Floyd +44 20 3753 3136  
Tristan Hedley +44 20 3753 3006  
Peter King +44 20 3753 3139  
Simon Messman +44 20 3465 2754  
AJ Pulley +44 20 3465 2756  
Matthew Regan +44 20 3465 2750  
Michael Schumacher +44 20 3753 3006  
Paul Somers +44 20 3465 2753

#### CHEMICALS

Sebastian Bray +44 20 3753 3011  
Anthony Manning +44 20 3753 3092  
Rikin Patel +44 20 3753 3080

#### CONSTRUCTION

Saravana Bala +44 20 3753 3043  
Zaim Beekawa +44 20 3207 7855  
Lush Mahendrarajah +44 20 3207 7896  
Robert Muir +44 20 3207 7860

#### DIVERSIFIED FINANCIALS

Charles Bendit +44 20 3465 2729  
Philip Ross +44 20 3465 2726  
Chris Turner +44 20 3753 3019

#### FOOD MANUFACTURING AND H&PC

Rosie Edwards +44 20 3207 7880  
Philip Patricha +44 20 3753 3039  
Fintan Ryan +44 20 3465 2748  
James Targett +44 20 3207 7873

#### FOOD RETAIL

Dusan Milosavljevic +44 20 3753 3123

#### GENERAL MID CAP - DACH

Martin Comtesse +44 20 3207 7878  
Charlotte Friedrichs +44 20 3753 3077  
Gustav Fröberg +44 20 3465 2655  
Julia Kochendörfer +44 20 3753 3052  
Alexander O'Donoghue +44 20 3207 7804  
Gerhard Orgonas +44 20 3465 2635  
Henrik Paganetty +44 20 3465 3140  
Benjamin Pfannes-Varrow +44 20 3465 2620

#### GENERAL MID CAP - EU core

Joseph Gruelich +44 20 3753 3119  
Anna Patrice +44 20 3207 7863  
Trion Reid +44 20 3753 3113

#### GENERAL MID CAP - UK

Joseph Barron +44 20 3207 7828  
Calum Battersby +44 20 3753 3118  
Robert Chantry +44 20 3207 7861

### SALES

#### BENELUX

Miel Bakker +44 20 3207 7808  
Bram van Hijfte +44 20 3753 3000

#### FRANCE

Alexandre Chevassus +33 1 5844 9512  
Dailia Farigoule +33 1 5844 9510

#### SCANDINAVIA

Mikko Vanhala +44 20 3207 7818  
Marco Weiss +49 40 350 60 719

#### UK

James Burt +44 20 3207 7807  
Fabian De Smet +44 20 3207 7810  
Marta De-Sousa Fialho +44 20 3753 3098  
Jules Emmet +44 20 3753 3260  
Robert Floyd +44 20 3753 3018  
David Franklin +44 20 3465 2747  
Karl Hancock +44 20 3207 7803  
Sean Heath +44 20 3465 2742  
James Hunt +44 20 3753 3007  
Gursumeet Jhaj +44 20 3753 3041  
James McRae +44 20 3753 3036  
David Mortlock +44 20 3207 7850  
Eleni Papoula +44 20 3465 2741

### EQUITY TRADING

#### HAMBURG

David Hohn +49 40 350 60 761  
Gregor Labahn +49 40 350 60 571  
Lennart Pleus +49 40 350 60 596  
Marvin Schweden +49 40 350 60 576  
Omar Sharif +49 40 350 60 563  
Philipp Wiechmann +49 40 350 60 346  
Christoffer Winter +49 40 350 60 559

#### LONDON

Edward Burlison-Rush +44 20 3753 3005  
Richard Kenny +44 20 3753 3083  
Chris McKeand +44 20 3207 7938  
Ross Tobias +44 20 3753 3137

