

Fundamentals:

Energy renewed.



Energy is transitioning. Climate policy and technological advances are slowly but steadily creating different dynamics. We, as investors, have an important role to play.



Energy is the engine of our livelihood. Without it, we simply couldn't function in our modern life. In this edition

of Fundamentals, LGIM Head of Sustainability Meryam Omi examines the consequences of how we generate that energy and key forces that could dramatically change the dynamic.

MAJOR FORCES AT PLAY

There are two major forces that can transform the way we generate, store and consume energy in the future. One is regulation. The world urgently needs to address climate change and reduce emissions. In doing so, we have to question existing policies that support a fossil-fuel based energy consumption model.

The other force is technology. Technological advances are constantly challenging our traditional models. We are entering that stage in energy. On the demand side, efficiency gains can significantly reduce energy consumption. On the supply side, renewables are becoming financially competitive.

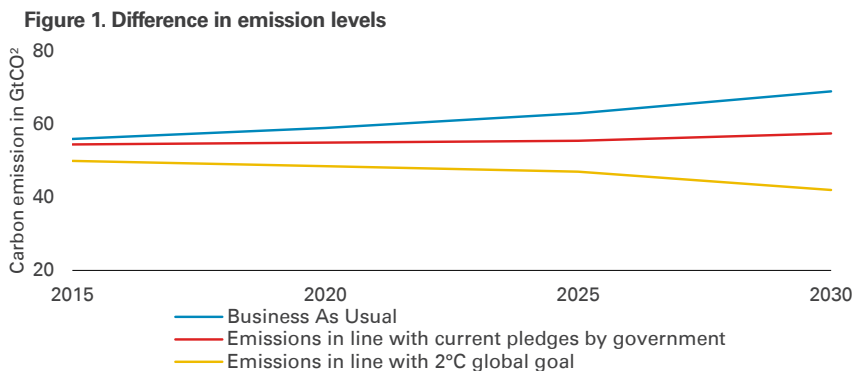
These changes are gradually eroding baseline assumptions. As investors, we must embrace and encourage such changes, supporting companies as they adapt and innovate through this period of transition. We must stimulate the discussion about how our capital can be best deployed to benefit from building a sustainable energy system.

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Source: WRI, Exane BNP Paribas estimates

POLITICAL WILL

Every year, policy makers have been gathering to edge closer to the globally agreed target of limiting the global temperature rise to 2°C above pre-industrial levels. This is in stark contrast to the Business-As-Usual trajectory of emissions that would lead to an increase of 4-5°C. The numbers seem slight, but even one degree difference brings with it catastrophic consequences.

2015 has been an important year to bridge the gap. As the December United Nations Climate Change Conference in Paris approaches, individual countries have been submitting their own commitments to curbing emission levels by 2025-30.

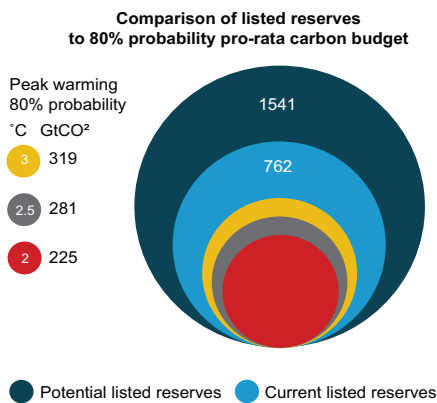
The submissions so far broadly put us on a path to temperature increases of around 2.6 -3°C¹. It is not ideal, but what is clear is that the trajectory of emission has already been altered from the baseline shown in figure 1. Even after Paris, every calamitous weather event will sustain pressure on policy makers to edge closer to 2°C.

While climate change realities are widely recognised by the energy industry, many remain sceptical about the political will to tackle the emission targets. This results in many business strategies being broadly based on Business-As-Usual scenarios.

The energy sector – particularly fossil fuels such as coal, oil and gas – is most at risk from changing policies. The Carbon Tracker Initiative demonstrated the potential for ‘stranded assets’².

Figure 2 shows the reserves owned by listed companies that could not be dug out of the ground and burned, if policies were to limit the temperature increase to 2°C, 2.5°C or 3°C. This would have significant financial consequences for the energy sector.

