



BANK OF ENGLAND

# Speech

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## **Financial Stability and Low for Long**

Speech given by

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Jane Austen's face appears on the Bank of England's latest £10 note, which entered circulation in September 2017. But the Bank's association with one of the world's finest authors goes back much further: as the meticulously kept records of the Bank show, the successful novelist invested much of the proceeds of her writing in Bank of England Annuities.

In July 1815, for example, she purchased 'Navy Five per Cent annuities' – an undated Bank of England security – with a face value of £300. 'Navy Fives' were a popular investment during the Napoleonic Wars, paying annual interest, as the name suggests, of 5%. Jane did not purchase the stock at par value – research using the Bank's archives has established that she paid around £250 – making an annual nominal interest rate on her risk free investment of nearly 6%<sup>1</sup>.

Today, a comparable risk free asset – a 30 year gilt – is yielding around 1% nominal. And had Jane been living in the euro area today, in Germany for example, she would only have been able to invest for the long term at a negative interest rate – the 30 year bund yielded minus 0.27% in August.

Nominal interest rates do vary through time of course. Since the Napoleonic wars and outside wartime, UK long term nominal rates moved mainly in a 2-5% range until the decades of inflation following the Second World War, during which they rose above 15%, before falling back as inflation was brought under control.

They have been falling ever since. The fall in long rates is a phenomenon that has been building since the late 1980s, gathering pace after the financial crisis (**Chart 1**).

During the past couple of months, UK long nominal rates have dropped to around, and sometimes even below, 1%. They have not been this low in the past 200 years. The same is true, more generally, for other advanced economies.

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<sup>1</sup> See Avery Jones (2019).

Some of this likely reflects low current and expected inflation. But it is a great deal more than just an inflation story. Long term *real* rates – in the United Kingdom and in other advanced economies – are extremely low and indeed are negative.

I want to look briefly today at why we are in a period of low interest rates and why we might expect it to persist – ‘low for long’ in other words.

I will then turn to the main issue I want to discuss – the implications of a ‘low for long’ world on financial stability and the interaction with monetary policy.

My colleague, Ben Broadbent, has argued in an excellent speech for the separation of powers, with which I agree, between monetary and financial stability (or ‘macro-prudential’) authorities.<sup>2</sup> But monetary and financial stability, to some extent, depend upon each other and I will look at the implications that ‘low for long’ has on those interdependencies.

**Chart 1. UK long-term nominal interest rates (a)**



Source: A Millennium of Macroeconomic Data (available at <https://www.bankofengland.co.uk/statistics/research-datasets>) and Bank of England calculations (<https://www.bankofengland.co.uk/statistics/yield-curves>).

The red line shows yields on new long-term issues of perpetuities and consols (a mixture of month-end and monthly averages). The last remaining consols were repaid in June 2015. The blue line shows the 30-year zero coupon spot rate (monthly average). The data are up to September 2019.

<sup>2</sup> Broadbent (2018).

## Low for Long

What explains the current very low level of market interest rates in advanced economies? It may partly reflect very low levels of current policy rates and any spillovers from that.<sup>3</sup> It may also reflect the term premia for inflation that are currently very compressed in some countries, for example, the US and in the Euro area. And it may also be a symptom of a more entrenched pessimism – an over-pessimism in my view – about long-term economic prospects, possibly due to fears of the de-integration of the global economy or concerns about future effectiveness of monetary policy.

But, more fundamentally, the very low level of market interest rates reflects an underlying structural trend – the fall in long-run real interest rates since the early 1980s<sup>4</sup> – that has been the subject of a great deal of research.

The literature has identified a large number of candidate explanations – both real and financial – for a structural decline in the long-run real interest rate. These include: demographic trends and, in particular, increased longevity; lower trend productivity growth; the liberalization of financial intermediation and an increase in the risk borne by individuals and households.<sup>5</sup>

The long-run equilibrium real interest rates determined by these factors are, of course, unobservable. There is a range of estimates for how far they have fallen. Bank of England work suggests a central range of 0-1% for the long-run equilibrium real interest rate in the United Kingdom.<sup>6</sup> Widely cited estimates for the United States suggest that the long-run

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<sup>3</sup> In addition to affecting the market rates directly, monetary policy easing could lead to a further compression in market rates because of spill-overs via exchange rates (in case of interest rate cuts) or compression of term premia (in case of asset purchases). See Brainard (2017).

<sup>4</sup> King and Low (2014) document a sizeable decline in market based measures of long-term real interest rates in several advanced economies.