#### GENERAL MID CAP - UK (cont'd)

Ned Hammond +44 20 3753 3017  
Omar Ismail +44 20 3753 3102  
Ian Osburn +44 20 3207 7814  
Antony Plom +44 20 3207 7908  
Edward James +44 20 3207 7811  
Benjamin May +44 20 3465 2667  
Owen Shirley +44 20 3465 2731  
Donald Tait +44 20 3753 3031

#### GENERAL RETAIL

Thomas Davies +44 20 3753 3104  
Michelle Wilson +44 20 3465 2663

#### HEALTHCARE

Scott Bardo +44 20 3207 7869  
Alistair Campbell +44 20 3207 7876  
Lara Fernandes +44 20 3465 2718  
Tom Jones +44 20 3207 7877  
Joseph Lockey +44 20 3465 2730  
Samantha Osborne +44 20 3207 7882  
Michael Ruzic-Gauthier +44 20 3753 3128  
Laura Sutcliffe +44 20 3465 2669  
Charles Weston +44 20 3465 2746

#### INSURANCE

Trevor Moss +44 20 3207 7893  
Emanuele Musio +44 20 3207 7916  
Iain Pearce +44 20 3465 2665

#### LUXURY GOODS

Mariana Horn +44 20 3753 3044  
Lauren Molyneux +44 20 3207 7892  
Zuzanna Puszc +44 20 3207 7812

#### MEDIA

Robert Berg +44 20 3465 2680  
Laura Janssens +44 20 3465 2639  
Alastair Reid +44 20 3207 7841  
Sarah Simon +44 20 3207 7830

#### REAL ESTATE

Kai Klose +44 20 3207 7888  
Tina Munda +44 20 3465 2716

#### UK (cont'd)

Bhavini Patel +44 20 3207 7926  
Kushal Patel +44 20 3753 3038  
Richard Payman +44 20 3207 7825  
Christopher Pyle +44 20 3753 3076  
Adam Robertson +44 20 3753 3095  
Joanna Sanders +44 20 3207 7925  
Mark Sheridan +44 20 3207 7802  
George Smibert +44 20 3207 7911  
Alexander Wace +44 20 3465 2670  
Paul Walker +44 20 3465 2632

#### GERMANY

Michael Brauburger +49 69 91 30 90 741  
Nina Buechs +49 69 91 30 90 735  
André Grosskurth +49 69 91 30 90 734  
Florian Peter +49 69 91 30 90 740  
Joerg Wenzel +49 69 91 30 90 743

#### SWITZERLAND, AUSTRIA & ITALY

Duncan Downes +41 22 317 1062  
Andrea Ferrari +41 44 283 2020  
Gianni Lavigna +41 44 283 2038  
Jamie Nettleton +41 44 283 2026  
Yeannie Rath +41 44 283 2029

### ELECTRONIC TRADING

Jonas Doehler +44 40 350 60 391  
Matthias Führer +49 40 350 60 597  
Sven Kramer +49 40 350 60 347  
Matthias Schuster +44 40 350 60 463

#### METALS & MINING

Charlie Clark +44 20 3207 3133  
Fawzi Hanano +44 20 3207 7910  
Laurent Kimman +44 20 3465 2675  
Michael Stoner +44 20 3465 2643

#### TECHNOLOGY

Josep Bori +44 20 3753 3058  
Georgios Kertsos +44 20 3465 2715  
Tej Shankiya +44 20 3753 3099  
Gordon Tveito-Duncan +44 20 3753 3100  
Tammy Qiu +44 20 3465 2673

#### TELECOMMUNICATIONS

David Burns +44 20 3753 3059  
Ondrej Cabejssek +44 20 3753 3071  
Nicolas Didio +44 20 3753 3091  
Usman Ghazi +44 20 3207 7824  
Laura Janssens +44 20 3465 2639