Figure 2. Potentially stranded fossil fuel reserves from policy changes



Source: Carbon Tracker Initiative

Setting aside the debatable global ambition, changing dynamics at individual countries are noteworthy. China aims to reduce energy intensity by 40-45%³, and is under enormous social pressure to reduce pollution. In the USA, the role of shale gas, combined with the threat of the Clean Power Act, is having an existential impact on the utility system. India’s desire to increase its solar energy generation, from the original target of 20GW to 100GW,

can be a true game changer for the industry that requires scale to bring the price down.

Another changing dynamic is the political appetite to sustain fossil-fuel subsidies. Global governments spent US\$541billion⁴ subsidising the energy system in 2013. While the vast majority of such subsidies go to keeping electricity and transport costs low for consumers in developing markets, countries like Indonesia are gradually phasing this out. What’s more relevant to policymakers today is that \$4,500billion is spent on addressing the side effects of such subsidies, mainly to finance the impacts of local pollution.

Governments need cheap and accessible fuel sources for economic growth, but when we look at fossil fuels holistically, they are neither cheap nor fiscally sustainable.

TECHNOLOGICAL TIPPING POINT

Technological advances can have a dramatic impact on market dynamics. Mobile phones combining telephony, computer, camera have had a profound effect in the way societies operate in the last decade. More recently in the energy space, the shale gas/tight oil revolution significantly increased US domestic energy production, helping pushing gas, oil and coal prices lower.

There is no silver bullet to solving the energy and climate dilemma. Any solution will require numerous technological advances, although some developments provide a glimpse into the near future.

Energy efficiency is one such area. Current energy systems are extremely inefficient. Energy through coal-fired plants can lose as much as 60%⁵ of its original energy through generation. Once

Figure 3. Solar capacity increasing faster than expectations

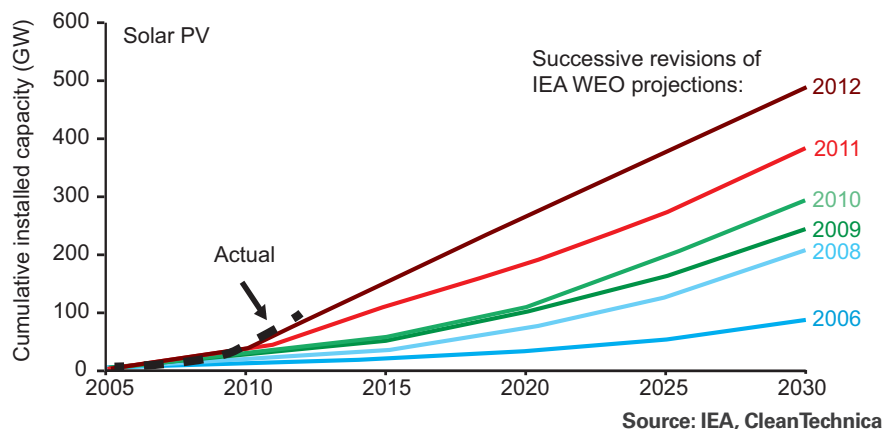
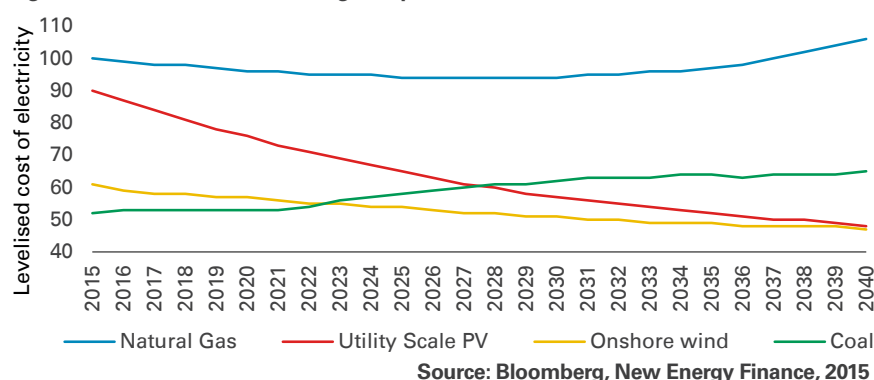


Figure 4. Solar and wind becoming cheaper in China



in the home, 50% of heat could be lost as a result of poor insulation. Relatively easy fixes to optimise energy use are possible technically, if the right financial incentives are offered.

