BANK OF ENGLAND

Speech

Stuck

Speech given by

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Oliver Jeffers is an author and illustrator of children's books. In *Stuck*, he tells the story of a boy whose kite becomes lodged in a tree. The boy makes vigorous attempts to dislodge the kite by throwing up objects, including a cat, a gorilla and an ocean-liner. (The story is fictional.) Yet the kite remains stuck.

Central banks today can sympathise with the boy's dilemma. Official interest rates in the major economies remain stuck at unprecedentedly low levels. Central banks have made vigorous attempts to dislodge them, including through special liquidity schemes, asset purchases and forward guidance. (This story is factual.) Yet interest rates remain stuck.

This stickiness in interest rates has surprised both policymakers and financial markets. After they hit their floor, financial markets expected official rates in the US to unstick in 6 months, in the UK in 10 months, in Japan in 13 months and in the euro-area in 14 months.

But they have remained stuck: in Japan for over 20 years and in the US, the UK and the euro-area for over 6 years. Indeed, the expected time to lift-off remains as many months away today as when rates first hit their floor: in the US 9 months, in the UK 10 months, in the euro-area 34 months, in Japan 72 months (Chart 1).[1]

Looking at the path of interest rates implied by financial markets, this adhesiveness is expected to continue. In Japan and the euro-area, official interest rates are only expected to have reached 1.2% and 2.0% respectively ten years hence. And in the UK and US, they are only expected to have reached 2.5% and 3.4% respectively by 2025 (Chart 2).[2]

This implies an extraordinarily slow pace of monetary tightening, at least by historical standards. On average over the next five years, interest rates are only expected to rise by 13 basis points per quarter in the US, 9 basis points in the UK, 7 basis points in the euro-area and 2 basis points in Japan. This, truly, is a brave new world: in my time at the Bank of England I can recall UK interest rates rising by 5 *percentage* points in a *day*.

Moreover, even these estimates may overstate the future path of interest rates implied by financial markets. Market interest rates are probability-weighted averages of different possible interest rate paths – they are a *mean*. Model estimates of the *modal* – or most likely - path for interest rates are lower still (Chart 3).

Estimates of the modal path of interest rates are drawn from estimated models, so are no more than illustrative. Nonetheless, the modal interest rate three years ahead in the US is only 1.1%. In the UK it is 0.8%, little changed from current levels. According to these estimates, the glue holding interest rates to the floor looks stronger still.

[1] Expected lift-off here refers to a 25 basis point increase.
[2] The path of forward interest rates will also be affected by term premia. See Shafik (2015).

There is an old English aphorism, due to Walter Bagehot in the 19th century: "John Bull can stand many things, but he cannot stand 2%". Prior to 2009, the Bank of England had been careful to avoid the wrath of Mr Bull: Bank rate had never been below 2% in its then-315 year history.

For the past six years the MPC has been testing the patience of Mr Bull, with the 2% threshold consistently breached. If financial markets are to be believed, Mr Bull, Mrs Bull, and their children are set to have their patience tested further: UK rates are not expected to reach 2% until 2019.

So whatever is gluing official interest rates to the floor in major economies is proving remarkably resilient. What factors are responsible? Are they temporary or permanent? And what are their implications for financial markets, the economy and monetary policy?

There are many factors which explain the extra-ordinary current constellation of yields. Many of these factors pre-date the crisis. Global real rates have been falling for over three decades (Chart 4). They averaged 5% in the 1980s and 4% in the 1990s. So far this century, they have averaged 2%. Currently, they are around zero or slightly negative.

At a Parliamentary Committee hearing a few years ago I asserted, boldly, that global interest rates were at their lowest-ever levels. A wise colleague challenged me afterwards: "How do you know they weren't lower in Babylonian times?" Several exhausted research assistants later I can report that, luckily, I was on safe ground. Interest rates appear to be lower than at any time in the past 5000 years (Chart 5).

The explanations for this secular fall in global real rates include excess savings in the East, deficient investment in the West, worsening demographic trends and rising inequality (Haldane (2015a)). Some have interpreted their downward drift as evidence of secular stagnation, in an echo of concerns raised after the Great Depression (Summers (2014)).

Whatever the explanation, there has been a further ratchet down in global real rates since the crisis. I wish to focus on two factors which have contributed to this fall: *dread risk* and *recession risk*. The first generates an elevated *perception* of risk, the second an asymmetric *balance* of risk. Both are relevant to explaining the path of interest rates, the likely fortunes of the economy and the optimal setting of monetary policy.

Dread risk

In their classic account, Friedman and Schwartz (1963) believed pessimism among households and businesses played a key role in explaining the severity and persistence of the Great Depression: "The contraction instilled an exaggerated fear of continued economic instability, of the danger of stagnation, of the possibility of recurrent unemployment." In other words, *economic* depression contributed to *psychological* depression, and vice-versa, in a feedback loop.

Subsequent research has lent support to Friedman and Schwartz's hypothesis. Psychological studies show that catastrophic events generate an exaggerated sense of fear and insecurity. This causes people to over-estimate systematically the probability of these dread events re-occurring, relative to their true probability.[3] Perceptions of risk, in other words, are exaggerated. Psychologists call this "dread risk" (Slovic (1987)).

Dread risk has been shown to be associated with events which, although low probability, are high impact. Specifically, they are associated with *large losses* among a *large number* of people occurring at the *same time*. Prominent examples of "dread risks" with these characteristics are plane crashes and terrorist attacks, such as 9/11 in the US.

This exaggerated sense of risk is stronger, the more recent the event. In other words, the over-estimation of risk is subject to time decay. This is known as disaster myopia (Guttentag and Herring (1986)). Rates of time decay from dread events are, however, typically slow. While the psychological scars from dread events fade, they do so only gradually and never fully disappear.

Although the over-estimation of risk is, in one sense, "irrational", its anthropological roots are deep. They are found in the hunter-gatherer communities that existed thousands of years ago, typically involving groups of 50-100 people. Simultaneous loss of 100 people would, in this setting, have threatened these communities' very existence. And this "dread" appears to have hard-wired itself into our psyche to this day (Gigerenzer (2014)).

The consequences of dread risk may not, however, be benign. It generates risk-averse behaviour which, while instinctive, may be counter-productive even from a risk perspective. The dread risk associated with 9/11 led to an exaggerated fear of flying and a sharp rise in car use. The loss of life from this increased car use may have been greater than the loss of life from 9/11 itself (Gigerenzer (2014)). This is the paradox of precaution.

The self-same logic applies when moving from catastrophic losses of life to catastrophic losses of livelihood. Financial crises are the classic example of such catastrophic events. They too cause *large losses* of income by a *large number* of people at the *same time*. In other words, they have all the hallmarks of a dread event, albeit one associated with economic, rather than physical, insecurity.

The Great Depression was the most prominent example of an economic dread event in the 20th century. Historical accounts point clearly to it having generated an exaggerated sense of insecurity (Galbraith (1954)). One way this manifest was a surge in demand for safe assets. In Friedman and Schwartz's words:

[3] As a corollary, people also tend systematically to under-estimate the probability of risks with a higher probability but which affect a smaller number of people, such as car crashes (Gigerenzer (2004)).

“Expectations of great instability enhanced the importance attached to accumulating money and other liquid assets”.

In the 1930s, this search for safety resulted in a rise in the demand for, and price of, government securities, lowering their yield. The yields on US and UK government bonds fell significantly and persistently during the 1930s (Chart 6). Insecurities revealed themselves in securities.

The Great Depression also widened the gap between the return on safe and risky assets such as equities. This wedge - the equity premium - appears to have risen sharply after the Great Depression. It remained elevated for several decades thereafter. In finance circles, this is known as the “equity premium puzzle” (Mehra and Prescott (1985)).

Recent academic evidence has argued, persuasively, that this puzzle can be solved by recognising that the Great Depression, and other catastrophic output losses, are dread events which exaggerate and prolong risk perceptions. Catastrophe risk then explains the size and persistence of the equity premium (Cogley and Sargent (2005), Barro (2005)).

As with other dread events, precautionary responses to the Great Depression worsened its impact. It blunted entrepreneurial activity, with fewer start-ups of new businesses and lower take-up of external financing (Malmendier and Nagel (2011)). Moreover, this scarring effect on risk-taking lasted a whole generation, consistent with a slow rate of disaster time decay.

These precautionary responses reduced investment and innovation by companies, adding to the depth and persistence of the recession and amplifying insecurities in a negative loop. This is what Keynes called the paradox, not of precaution, but thrift (Keynes (1936)).

After the Great Depression, the next largest financial crisis of the 20th century was probably the Asian financial crisis of the late 1990s. Like its predecessors, this caused catastrophic losses of income for a great many people across Asia at around the same time. In other words, it too bears all the hallmarks of an economic dread event.