#### THEMATIC RESEARCH

Nick Anderson +44 20 3207 7838  
Oyvind Bjerke +44 20 3753 3082  
Steven Bowen +44 20 3753 3057  
Asad Farid +44 20 3207 7932  
Robert Lamb +44 20 3465 2623  
Paul Marsch +44 20 3207 7857  
Saliha Shariff +44 20 3753 3097  
James Sherborne +44 20 3753 3073

#### TOBACCO

Jonathan Leinster +44 20 3465 2645

#### UTILITIES

Oliver Brown +44 20 3207 7922  
Andrew Fisher +44 20 3207 7937  
Neha Saxena +44 20 3753 3048  
Lawson Steele +44 20 3207 7887

### ECONOMICS

Florian Hense +44 20 3207 7859  
Carsten Hesse +44 20 3753 3001  
Kallum Pickering +44 20 3465 2672  
Holger Schmieding +44 20 3207 7889

#### CRM

Laura Cooper +44 20 3753 3065  
Jessica Jarmyn +44 20 3465 2696  
Madeleine Lockwood +44 20 3753 3110  
Vikram Nayyar +44 20 3465 2737  
Rita Pilar +44 20 3753 3066

#### COO Office

Greg Swallow +44 20 3207 7833  
Fenella Neill +44 20 3207 7868

#### CORPORATE ACCESS

Lindsay Arnold +44 20 3207 7821  
Robyn Gowers +44 20 3753 3109  
Jennie Jiricny +44 20 3207 7886  
Ross Mackay +44 20 3207 7866  
Stella Siggins +44 20 3465 2630  
Lucy Stevens +44 20 3753 3068  
Abbie Stewart +44 20 3753 3054

#### EVENTS

Charlotte David +44 20 3207 7832  
Suzy Khan +44 20 3207 7915  
Natalie Meech +44 20 3207 7831  
Eleanor Metcalfe +44 20 3207 7834  
Rebecca Mikowski +44 20 3207 7822  
Ellen Parker +44 20 3465 2684  
Sarah Weyman +44 20 3207 7801

**BERENBERG CAPITAL MARKETS LLC**

Member FINRA &amp; SIPC

E-mail: [firstname.lastname@berenberg-us.com](mailto:firstname.lastname@berenberg-us.com)**EQUITY RESEARCH**

Andrew Fung +1 646 445 5577  
Donald McLee +1 646 445 4857  
Adam Mizrahi +1 646 445 4878  
Gal Munda +1 646 445 4846  
Patrick Trucchio +1 646 445 4851

**ECONOMICS**

Mickey Levy +1 646 445 4842  
Roiana Reid +1 646 445 4865

**EQUITY SALES****SALES**

Enrico DeMatt +1 646 445 4845  
Kelleigh Faldi +1 617 292 8288  
Ted Franchetti +1 646 445 4864  
Shawna Giust +1 646 445 7216  
Rich Harb +1 617 292 8228  
Zubin Hubner +1 646 445 5572  
Michael Lesser +1 646 445 5575  
Jessica London +1 646 445 7218  
Anthony Masucci +1 617 292 8282  
Ryan McDonnell +1 646 445 7214  
Emily Mouret +1 415 802 2525  
Peter Nichols +1 646 445 7204  
Kieran O'Sullivan +1 617 292 8292  
Rodrigo Ortigao +1 646 445 7202  
Ramnique Sroa +1 415 802 2523  
Matt Waddell +1 646 445 5562

**CRM**

Lajada Gonzales +1 646 445 7206  
Monika Kwok +1 646 445 4863

**CORPORATE ACCESS**

Olivia Lee +1 646 445 7212  
Tiffany Smith +1 646 445 4874

**EVENTS**

Laura Hawes +1 646 445 4849

**SALES TRADING**

Ronald Cestra +1 646 445 4839  
Michael Haughey +1 646 445 4821  
Christopher Kanian +1 646 445 5576  
Lars Schwartz +1 646 445 5571  
Brett Smith +1 646 445 4873  
Bob Spillane +1 646 445 5574  
Jordan White +1 646 445 4858