Products that use energy are also changing. Internal combustion engine cars can lose over 60-80% of potential energy, while electric cars would only lose 10-20%⁶. Electrical appliances use a fraction of the energy they used to; refrigerators now use only about a third of electricity compared to 1990⁷.

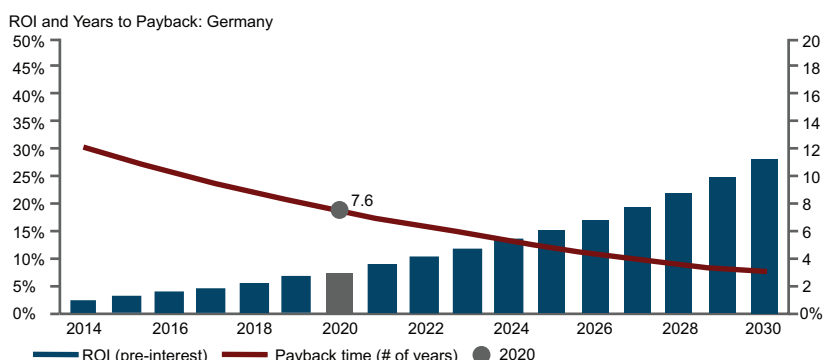
Emerging economies have the advantage of leapfrogging some of the technological advances that developed markets underwent – for example skipping fixed line telephony and jumping straight to mobile. This sort of unprecedented energy use pattern would have a profound impact on the energy demand trajectory.

Another noteworthy trend is in renewable energy generation.

Solar photovoltaics (PV) prices have fallen by 75% since 2009, consistently exceeding the projection of installed capacity in the International Energy Agency’s World Energy Outlook (figure 3).

Onshore wind is already becoming competitive with traditional energy generation in many markets – without subsidies – including the UK⁸. Even in China, figure 4 shows how the overall costs of such technologies may dramatically challenge the existing system, with wind cheaper than coal by 2022 and solar before 2028.

Figure 5. German solar and battery economics should improve dramatically



Renewables, particularly solar, will become a force for change when combined with cost-effective energy storage systems. Battery prices are predicted to continue their downward trajectory and may fall by up to 50% in the next five years or up to 70% by 2030⁹.

Energy generated on the roof, stored internally and used to charge electrical vehicles may seem hard to imagine. But as we saw with the launch of the iPhone in 2007, change can occur quickly. The economics are becoming compelling: figure 5 shows that in Germany, the pay-off period of this combination may become economical in five years time.

New technologies will challenge the traditional energy generation and consumption model. Naturally some of these solutions are costlier at the outset, but the pay-off period is firmly within sight for most infrastructure plans. Crucially, such solutions could help build energy independence, create domestic employment opportunities and reduce burdens on health systems. Meeting climate goals is just the cherry on top.

It is important to emphasise that fossil fuel will play a key part in our energy mix for many years to come. But faced with these trends, their role could reduce materially.

ROLE OF INVESTORS

As an owner of long-term assets on behalf of our clients, we believe we have a vital role in this energy transition. There are broadly three ways we can do this:

1. Policy engagement

Global and long-term issues manifestly require policy support. It is important that institutional investors, such as LGIM, call for and support policy mechanisms that avoid catastrophic consequences from climatic changes and build a platform to finance new energy systems.

For instance, in the run-up to the Paris conference, we jointly led the initiative to send an investor statement to global finance ministers, advocating meaningful emission reduction targets and a successful global agreement.

We believe engagement at this level can only be done effectively through collective action. Our memberships of groups such as the IIGCC, the Institutional Investor group on Climate Change, help to push for global, European and UK policy changes to help build a low carbon economy.