As in the past, this caused a precautionary shift into safe assets, lowering the yield on US bonds by a similar amount and for a similar period as after the Great Depression (Chart 6). The increased demand for safety was concentrated among Asian countries. But the fear of a similar dread event spread to other potentially vulnerable emerging markets too.

In response, they built war-chests of foreign exchange reserves: the global stock rose 6-fold between 1997 and 2012, from $2 trillion to $11 trillion or from 5% to 16% of world GDP (Chart 7). The consequences of this

precautionary response were far from benign. The global glut of savings is believed by many to have sowed the seeds of the subsequent global financial crisis (Bernanke (2005), Wolf (2014)).

That global financial crisis is the most damaging economic and financial event since at least the Great Depression. To put it in context, Chart 8 plots the distribution of annual GDP growth across four countries since 1870 and in the UK since 1700. It highlights outcomes around the Great Depression and the Great Recession. Both occupy a place in the left tail of the historical growth distribution.

The precautionary responses to these crises have been similar, with the fall in US and UK government bond yields since the Great Recession mimicking that after the Great Depression (Chart 6)). As in the 1930s, the global financial crisis also appears to have caused the equity premium to rise (Chart 9). This time, perhaps it is not so puzzling.

Pre-crisis, one of the causes of low global real rates was felt to be the insufficient supply of safe assets (Caballero and Farhi (2014)). Since the crisis, the deteriorating fiscal position of many countries has helped solve that problem. Since 2010, the US, UK, the euro-area and Japan have issued around $11 trillion in government securities.

Yet over the same period, global real interest rates have fallen further. The demand for safe assets has overwhelmed this additional supply. Through their asset purchase programmes, central banks in the UK, US, Japan and the euro-area have purchased government assets totalling around $5 trillion since the start of 2010.

But they have clearly not been alone. Most global banks have increased their holdings of safe government assets and central bank reserve balances. Among US banks, the ratio of liquid assets to total assets increased from 11% in 2009 to 15% in 2014, while among UK banks it rose from 20% to 23%.[4] That has been in part for precautionary purposes and in part in anticipation of new regulatory requirements.

Among companies in the UK, US and Europe, there has been a significant increase in their liquid asset holdings, of around $0.5 trillion since 2008, mostly for precautionary purposes. And among institutional investors, there has been a further portfolio switch into bonds since the crisis. Since 2009, the size of US bond funds has more than doubled, rising from $1.5 trillion to $3.5 trillion.

As after the Great Depression and the Asian financial crisis, this precautionary behaviour has not been confined to the government bond market. It has affected spending behaviour among households and companies too. And, as previously, the consequences for the wider economy have not been benign.

[4] See IMF Financial Soundness Indicators, available here: http://fsi.imf.org/Default.aspx.

In 2008, households and companies were running a combined financial deficit (income less spending) of 2.4% of GDP in the US and 1.5% of GDP in the UK, while in the euro-area they were running a small surplus of 2.4% of GDP (Chart 10). In other words, the private sector in aggregate was neither saving nor dissaving to any great degree.

By 2010, the private sector had switched to a large financial surplus of 7.2% of GDP in the US, 8.2% of GDP in the UK and 5.8% of GDP in the euro-area. The private sector was now saving and in significant scale. This precautionary behaviour, as after the Great Depression, has proved persistent. It has only recently started to normalise.

This is a 21st century paradox of thrift and precaution. The psychological scars of the Great Recession, as after the Great Depression, have proved lasting and durable. They help explain the sluggishness of the recovery, and the adhesiveness of interest rates, since the crisis. And, if the past is any guide, these scars may heal only slowly.

Recession risk

Psychological scarring affects how people perceive and respond to risk in the *past*. As important for monetary policy, however, is the economic and financial risk people expect to face in *future*. Another lower left tail event could further frazzle the nerves and set back recovery and risk appetite. Just how likely is that?

Looking at the long-run pattern of growth, across countries and time, gives some guide to the probability of a future tail event, such as a recession. As Chart 8 illustrates, the historical distribution of growth is fat-tailed and negatively skewed (Haldane (2012)). Large recessions are significantly more likely than, for example, the normal (or bell) curve might lead us to expect.

Based on historical data, the probability of a recession (defined here as a negative rate of annual GDP growth) over the following year lies between 17% (taking cross-country evidence since 1870) and 30% (if we take the UK since 1700). In other words, a recession should be expected one in roughly every 3 to 6 years. Of course, the distant past might be a poor guide to the future. But even if we took the period since 1945, the probability of recession would only fall to 12%, or one year in around every 10.

These are probabilities over a one year horizon. In practice, what matters for spending and saving are people's risk perceptions over a longer-term horizon. By making some assumptions about how these probabilities evolve over time, it is possible to construct *cumulative* probabilities of recession.

Chart 11 shows the cumulative probabilities of recession over a ten year horizon using two long-run cross-country GDP samples.[5]

Over the course of a decade, the risk of experiencing at least one recession rises steadily, reaching between 85-90% after ten years. Using post-war data, this cumulative probability is just less than 80%. So over any plausible sample period, a recession remains considerably more likely than not over the course of a decade.[6]

That is not to say longer periods of interrupted growth are impossible. The world has in the past experienced lengthy periods of continuously positive annual growth: in the UK, for a remarkable 26 years after the Second World War and for 16 years during the Great Moderation starting in the late 1990s. As Chart 12 shows, however, these are extreme outliers in the distribution of expansions. The probability of an expansion lasting for longer than 10 years is, on past evidence, less than 10%.

If a recession were to strike in the period ahead, a relevant question for monetary policy is how much room for manoeuvre might be necessary to cushion its effects. History can again offer some guide. Table 1 looks at loosening cycles in the UK, US, Germany and Japan in the period since 1970 and in the period since 1994.

There has been considerable variation in the scale and duration of loosening cycles over time and across countries. Nonetheless, Table 1 suggests that the average cycle has typically been in the range 3 to 5 percentage points – towards the upper end in the period since 1970, towards the lower end in the period since 1994. Fairly sizeable degrees of interest rate headroom have been necessary in the past.

An interesting thought-experiment is to assess the likelihood of future interest rates having risen sufficiently to give monetary policy the headroom necessary to cushion a recession. Chart 13 plots a set of cumulative probabilities of official interest rates exceeding a set of interest rate thresholds – 2% (the "John Bull threshold"), 3% (the average loosening cycle since the 1990s) and 5% (the average loosening cycle since the 1970s).[7]

With yield curves currently low across the major advanced economies, the probabilities of interest rates exceeding these thresholds are modest. Even at a ten-year horizon, the probability of UK rates exceeding 2% is only around 50%, 3% around 40% and 5% around 20%. If financial markets' guesses about interest rates are realistic, it is odds-against there being sufficient monetary policy headroom to cushion a typical recession.

[5] Assuming these probabilities evolve according to a Bernoulli distribution – that is to say, the probability of a recession triggering shock occurring in one year is independent of the probability of a shock occurring in another year. This probability is calculated by looking at data on the frequency of negative annual growth rates. The cumulative probability is the probability that there will be at least one such shock over a given horizon.

[6] Using *conditional* probabilities – for example, on starting in recession or expansion – does not dramatically alter these cumulative probabilities.

[7] These probabilities are drawn from estimated distributions using data from interest rate options contracts.

If we now compare the probabilities of interest rates being at these thresholds with the probabilities of recession, a striking conclusion emerges. Recession probabilities exceed interest rate threshold probabilities by a factor of anywhere between 1.5 and 4 (Chart 13). For example, a conservative estimate of the probability of recession over a ten-year horizon is around 80%. The probability of interest rates having 3 percentage points of headroom over this horizon is around 40%.

Put differently, based on these estimates there is a considerably greater chance of interest rates needing to be cut to their floor to meet recessionary needs than of them gliding back to levels that could safely cushion a recession. Even after interest rates have lifted off from their floor, it is more likely than not they may return there over a ten-year horizon. For the foreseeable future, the effective lower bound will exert a strong magnetic pull.

Another way of illustrating the same point is through the lens of real interest rates. In the 1990s, they were around 4%. With a 2% inflation target, that meant nominal interest rates would be expected to average around 6% over the cycle. That would give more than enough room to cut interest rates to cushion recession in a typical loosening cycle.

Today, global real rates are around zero. With 2% for inflation, that gives a nominal interest rate of only around 2% over the cycle. That would give insufficient room above the effective lower bound to accommodate a typical loosening cycle. Provided real rates remain low, the lower bound constraint is likely to form part of the new normal.