<sup>5</sup> See, e.g., Eggertsson et al (2017), Gagnon et al (2016), Rachel and Smith (2017) on the role of demographics and productivity growth and Vlieghe (2017) on the role of financial liberalization and increased risk taking. Some very different candidate explanations have also been suggested. Borio (2017) links the fall in long run real interest rates to monetary policy regimes, while Caballero (2017) links them to a shortage of safe assets.

<sup>6</sup> See Bank of England (2018), Box 6 on pages 39-43.

equilibrium real interest rate fell to close to zero during the crisis and has remained there into 2016.<sup>7</sup>

Of course, the long-run real rate is not the only driver of real interest rates. Over the business cycle, the real interest rate required to sustain output at potential and inflation at target, can fluctuate around the long-run real rate as a result of shorter-term influences on the economy.

At any given time, other factors like fiscal policy, uncertainty and global growth prospects may push the real rate required to bring inflation back to target further above or below the long-run real rate.

But given the slow moving nature of the underlying drivers of the long-run real rate, one would expect the downward shift in the overall interest rate cycle to persist into the foreseeable future.

It is this downward shift in the long-run real rate that has lain, in part, behind the Bank of England's message that any future increases in rates will be limited and we should not expect to see a return to the levels of policy rates we saw before the crisis. And this is exactly what motivates me today to speak about the implications of this low rate environment for financial stability.

### **Financial stability challenges of low for long: the financial sector**

I want to look today at the three main challenges to financial stability that this environment could pose and briefly consider possible policy responses.

The first challenge is that a slow or an unwilling adjustment to the lower returns implied by low for long can lead both to greater risk taking and less resilience in the financial sector.

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<sup>7</sup> Holston et al (2017).

In the banking sector, lower interest rates across the cycle reduce the net interest margins (NIMs) that banks earn from liquidity and maturity transformation. Moreover, NIMs would come under greater cyclical pressure more frequently and for longer because a proportion of banks' liabilities pay no interest and cannot therefore come down to match a reduction in lending rates when the policy rate is cut.<sup>8</sup>

It is also possible that the yield curve will be flatter in a low for long environment as greater proximity to the zero lower bound of interest rates will mean less interest rate variability on average across the cycle leading to lower term premia. If so, this would further reduce banks' earnings from maturity transformation.

In Japan, a prolonged period of low interest rates has contributed to falling NIMs for over a decade. More recently, we've seen a similar – albeit smaller - effect in other advanced economies<sup>9</sup>.

The impact of lower NIMs on bank profitability is currently reflected in lower price-to-book valuations of banks.<sup>10</sup> Arguably, in 'steady state', once expectations of returns have adjusted downwards to a low for long environment, target returns on bank equity will adjust accordingly, though there is no evidence of this happening so far. We should expect, even if only for a transitional period if expectations of returns do adjust, greater pressure on banks to search for yield and move further out on the risk curve. To the extent that they cannot meet target returns, it will be harder for them to accrete capital to build resilience.

Although the NIM effect has been present for some years now, we have not yet seen a broadly based move by banks in advanced economies to push up returns by taking on greater risk. Post crisis regulation has almost certainly played a role in constraining aggressive search for yield behaviour, as perhaps have banks' memories of the crisis.

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<sup>8</sup> For example, using the data for banks from 47 countries from 2005 to 2013, Claessens et al (2018) find that a 1 pp fall in interest rates implies an 8 bps lower NIM – compared to 20bps at low rates.

<sup>9</sup> In the euro area, NIMs are very low at around 130bps and retail-focused German savings banks in particular have seen their NIMs fall by 40bps since the ECB introduced negative rates in 2014. In the United Kingdom, NIMs are higher at around 230bps and have remained relatively stable over the past few years, supported by higher policy rates and the more international focus of major UK banks.

<sup>10</sup> Low current and expected profitability appears to be the main driver of banks' equity prices. There is little evidence that investors are concerned about asset quality: the proportion of banks' loans that are non-performing and credit default swap premia remain low.

But more recently we started seeing some evidence of search for yield behaviour. One notable example of this is the growth of corporate leveraged lending in many jurisdictions. The Bank estimates that the global stock of leveraged loans has now reached an all-time high of US\$ 3.4 trillion, equivalent to 11% of total advanced economy credit to non-financial corporates. The share of corporate debt owed by highly leveraged companies is now very close to or above pre-crisis levels in major advanced economies.<sup>11</sup>

The growth of this market has been accompanied by a marked easing of underwriting standards and compensation for risk. The share of new leveraged loans with no maintenance covenants has tripled since 2007.<sup>12</sup> Spreads have declined and remain below their 2015 levels. And there has been growing use of accounting adjustments ('add-backs') that could understate leverage<sup>13</sup>.