2. Company engagement

As a major shareholder and bond holder, our engagement with companies is key to help this transition. Our conversations increasingly focus on the impacts of future costs to the business in the form of carbon tax, carbon price, retrofit costs and increasing

research and investment needs. Affected sectors like energy, materials, auto/transport and real estate need to establish resilient strategies that will withstand the burdens.

Our role is to ensure that companies faced with this paradigm shift are having appropriate discussion at the board level with adequate skillsets. We encourage them to demonstrate long-term strategies that embrace innovation and adequately communicate the business risks and opportunities to their investor base.

3. Investment solutions

With increased scrutiny over the role of fossil fuels and raising carbon emissions, some of our clients are evaluating their own carbon footprint and exposure to fossil fuel reserves in their portfolios. A wide range of indices have been launched in the market to help reduce carbon risks.

The next step is looking at how best to redirect capital to provide a sustainable energy system. With dwindling yields, many investors are in search of long-term, stable returns. Renewable energy projects with stable policy support may be a match.

More widely, we need to recognise that the solutions to a more advanced system would require a joint effort between investors, policy makers and companies. We need to find a way

to finance new connections; from alternative energy generation, robust grid systems, efficient batteries, advanced appliances, all the way to smart energy use.

STARTING THE 'RIGHT' CONVERSATION

We have barely started this conversation and we are aware that we don't have a perfect answer. What we know is that energy is important. It impacts our lives, drives our economy and therefore our investments. In light of climate-led policies and technological advances, we should embrace this energy transition and challenge baseline assumptions. It is vitally important for us to engage with our clients, the companies and policy makers to ensure investments are directed into building a desirable future.

¹IEA, UN respectively

²Carbon Tracker Initiative: Unburnable carbon 2013: wasted capital and stranded assets

³Over period from 2005 to 2020

⁴2013, IMF, <https://www.imf.org/external/pubs/cat/longres.aspx?sk=42940.0>

⁵<http://www.nap.edu/reports/energy/sources.html>

⁶<http://www.nap.edu/reports/energy/sources.html>

⁷https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/328083/Energy_efficient_products_-helping_us_to_cut_energy_use_-_publication_version_final.pdf

⁸Source: National Grid

⁹UBS 2014, Morgan Stanley 2015

Market overview:

Dovish Fed stabilises markets

Global investment markets weathered the storm in September. Having suffered their most significant falls for four years over the summer, most risk assets moved broadly sideways, albeit with significant volatility. Investor attention shifted from China to the US, with September having been flagged as the most likely month for the Federal Reserve to start the long process of normalising its interest rate policy. However, the recent rise in global market volatility convinced the Fed to delay hiking rates, which was instrumental in soothing investors' fears over global growth. In developed economies, low levels of inflation continued to support the domestic consumer, while the stabilisation in commodity prices meant that emerging economies avoided further deterioration.

UK

Services sector remains domestic driver

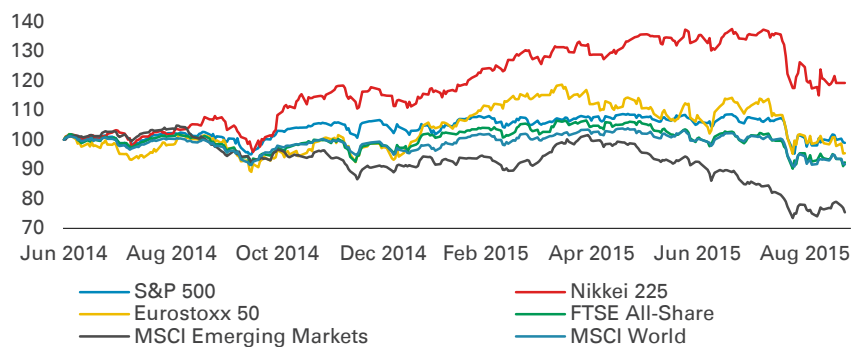
Recent strength in the UK economy showed some signs of faltering, as manufacturing data disappointed analyst expectations. However, low levels of inflation continued to ensure that the consumer remained at the heart of the UK economic recovery. Chancellor George Osborne made regular headlines as he promoted stronger ties with China during his visit to Asia. In particular, he promoted growth in financial links between Shanghai and London and confirmed new Chinese investment in the Hinckley Point nuclear power station. Such announcements proved timely, as August's government finances painted a decidedly negative picture, with a fall in tax receipts leading to sharp rise in the UK budget deficit.