Of course, part of the reason the yield curve is low in the first place is because markets are weighing recession risk, perhaps using historical probabilities. That drags down the yield curve by an amount equal to the probability of recession multiplied by the lower interest rate bound. As recession probabilities dominate over medium-term horizons, so too does the magnetic attraction of the lower bound on the yield curve.

There are plausible reasons why financial markets might currently be over-pricing recession risk, causing an excessive downdraught to the yield curve. Psychological scarring is one such explanation. Nonetheless, historical experience suggests these recessionary fears are not unreasonable. Those fears provide a plausible explanation for why interest rates are, and are expected to remain, resolutely stuck to their floor.

Monetary policy implications

Given these risks, what are the implications for monetary policy? Growth in the UK remains solid. Robust private sector demand has been a key contributor, with household consumption growing steadily for two years, largely funded by a pickup in real incomes. Despite some signs of slowing recently, business investment has also remained robust. We have seen a reasonable, and reasonably balanced, recovery.

The forecasts for GDP and inflation contained in the Bank's May *Inflation Report* envisaged these broad patterns continuing. Growth was expected to remain around its historical average rates over the next few years, while inflation was expected to rise from its current near-zero rates to reach 2% after two years. Earlier this year, I used the central paths from the February *Inflation Report* to generate some interest rate trajectories, assuming monetary policy was set to minimise current and future deviations of inflation from target and output from trend (Haldane (2015b)). It is useful to update these interest rate paths for the MPC's latest GDP and inflation forecasts.

These are shown in Chart 14. The interest rate profiles are relatively similar to those in February. As then, they suggest the optimal path for interest rates involves an immediate cut in rates for about a year, which pushes inflation back to target and closes the output gap. Thereafter, interest rates rise gradually in line with the market curve.

As with any model-based simulation, these interest rate paths are no more than illustrative. Nonetheless, I find they serve as a useful benchmark: what is it about the economy, not captured by the model, which would cause me to deviate from this path? Earlier in the year, these types of simulations played a role in my judging that a neutral stance on the future direction of interest rates was a prudent course.

One important drawback of these model-based simulations is that they tend to underplay the effects of risk, focussing instead on central paths for growth and inflation. So how might risks, including dread and recession risk, affect the path of demand and the optimal interest rate trajectory in the period ahead?

In principle, dread risk affects demand in two ways. First, it generates an attitude of caution when making major decisions – moving house or job or making an investment. People will tend to look before they leap, to think twice before diving in. It creates the mind-set of the glass being half empty.

Second, insecurity generates an asymmetric response to news flow. Good news will be banked or used to strengthen balance sheets. Roofs get repaired during the sunshine. But when bad news strikes, the response is immediate and defensive. There is a hunkering down, with cuts in spending and risk-taking.

The exact opposite psychological traits are, of course, exhibited during a boom. Then, good news is spent and bad news borrowed against. Roof repairs are deferred, whatever the weather. The glass is half full. There is a wealth of experimental evidence documenting these psychological swings and asymmetries.

Despite the recovery, evidence continues to suggest a "half-empty" mind-set. World growth has, since 2010, averaged less than 4%. Forecasts have been consistently over-optimistic by ½ percentage point per year. The evidence so far during 2015 suggests this pattern may continue. Caution is a plausible explanation for this dragging anchor.

The household sector has undertaken significant balance sheet repair since the crisis, dragging on spending.[8] This can be seen in the proportionately greater belt-tightening exhibited among highly-indebted consumers (Chart 15)). These debt-induced adjustments in spending have also been important among US consumers (Mian and Sufi (2014)).

Several other features of household decision-making over recent years might also plausibly reflect the effects of insecurity: weak transactions in the housing market, which are 20% lower than their pre-crisis average; subdued job-to-job flows in the labour market, which remain below their pre-crisis average; and real wages which remain lower than historical relationships can explain, as workers' bargaining power has been sapped.

Over the past year, this cautious behaviour has been evident in households' response to the income windfall arising from the fall in oil prices. This has boosted real incomes by perhaps 0.4%. And it appears also to have boosted consumer confidence. What it appears not to have translated into, or at least not yet, is higher consumption: retail spending growth is little different than before the oil price fall (Chart 16).

One interpretation is that consumers are simply waiting to see if the fall in oil prices persists. My preferred interpretation is that it reflects instead the asymmetric response of a cautious consumer: good news has been banked, not blown. Consumers are pleased their glass is now less than half empty. But they are no more willing to drink it.

This cautious behaviour is, to a degree, also mirrored among companies. This can be seen in the weakness of global investment since the crisis, despite the cost of company borrowing being at its lowest-ever levels (Chart 17). Uncertainty-induced weakness in investment has provided a continuing drag on recovery, globally if not nationally.

This uncertainty can be seen, too, in how companies are reinvesting their earnings. The trend over the past 20 years has been for companies to invest more in passive assets such as cash, than active ones such as physical capital. But this trend has been accentuated since the crisis. Table 2 looks at the ratio of liquid assets to investment by the corporate sectors in the UK, US, France and Germany.

These ratios have risen sharply since the crisis, on average by around 70 percentage points. Companies are not just saving more of their earnings. They are doing so in a more liquid form than previously. As among consumers, business confidence has risen in lockstep with profits. But this good news has been banked, not invested. Despite the sunshine, many companies are still engaged in roof-repair.

[8] See Bunn and Rostom (*forthcoming*).

Growth in the UK, the US and some other countries remains solid, if unspectacular. But caution increases the chances of world growth continuing systematically to underperform, as it has since the crisis. By generating an asymmetric response to good and bad news, it may also skew growth risks to the downside, again as we have seen.

While emphasizing the downside, it is important not to forget the potential for upside risks. The upside risk that has generated most attention over recent weeks has been wage growth. At a headline level, this picked up to 2.7% for regular pay growth on an annual basis in April, from a low of 0.7% as recently as the summer of last year. This is around 0.2 percentage points higher than forecast in the Bank's May *Inflation Report*.

This pick-up in wage growth is welcome. Indeed, this rise is a necessary ingredient for getting inflation back to target in the period ahead. Equally, were wage inflation to continue to surprise to the upside as the labour market tightens, this could pose an upside risk to inflation, with corresponding implications for the MPC's monetary policy stance.

It is important also, however, to place this wage news in context. This most recent upside surprise comes against a backdrop of wage growth having surprised to the *downside* for much of the past two years. Up until last month, wages had surprised to the downside in 11 of the past 18 months. That has left the level of regular pay in the economy 2% lower than we expected 18 months ago, even with the recent news.

Second, one explanation for the recent weakness of wages has been the compositional effects of a greater number of lower-skilled, lower-paid workers entering the job market. This has clearly had some, probably temporary, depressing effect on wage growth. Over the post-crisis period as a whole, however, compositional effects have not depressed wages. Rather, they have *inflated* them. Without composition effects, the level of wages today would be around 1% *lower*, not higher.

Third, my visits to the Bank's regional agencies over the past few weeks talking to businesses leave me confident wages are not about to embark on a rocket-propelled ascent. Settlements seem to have edged up from first to second gear: they are now often in the "2-point-something" zone. But with the exception of a few regions and sectors, I do not yet see evidence of wage inflation going through the gears into third or fourth.

Fourth, since the May *Inflation Report* sterling's effective exchange rate has appreciated a further 3%. That will exert a downward drag on demand and inflation over the policy horizon: using the Bank's model ready-reckoners, by around 0.2 percentage points at the two-year horizon. In other words, the exchange rate news may be more important quantitatively for the two-year-ahead inflation outlook than the recent news from wages.

April's wage data was news, encouraging news. And the Phillips curve may well be re-emerging after several years in hibernation. But one swallow does not a summer make. As Aristotle inexplicably did not add, "especially once you adjust for compositional shifts". Wage growth is causing some fluttering, but not in this dovecote.

One reason for that is because expectations of inflation (the MPC's primary objective) at the two-year-ahead point (the MPC's preferred horizon) are skewed, if anything, to the *downside*. Chart 18 plots the MPC's forecasts for inflation at different horizons, alongside companies', households', financial markets' and professional forecasters' projections.

At the two-year point, outside forecasters' inflation projections lie below the MPC's. The MPC sees a 50% chance of inflation exceeding its target two years hence. Outside professional forecasters put that probability at just over 40%. Only around a third of companies and a quarter of households expect inflation to be above the target at that point.[9] The balance of risks, as perceived by those setting and receiving wages, is skewed squarely to the downside.

That leads naturally to questions of monetary policy strategy. There is clearly a tightrope to walk here: lean too much in an expansionary direction and the inflationary cat is let out of the bag (assuming it isn't already stuck in the tree with that kite); lean too much in a contractionary direction and the recessionary gorilla is unleashed (ditto).