US

Fed leaves rates on hold following market volatility

Having been expected to raise rates at their September policy meeting as recently as early August, the Federal Reserve ultimately kept short-term borrowing costs unchanged. Fed Chair Janet Yellen sounded a distinctly dovish tone and cited the rise in market volatility as the rationale for holding off on hiking rates. Despite the decision, the US dollar held its ground, as investors continued to view the world's reserve currency as a relative safe haven. From an economic perspective, the picture in the US remained positive, particularly in consumer sectors, with lower oil prices keeping a lid on price inflation. Furthermore, construction activity in both the housing and commercial sectors remained robust.

Figure 1. Global equity markets



Source: Bloomberg L.P. chart shows price index performance in local currency terms

EUROPE

Volkswagen woes cloud improving economy

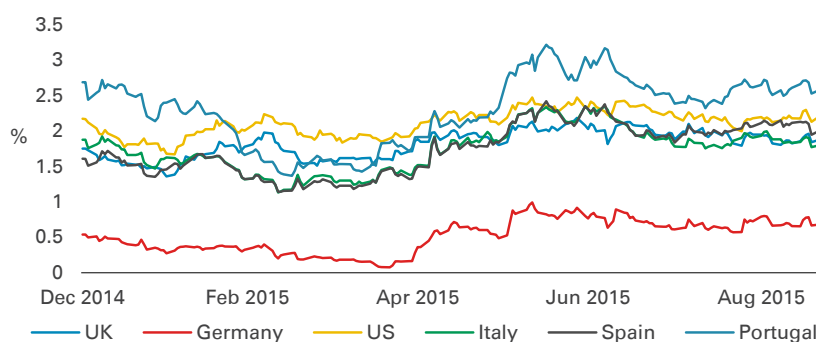
The euro zone economy showed signs of returning to growth in September, only two months after a Greek exit from the single currency looked to be on the cards. The recovery was spurred by an increase in lending to households and non-financial companies. Furthermore, Greek regained some political stability, with Tsipras winning the national elections for the Syriza party. However, the month was not without its issues for Europe. Global leading car manufacturer Volkswagen shocked investors by announcing it had knowingly disguised emissions levels from its cars. This led to a sharp fall in company's stock price and increased fears for the wider automotive industry.

JAPAN

Abenomics concerns lead to rating cut

The rebound in Japanese growth following Prime Minister Shinzo Abe's huge stimulus programme suffered a further setback in September as Standard & Poor's cut the country's long-term credit rating by one notch to A+. The rating agency cited concerns over the potential for Abenomics to halt the nation's economic decline and contain domestic debt levels. With the effectiveness of the Prime Minister's policy of monetary stimulus now being called into question – a 30% decline in the yen has failed to result in lasting consumer price inflation – investor focus moved to the issue of fiscal stimulus as the best future means of promoting growth and lifting the country out of deflation.

Figure 2. 10-year government bond yields



Source: Bloomberg L.P.

ASIA PACIFIC/EMEA

Chinese government action provides stability

Following a tumultuous August, Asian financial markets proved relatively stable in September. Although manufacturing data in China continued to be weak, signs that domestic property prices and retail demand stabilised over the month saw capital outflows from the region stop. Even China's currency, the epicentre of investor concerns in August, proved more stable, managing a slight rise against the US dollar as the Chinese authorities looked to the nation's substantial currency reserves for support. In response emerging market currencies and risk assets also stabilised, helped by commodity prices not falling any lower.

FIXED INCOME

Government bonds fail to respond to dovish sentiment

Having returned to favour during August, UK gilt and US treasury prices moved sideways in September. This was despite relatively dovish statements from both the Federal Reserve and Bank of England during the month. Given the sharp rise in risk asset volatility levels across the globe in August, investors had already effectively discounted

the possibility of a rate hike in either country during 2015. With oil prices remaining only just above recent lows and other commodity prices remaining equally low, breakeven inflation rates dropped, leading inflation-linked government assets to underperform.