The asymmetric risks posed by the effective lower bound have led some to suggest that the optimal strategy is to leave rates "lower for longer" (Evans et al (2014)). The argument here is that it is better to err on the side of over-stimulating, then course-correcting if need be, than risk derailing recovery by tightening and being unable then to course-correct. I have considerable sympathy with this risk-management approach.

Table 3 provides an illustrative list of countries which have pursued the latter strategy - tightening during a post-crisis recovery and then course-correcting. The most celebrated (if that is the right word) was the Fed's tightening in 1937. This is felt by many to have sent the US economy back into recession (Friedman and Schwartz (1963)). Almost 80 years on, the scars from that experience have yet to fade.

The US experience in the 1930s was special, but not unique. In few of the cases in Table 3 did things go well. In each case the tightening was subsequently unwound. In a number of cases it had to be *more than* unwound due to its contractionary effects on the economy.

[9] The professional forecasters' probability is taken from the Bank's Survey of External Forecasters for 2015 Q2. The company data are from the Deloitte CFO survey for 2015 Q1, and are based on an assumption that half of those companies that report that their two year ahead CPI inflation expectation is in the 1.5-2.5% bucket expect inflation to be above 2%. The household data are derived from the Bank/GfK inflation attitudes survey for 2015 Q2. That survey does not refer to a specific price index, so given that the average wedge between perceived inflation in the survey and actual CPI inflation is 1 percentage point, the proportion refers to the households that expect that inflation will be 3% or higher two years ahead.

Chart 19 shows the average path of output either side of the tightening. Most of these countries experienced several years of robust growth prior to the tightening, suggesting the economy was primed for lift-off. Yet when lift-off came, annual output growth weakened by around 2 percentage points in the following year, in the US by much more. Lift-off was quickly aborted as the economy came back to earth with a bump. In trying to spring the interest rate trap, countries found themselves being caught by it.

Why did this happen? One plausible explanation is the asymmetric behavioural response of the economy during periods of insecurity. Dread risk means that good news – such as oil windfalls - is banked. But it also means that bad news – 9/11, the Great Depression - induces a hunkering down. It risks shattering that half-empty glass.

A rate tightening, however modest, however pre-meditated, is an example of bad news. Its psychological impact on still-cautious consumers and businesses may be greater, perhaps much greater, than responses in the past. Or that, at least, is what historical experience, including monetary policy experience, suggests is possible.

Another way of illustrating this point is to imagine you were concerned with the low path of the yield curve and the limited monetary policy space this implied. And let's say you were able to lift the yield curve to a level which, for the sake of illustration, equalised the probabilities of recession striking and interest rates being at a level at which they could be cut sufficiently to cushion a recession.

With monetary policy space to play with, this might seem like a preferred interest rate trajectory. But it comes at a cost, potentially a heavy one. The act of raising the yield curve would itself increase the probability of recession. If we calibrate that using multipliers from the Bank's model, cumulative recession probabilities would rise from around 45% to around 65% at a 3-year horizon. These ready-reckoners are, if anything, likely to understate the behavioural impact of a tightening in a nerve-frazzled environment.

This suggests that a policy of early lift-off could be self-defeating. It would risk generating the very recession today it was seeking to insure against tomorrow. In that sense, the low current levels of interest rates are a self-sustaining equilibrium: moving them higher today would run the risk of a reversal tomorrow. These self-reinforcing tendencies explain why the glue sticking interest rates to their floor has been so powerful.

Taking these risks together, my judgement on the appropriate monetary stance in the UK is relatively little altered from earlier in the year. The current level of interest rates remains, in my view, appropriate to assure the on-going recovery and to insure against potential downside risks to demand and inflation. Looking ahead, I have no bias on either the size or direction of future interest rate moves.

Conclusion

In *Stuck*, the boy's attempts to unstick his kite from the tree come, well, unstuck. The cat, the gorilla and the ocean-liner, along with assorted other objects, get stuck up the tree too. In trying too hard to unstick his kite, the boy makes a difficult situation worse. Eventually, with the passage of time, the kite comes free of its own accord.

Trying too hard to unstick interest rates, or doing so too quickly, also runs the risk of making a difficult situation worse. It runs 1937 risk. That is one reason why the glue holding interest rates to their floor has remained so strong. And it is why I feel no immediate need to loosen that glue.

References

Barro, R (2005), 'Rare Events and the Equity Premium', *NBER Working Paper No 11310, available here:* http://www.nber.org/papers/w11310

Bernanke, B (2005), 'The Global Savings Glut and US Current Account Deficit', speech given at the Virginia Association of Economists, available at: http://www.federalreserve.gov/boarddocs/speeches/2005/200503102/

Bunn, P and Rostom, M (*forthcoming)*, 'Household debt and spending in the United Kingdom', *Bank of England Working Paper*

Caballero, R and Farhi, E (2014), 'On the role of safe asset shortages in secular stagnation', Chapter 9 in the VoxEU e-book 'Secular Stagnation: Facts, Causes and Cures' available here: http://www.voxeu.org/sites/default/files/Vox_secular_stagnation.pdf

Cogley, T and Sargent, T (2005), 'The conquest of US inflation: Learning and robustness to model uncertainty', *Review of Economic Dynamics No 8 p528-563*

Evans, C, Fisher, J, Gourio, F and Krane, S (2015), 'Risk Management for Monetary Policy Near the Zero Lower Bound', *Brooking Papers on Economic Activity, available at:* http://www.brookings.edu/~/media/Projects/BPEA/Spring-2015/2015a_evans.pdf

Friedman, M and Schwartz, A (1963), 'A Monetary History of the United States, 1867-1960', ISBN: 9780691003542

Galbraith, J (1954), 'The Great Crash 1929', ISBN: 978-0141038254

Gigerenzer, G (2004), 'Dread Risk, September 11, and Fatal Traffic Accidents', *Psychological Science Vol 15 No 4*
Gigerenzer, G (2014), 'Risk Savvy: How To Make Good Decisions', ISBN: 978-0241954614

Guttentag, J and Herring, R (1986), 'Disaster Myopia in International Banking', *Essays in International Finance No 164*

Haldane, A (2015a), 'Growing, Fast and Slow', *speech given at the University of East Anglia, available here:* http://www.bankofengland.co.uk/publications/Documents/speeches/2015/speech797.pdf

Haldane, A (2015b), 'Drag and Drop', *speech given at the BizClub lunch, Rutland, available here:* http://www.bankofengland.co.uk/publications/Documents/speeches/2015/speech810.pdf

Haldane, A and Nelson, B (2012), 'Tails of the Unexpected', speech given at the University of Edinburgh Business School, available at: http://www.bankofengland.co.uk/publications/Documents/speeches/2012/speech582.pdf

Heim, C and Mirowski, P (1987), 'Interest rates and crowding-out during Britain's industrial revolution', *Journal of Economic History Vol 47 Pages 117-139*

Hills, S, Thomas, R and Dimsdale, N (2010), 'The UK recession in context — what do three centuries of data tell us?', *Bank of England Quarterly Bulletin 2010 Q4*

Hills, S, Thomas, R and Dimsdale, N (2015), 'Three Centuries of Data - Version 2.1', *available here:* http://www.bankofengland.co.uk/research/Pages/onebank/datasets.aspx

Homer, S and Sylla, R (1991), 'A history of interest rates', *ISBN: 978-0471732839*

Jeffers, O (2012), 'Stuck', *ISBN: 978-0007263899*

Keynes, J (1936), 'The General Theory Of Employment, Interest, And Money', *ISBN: 978-1494854744*

King, M and Low, D (2014), 'Measuring the "World" Real Interest Rate', *NBER Working Paper 19887*, available at: http://www.nber.org/papers/w19887.pdf

Malmendier, U and Nagel, S (2011), 'Depression Babies: Do Macroeconomic Experiences Affect Risk Taking?', *Quarterly Journal of Economics Vol 126 Issue 1*

Mehra, R and Prescott, E (1985), 'The Equity Premium: A Puzzle', *Journal of Monetary Economics No 15.*

Mian, A and Sufi, M (2014), 'House of Debt', ISBN: 978-0226271651

Slovic, P (1987), 'Perception of risk', *Sciences, New Series, Vol 236 No 4799.*

Shafik, M (2015), 'Interpreting the yield curve: pessimism or precaution?, VOX-EU, available at: http://www.voxeu.org/article/interpreting-yield-curve-pessimism-or-precaution

Summers, L (2014), 'U.S. Economic Prospects: Secular Stagnation, Hysteresis, and the Zero Lower Bound', *Business Economics Vol 49 No 2*

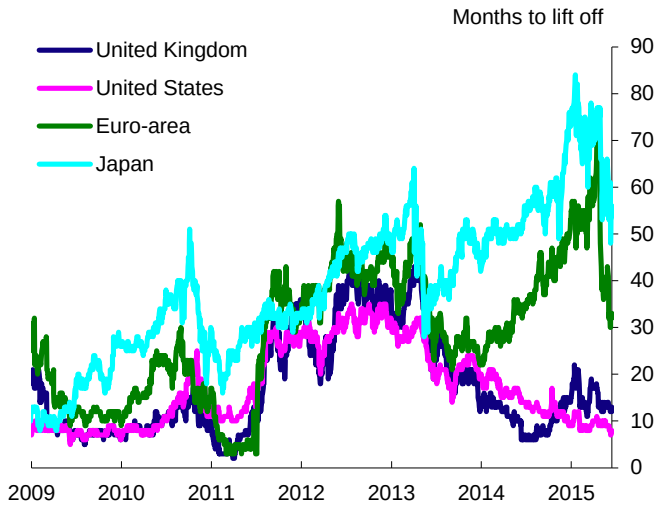
Velde, F (2009), 'The Recession of 1937—A Cautionary Tale', *Federal Reserve Bank of Chicago Economic Perspectives 2009 Q4, available at:* https://www.chicagofed.org/publications/economic-perspectives/2009/4qtr2009-part2-velde

Weiller, K and Mirowski, P (1990), 'Rates of interest in 18th century England', *Explorations in Economic History Vol 27 Issue 1*

Wolf, M (2014), 'The Shifts and the Shocks: What we've learned - and have still to learn - from the financial crisis', *ISBN: 978-1846146978*

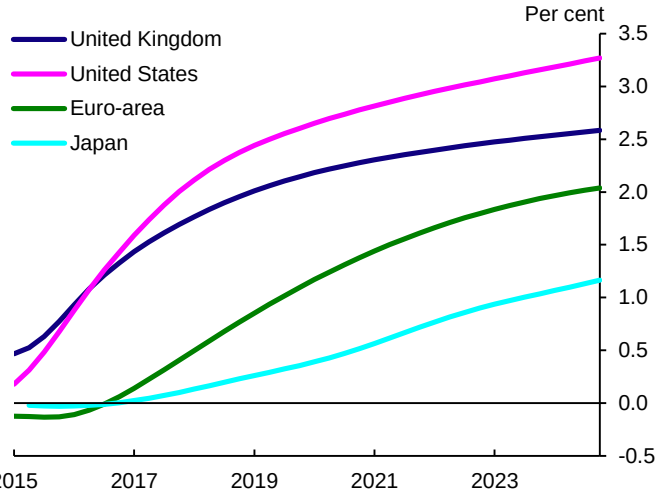
Appendix

Chart 1: Implied number of months until interest rates increase by 25 basis points



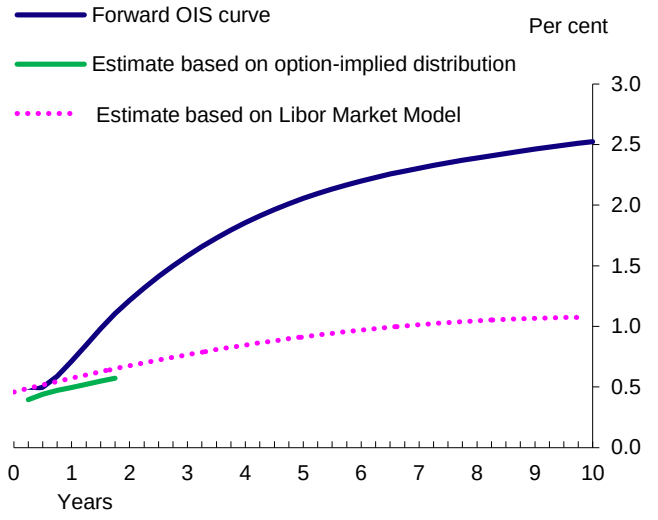
Source: Bloomberg; Bank calculations.

Chart 2: International forward interest rates



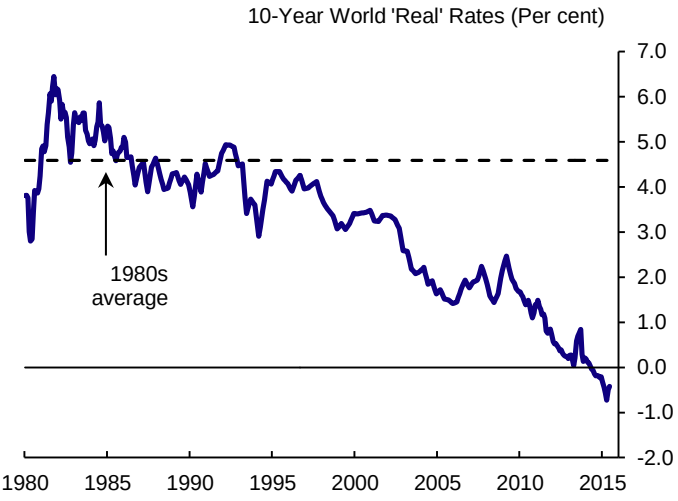
Source: Bloomberg; Bank calculations.

Chart 3: Mean and estimated modal paths for UK interest rates



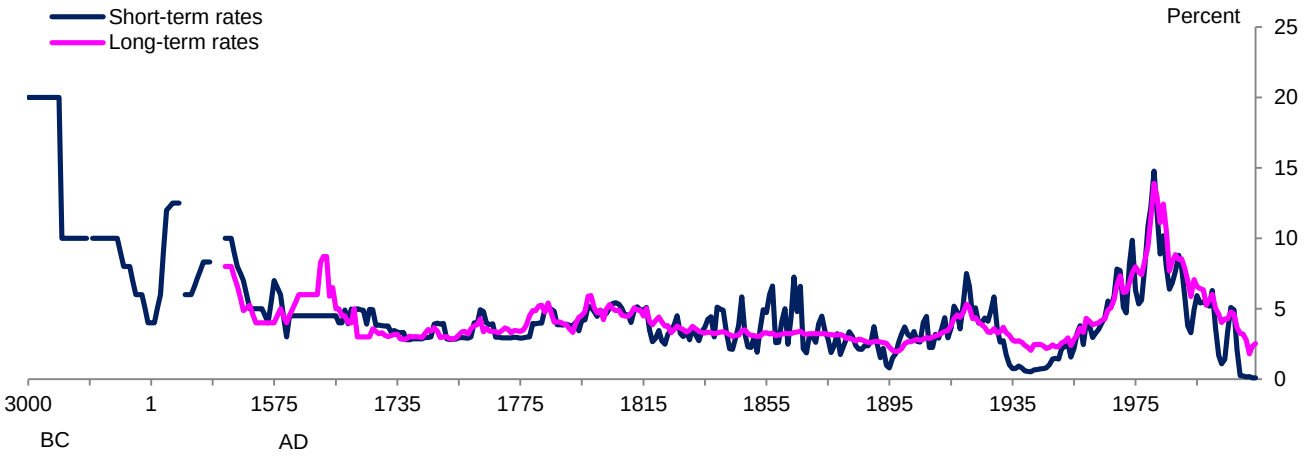
Source: Bank calculations; Bloomberg; ICE. Notes: The green line shows the mode of estimated option-implied distribution for 3-month sterling OIS rate, estimated from options on short sterling futures and adjusted to account for the forward libor-OIS spread. For more information see http://www.bankofengland.co.uk/statistics/Pages/impliedpdfs/default.aspx. The pink dotted line shows estimates based on a standard model for pricing interest rate derivatives and which makes certain parametric assumptions. The model uses Libor swaption implied volatilities and has been adjusted for the Libor-OIS spread. The line plots a simple line of best fit through these estimates.

Chart 4: Global real rates



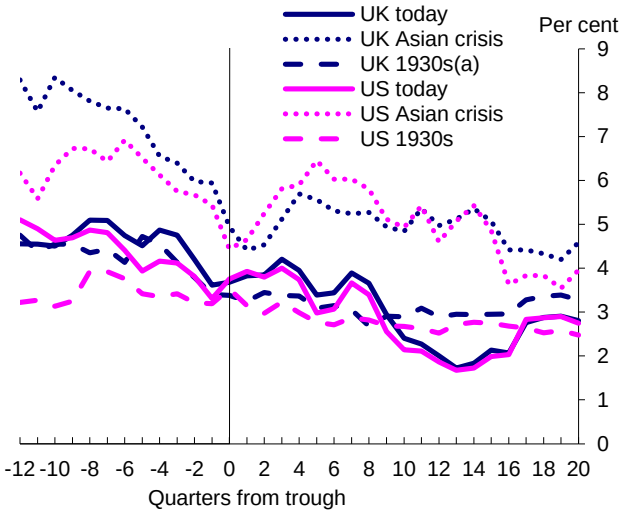
Source: King and Low (2014); Bank Calculations. Notes: The 'World' real rate taken from King and Low (2014) and is based on the average 10-year yield of inflation-linked bonds in the G7 countries (excluding Italy). UK rates have been adjusted to take account of the RPI-CPI wedge. Data availability means that US yields are only included from 1997 so the UK provides most of the historical back-run.