Stability returns to credit markets

Following the sharp widening in spreads over government bonds in August, a degree of stability returned to credit markets in September. This was driven by three main factors. First, global growth fears remained relatively contained and commodity prices held above August's lows. Second, the Federal Reserve supported investor confidence by keeping short-term interest rates on hold. Third, there were lower issuance levels in the corporate sector, with companies having already issued a significant amount of debt over the summer months in the anticipation that interest rates would rise.

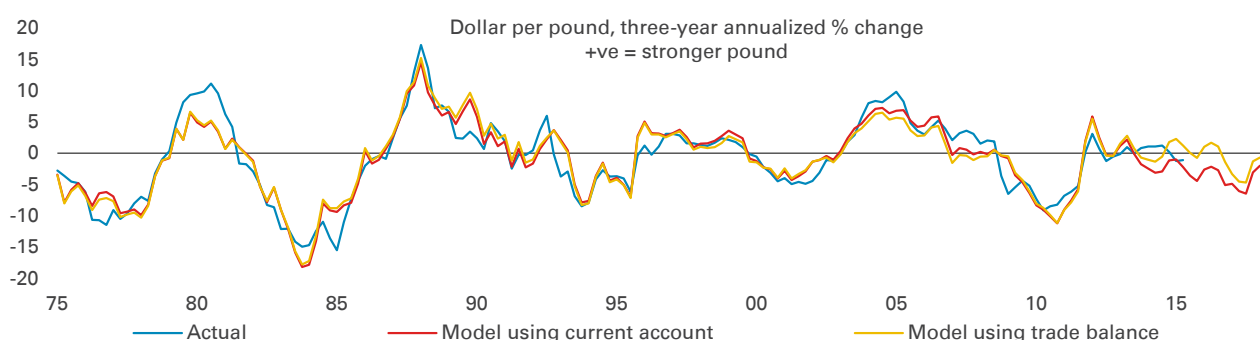
Snapshot:

Cable guy

The outlook for the pound is a key issue for investors. The return on overseas investments depends not only on the local performance of underlying assets, but also movements in the exchange rate. On a trade-weighted basis, the pound has retraced around half of the losses experienced between 2007 and 2009. It has gained significantly against the euro, which has been dragged down by political uncertainty and the ECB's money printing schemes. It has also held broadly steady against the US dollar, meaning it has appreciated sharply against many emerging economy currencies, which have crashed against the dollar.

Macro models suggest the pound is likely to drift lower versus the dollar over the next three years. If we start with valuations (relative price levels), the pound was 'cheap' after the financial crisis. But the subsequent rally means this is no longer the case and can no longer be seen as a positive for the pound going forward.

Figure 1. Macro models point to the pound falling against the dollar in coming years

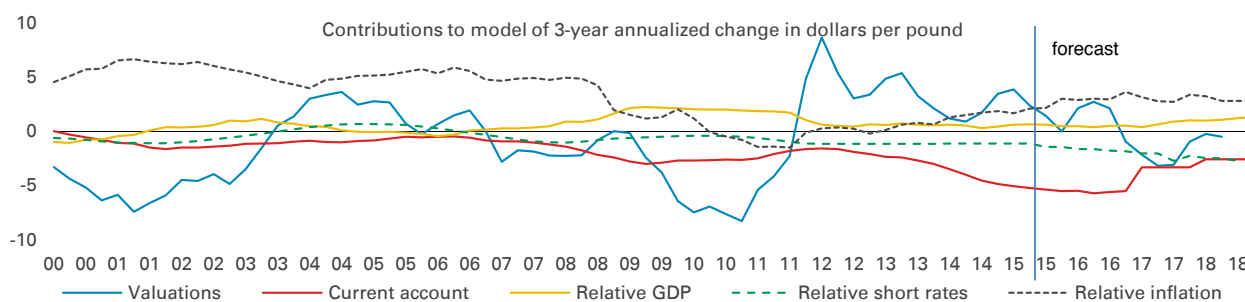


Source: Macrobond, LGIM estimates

The next variable to consider is relative monetary policy. The Fed and BoE acted broadly in parallel after the financial crisis, quickly slashing interest rates to low levels, introducing QE and promising to keep rates lower for longer. With unemployment falling in both countries, market participants are constantly assessing which month the Fed and the BoE will hike rates for the first time. But the bigger picture is that the BoE will hike rates more gradually than the Fed in coming years, as the UK is more sensitive to changes in short rates. Most US mortgages are fixed, whereas about half of UK mortgages are floating rate and the rest are only 'fixed' for around two years.