Chart 5: Short and long-term interest rates



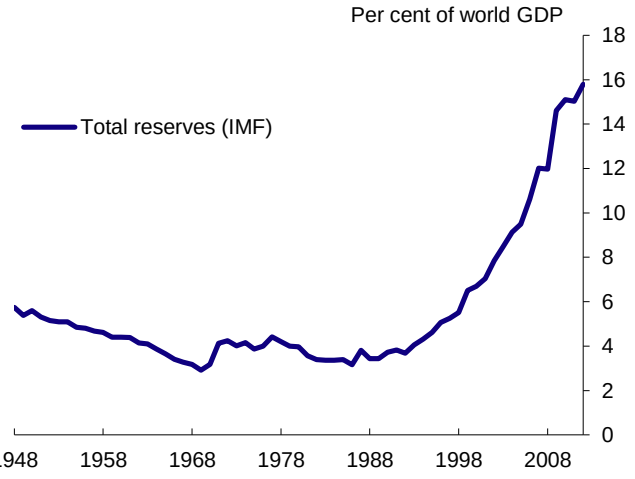
Sources: Homer and Sylla (1991); Heim and Mirowski (1987); Weiller and Mirowski (1990); Hills, Thomas and Dimsdale (2015); Bank of England; Historical Statistics of the United States Millenial Edition, Volume 3; Federal Reserve Economic Database. Notes: the intervals on the x-axis change through time up to 1715. From 1715 onwards the intervals are every twenty years. Prior to the C18th the rates reflect the country with the lowest rate reported for each type of credit: 3000BC to 6th century BC - Babylonian empire; 6th century BC to 2nd century BC - Greece; 2nd century BC to 5th century AD - Roman Empire; 6th century BC to 10th century AD - Byzantium (legal limit); 12th century AD to 13th century AD - Netherlands ;13th century AD to 16th century AD - Italian states. From the C18th the interest rates are of an annual frequency and reflect those of the most dominant money market: 1694 to 1918 this is assumed to be the UK; from 1919-2015 this is assumed to be the US. Rates used are as follows: Short rates: 1694-1717- Bank of England Discount rate;1717-1823 rate on 6 month East India bonds; 1824-1919 rate on 3 month prime or first class bills; 1919-1996 rate on 4-6 month prime US commercial paper ; 1997-2014 rate on 3month AA US commercial paper to non-financials. Long rates: 1702-1919 - rate on long-term government UK annuities and consols; 1919-1953, yield on long-term US government bond yields; 1954-2014 yield on 10 year US treasuries.

Chart 6: Bond yields around financial crises



Source: Datastream; Global Financial Data; Bank calculations.

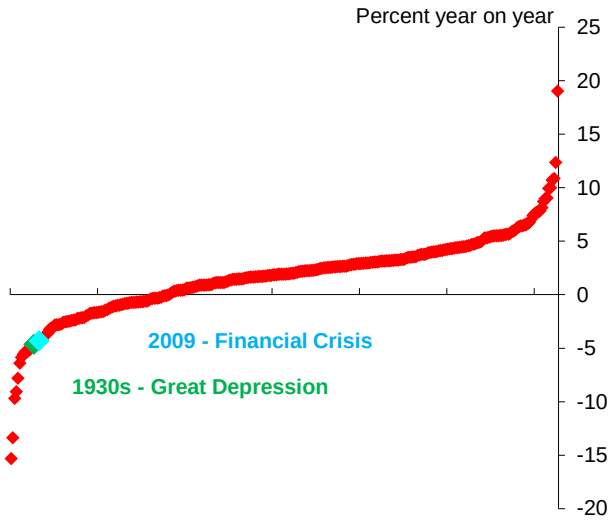
Chart 7: Global forex reserves



Sources: IMF IFS; Maddison Historical GDP Database; Bank calculations. Notes: Where there are gaps in this series, a constant growth rate between data points is assumed.

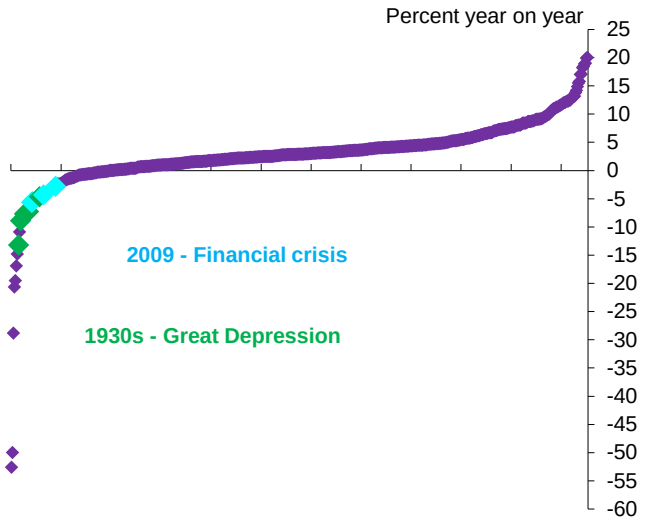
Chart 8: Distribution of GDP growth

UK 1700-2014



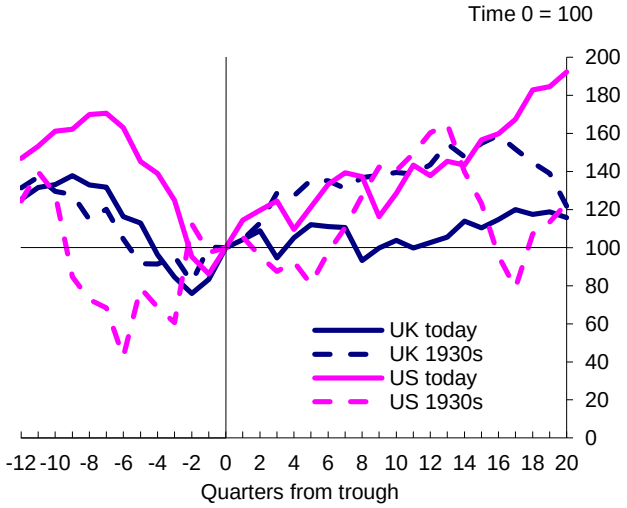
Source: Hills, Thomas and Dimsdale (2010, 2015). Notes: Chart shows annual GDP growth between 1700 and 2014. Data points are sorted from the lowest to highest values. Each dot represents one year.

UK, US, Japan, Germany 1870-2014



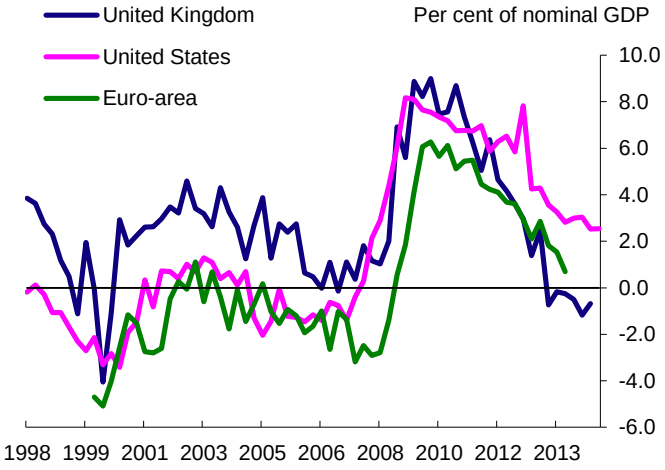
Source: Maddison Historical GDP Database; Hills, Thomas and Dimsdale (2010, 2015); Federal Reserve Economic Database. Notes: Chart shows annual GDP growth between 1870 and 2014. Data points are sorted from the lowest to highest values. Each dot represents one year.

Chart 9: Real equity prices around financial crises



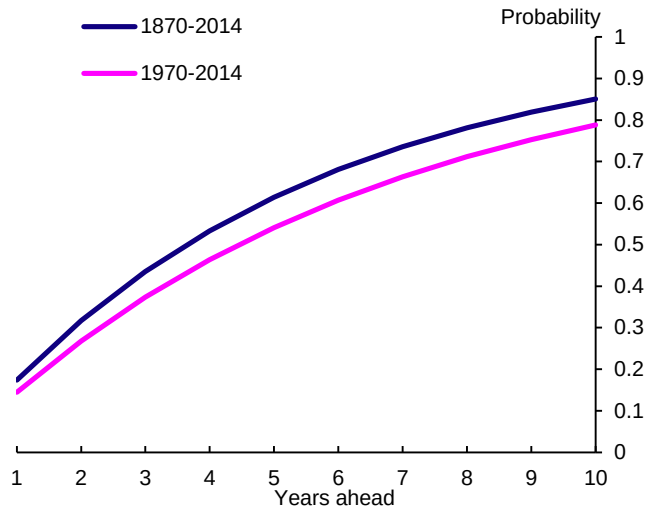
Source: Datastream; Global Financial Data; Bank calculations.

Chart 10: Private sector financial balances



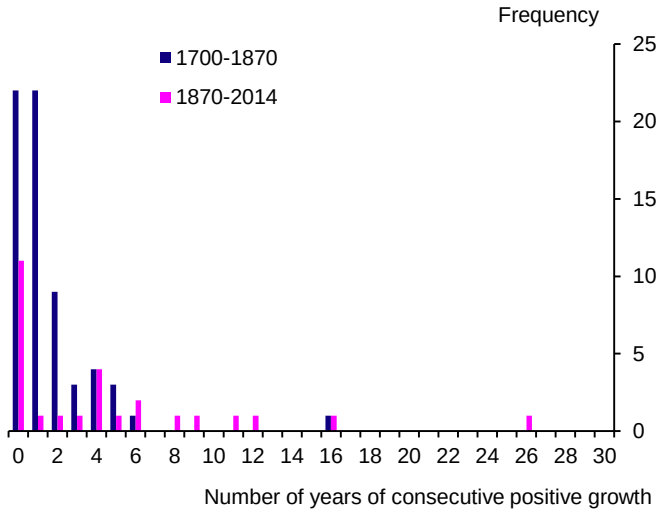
Source: ONS; Federal Reserve; BEA; Eurostat; Bank Calculations. Notes: The chart shows the total net financial balance for households and private non-financial corporations.

Chart 11: The cumulative probability of a recession estimated from historical data



Source: Bank calculations; Maddison Historical GDP Database; Hills, Thomas and Dimsdale (2010, 2015); Federal Reserve Economic Database. Notes: The cumulative probability of a recession 1-10 years ahead is defined as the probability of at least one recession within that horizon. Recessions are assumed to follow a Bernoulli process so that the probability of a recession in any given year is independent of outcomes in any other year. The probability of recession is estimated from the frequency of annual recessions in the historical for the sample periods 1870-2014 and 1970-2014 across the US, UK, Germany and Japan.

Chart 12: Distribution of consecutive years of UK economic expansion



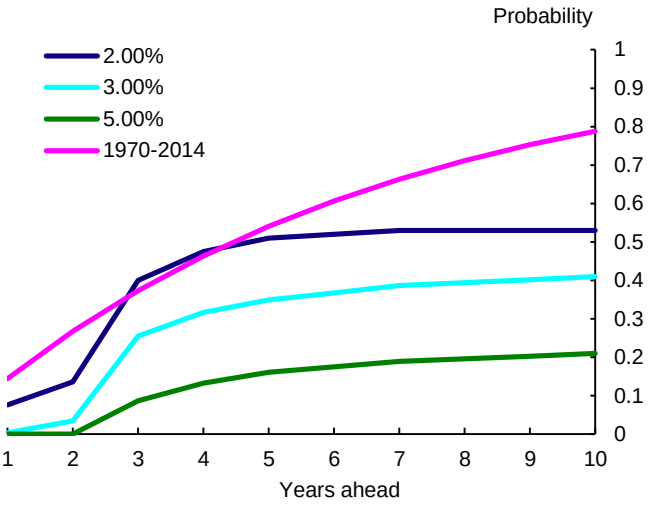
Source: Bank calculations; Hills, Thomas and Dimsdale (2010, 2015). Notes: The chart shows the frequency of expansionary episodes lasting different lengths of time. Zero denotes recessionary years.

Table 1: Average interest rate loosening cycles

	1970-2014		1994-2014	
Country	Range	Duration	Range	Duration
United Kingdom	5.0	23.8	2.8	16.5
United States	5.4	19.8	3.0	13.8
Germany	4.5	49.8	3.1	48.5
Japan	5.9	77.3	-	-
SUM	5.2	42.7	3.0	26.3

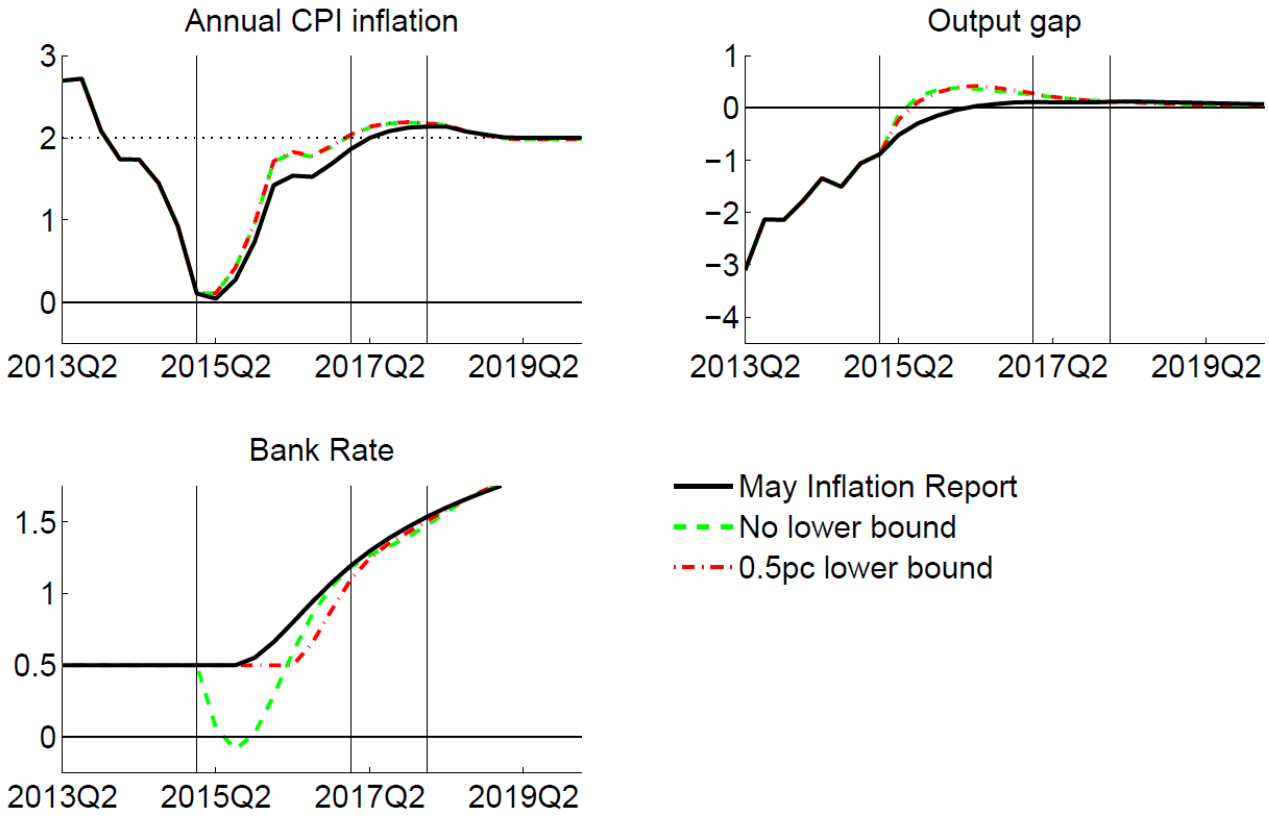
Source: Bank calculations; Bank of England; Deutsche Bundesbank; FRED database at St. Louis Fed. Note: Monthly data. Loosening cycles are assigned to subsamples according to the month of initial trough. Ranges are in percentage points and durations in months.

Chart 13: The cumulative probability of a recession and the probability that interest rates reach a certain threshold



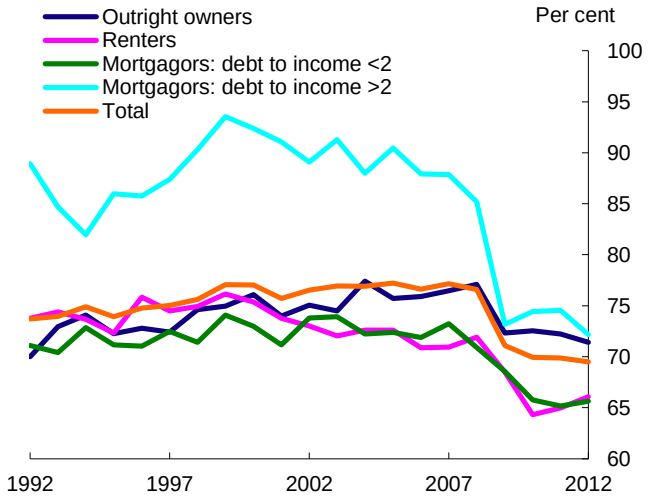
Source: Bank calculations; Hills, Thomas and Dimsdale (2010, 2015). Notes: The pink line is the same as in Chart 11. The probabilities that the realised short-term interest rate will exceed given thresholds (2%, 3% and 5%) at different horizons (1-10 years ahead) are estimated from the implied density function from option prices on 3-months LIBOR rates from June 2015.