The UK is also running a humongous current account deficit of 6% of GDP (vs a long-run average of 1%). This reflects a deterioration in net income flows. UK investments made overseas (first in the euro area and now in commodity regions) have suffered losses. It is unclear where the 'income balance' will eventually settle, but the UK's trade balance (1½% of GDP) remains above its long-run average (1%) despite the collapse in the pound after the financial crisis. We also have forthcoming political uncertainty as the nation decides whether to remain in the European Union. So we believe that the pound seems more likely to fall than rise against the US dollar in coming years.

Figure 2. The pound is no longer cheap, it is running a large external deficit and US interest rates should rise relatively faster



Source: Macrobond, LGIM estimates

UK forecast:

Half full or half empty

UK economy	Price inflation (CPI)		GDP (growth)		10-year gilt yields		Base rates		\$/£		£/€		
	2015 %	2016 %	2015 %	2016 %	2015 %	2016*	2015 %	2016**	2015	2016*	2015	2016*	
Market participants' forecasts													
High	1.10	2.20	3.00	3.00	2.60	4.00	0.75	2.50	1.63	1.76	0.78	0.81	
Low	-0.10	1.00	2.10	1.80	1.45	1.40	0.50	0.75	1.44	1.42	0.65	0.59	
Median	0.20	1.50	2.60	2.40	2.20	2.64	0.50	1.25	1.54	1.54	0.69	0.70	
Last month median	0.40	1.60	2.50	2.40	2.18	2.59	0.50	1.00	1.50	1.52	0.70	0.72	
Legal & General Investment Management	0.10	1.30	2.50	2.30	2.35	2.70	0.50	1.00	n/a	n/a	n/a	n/a	

Source: Bloomberg L.P. and LGIM estimates

*Forecasts are for end of Q2 2016

**Forecast for end of 2016

There has been a developing global trend whereby consumer-related economic numbers have generally been quite positive, while industrial figures have been disappointing. It's easy to take a very positive or negative view of the world depending on which of these you prefer to focus on.

It's a pattern replicated to some extent in the UK. Retail sales have generally been positive, helped by lower fuel prices, as we detailed in "Beyond Goldilocks" (the February edition of Fundamentals). One area of difference for the UK is the strength of wage growth. While this is still pretty lacklustre in many developed economies, the UK is seeing stronger wage growth.

This trend has been helped by a return to more normal 'job-to-job' moves – in other words, as the labour market has got tighter, firms have less choice and need to tempt workers to move jobs through higher wages. These job-to-job moves were weak after the financial crisis – which makes intuitive sense: people tend to avoid moving job (where you lose redundancy eligibility and may suffer on a last in first out basis if there are job cuts) in the midst of a financial crisis. Increased job-to-job flows reinforces our view that the labour market is tightening.

What this means is that the Bank of England does not have the deflation concerns that the Federal Reserve is weighing against its desire to increase rates. As we said last month, we still believe that the Fed will be the first to pull the trigger. Consensus remains that the Bank of England will hike in the first half of the year. While we agree with this, we believe that there will be fewer subsequent rate hikes than many expect: with underlying inflation still very low there is little impetus to increase rates quickly. Austerity measures will not be eased as the Government is still committed to deficit reduction. Furthermore, UK households are very sensitive to interest rates – even those on fixed rates are generally protected for a maximum of two years. After seven years of 'emergency' low levels, the trip back to 'normal' will be a slow one.

The forecasts above are taken from Bloomberg L.P. and represent the views of between 20–40 different market participants (depending on the economic variable). The 'high' and 'low' figures shown above represent the highest/lowest single forecast from the sample. The median number takes the middle estimate from the entire sample.

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