Chart 14: Optimal control simulations



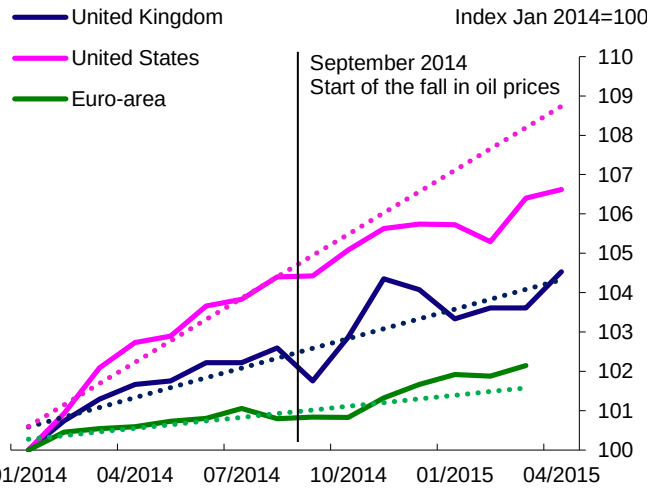
Source: ONS; Bank Calculations. Simulations show optimal policy under full commitment.

Chart 15: Non-housing consumption as a share of income



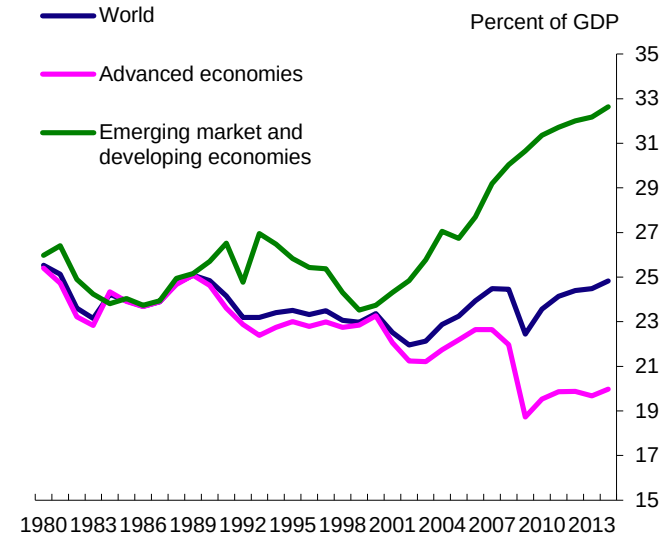
Sources: Living Costs and Food (LCF) Survey; ONS; Bank calculations. Non-housing consumption as a share of income net of mortgage interest payments. Data are scaled so that the total matches the National Accounts. Debt to income ratio is calculated using secured debt only. For further details see Bunn and Rostom (*forthcoming*).

Chart 16: Retail sales



Source: ONS, US Census Bureau, Eurostat and Bank Calculations.
Notes: The charts show nominal retail sales excluding automotive fuels. The dotted lines show simple trends taken between January and August 2014.

Chart 17: Global investment rates



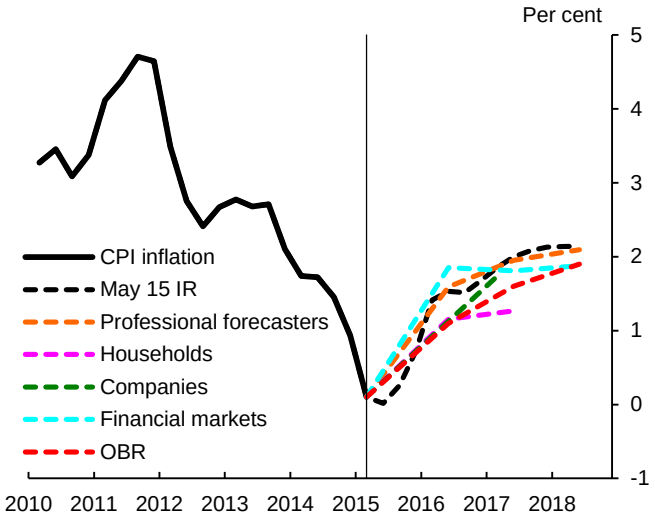
Source: IMF World Economic Outlook Database.

Table 2: Cash to investment ratios across countries, percent

Country	Pre-crisis	Post-crisis
United States	121	172
United Kingdom	216	332
France	122	194
Germany	126	158

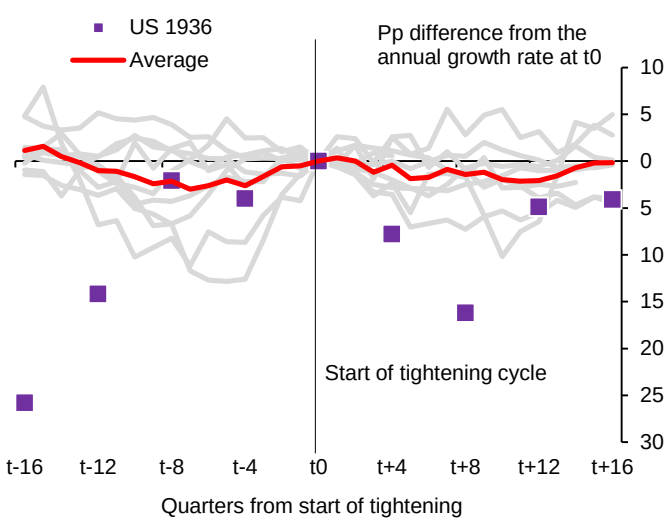
Note: Pre-crisis average calculated between 1997-2006. Post-crisis between 2010-2012, and for the UK between 2010-2014.

Chart 18: Survey implied projections of future inflation



Sources: Bank of England; Bloomberg; GfK; Deloitte CFO Survey; OBR; Bank calculations. Notes: Where these series do not refer directly to CPI, they have been adjusted to make the level of the series more comparable to the MPC's CPI inflation projection. The household measure is derived from the Bank/GfK inflation attitudes survey for 2015 Q2. It is adjusted down by 1 percentage point to account for the average wedge between perceived inflation in the survey and actual CPI inflation. The financial market measure is derived from instantaneous forward RPI inflation swaps one, two and three years ahead. These have been adjusted down to account for the difference between RPI and CPI. The professional forecasters measure refers to the average of central CPI inflation forecasts from the Banks' Survey of External Forecasters for 2015 Q2. The OBR measure refers to its CPI projections from its March 2015 forecasts. The companies measure refers to the estimated median two year ahead CPI inflation expectation from the Deloitte CFO survey for 2015 Q1.

Chart 19: Paths for GDP around policy reversals



Sources: Bank calculations; Datastream; Federal Reserve Economic Database. Notes: The chart shows the percentage point difference in annual growth rates relative to the point at which monetary policy was tightened. The countries included in the grey lines are listed in Table 3. The average excludes the US 1936 episode.

Table 3: Examples of policy reversals

Country	Period of tightening	Period of loosening	Size of tightening (bps)	Size of loosening (bps)
Japan	May 1989 to Aug 1990	Jul 1991 to Oct 1999	350	-600
	Aug 2000	Mar 2001	25	-25
	Jul 2006 to Feb 2007	Oct to Dec 2008	50	-40
Sweden	Jul 2010 to Jul 2011	Dec 2011 to Mar 2015	175	-225
Euro area	Apr to Jul 2011	Nov 2011 to Sep 2014	50	-95
New Zealand	Mar to Jul 2014	Jun 2015	100	-25
Australia	Oct 2009 to Nov 2010	Nov 2011 to May 2015	175	-275
Norway	Oct 2009 to May 2011	Dec 2011 to Jun 2015	100	-125
Iceland	Aug 2011 to Nov 2012	Nov to Dec 2014	175	-75
US	Jul 1936 to May 1937	Sep 1937 to Apr 1938	Reserve requirements were increased. US Treasury also began Gold sterilisation programme.	Reserve requirements were decreased. Gold sterilisation programme ended.

Source: Bank calculations; Datastream. Notes: Information for the US based on Velde (2009).