There are other examples. We have also seen an increase in sales of complex products as investment banks try to boost their income in a challenging trading environment. And in some countries, retail lending conditions have loosened. For example, in the United Kingdom the proportion of mortgage lending at higher loan-to-value (LTV) ratios has been rising over the past few years and is now close to its pre-crisis peak.<sup>14</sup> At the same time, interest rate spreads on high LTV lending have declined and are close to recent post-crisis lows.<sup>15</sup>

Search for yield behaviour may have been more pronounced in the non-bank financial sector.

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<sup>11</sup> For example, the share of corporate debt owed by listed UK companies with a ratio of net debt to EBITDA greater than four was 35% in 2018, compared to 28% in 2007. And the share of debt owed by highly leveraged US companies has reached pre-crisis levels of above 40%.

<sup>12</sup> Globally, this share was around 60% on average in 2019Q1-Q3, close to record highs.

<sup>13</sup> For example, PRA data indicates that the share of new lending with leverage above 7 times would increase from 18% to 28% if add-backs and subsequent borrowing were included.

<sup>14</sup> The share of new mortgages issued at LTV ratios of 90% or more was 20% in 2019Q2 compared to 22% in 2006-07.

<sup>15</sup> The spread of quoted 2-year fix rates at 90% LTVs over 2-year fix rates at 75% LTVs fell to below 0.5% in 2019H1, compared to a post-crisis average of more than 1.5%.

For insurance companies and pension funds the impact of low for long on the valuation of their liabilities, combined with the rigidity of returns expected by some claimholders (and specified in defined benefit pension schemes), puts pressure on their balance sheets.

This has led to changes in asset allocation, with greater investment in less liquid, lower quality assets. For example, UK life insurers have increased their holdings of higher-yielding assets such as long-term, non-traded real economy exposures like property to back annuities.<sup>16</sup>

This increased risk taking may continue as insurance companies and pension funds adjust further to low returns. From a financial stability perspective, a key risk is that insurance companies and pension funds encounter higher losses in stressed markets and become forced sellers or bystanders rather than buyers, so amplifying market vulnerabilities.

Other non-bank financial firms such as investment funds have also turned increasingly to less liquid and riskier investments. Investment fund flows now account for one third of total portfolio flows to emerging market economies (compared to one tenth before the crisis).<sup>17</sup> Bank analysis suggests that non-banks now hold around 40% of the rapidly growing global leveraged loan market. More than US\$ 30 trillion of global assets are now held in open-ended funds that offer short-term redemptions while investing in longer-dated and potentially illiquid assets, such as corporate bonds.

This liquidity mismatch may lead to more frequent fire-sales of assets if funds are required to meet large investor redemptions. Fund leverage could further exacerbate this, for example due to margin calls on funds' derivative exposures.

In short, the adjustment to a low for long world is likely to lead to upward pressure on financial sector risk taking and downward pressure on resilience. We have started to see evidence of these effects in some sectors. One would expect such pressures to continue.

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<sup>16</sup> Property and direct investment assets backing annuities have risen to more than £110 billion from £94 billion when Solvency II was introduced in January 2016. See also Rule (2019), Chart 3.

<sup>17</sup> See Carney (2019a).



Financial firms will, of course, seek to adapt their business models to help adjust to a low for long environment. From a financial stability perspective this could make some financial services to the real economy unviable and shift risks to sectors less able to bear them.

Banks, for example, can pursue cost cutting and consolidation but, as an exploratory stress test carried out by the Bank in 2017<sup>18</sup> of the major UK banks' illustrated, there are limits to both strategies.

There may therefore be pressure for more significant shifts of business model – for example expansion into fee generating areas such as asset securitisation. The 2017 test also suggested that under low for long pressure banks may reduce their balance sheet share of less profitable activities, such as SME and corporate lending.

Low for long may also change business models in other parts of the financial sector.

Continued pressure on insurance companies' solvency and defined benefit pension fund funding gaps will reinforce and accelerate current pressures that are shifting the insurance and pension industries further towards providing 'self-insurance', with a larger proportion of pensioners retaining their own longevity and investment risks and less risk sharing.

Active asset management could also become less viable in a low for long world. Lower asset returns put active asset managers under pressure relative to passive funds given the higher costs of active management. We are already seeing this: since 2007, the share of index tracking US equity funds has increased from about 20% to 50% of US equity assets under management.

It is not yet clear what the impact in financial stability terms might be of greater passive asset management, though some research<sup>19</sup> suggests further acceleration of this trend could result in more volatile markets with greater vulnerability to swings in sentiment.

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<sup>18</sup> The Bank's 2017 exploratory scenario considered how the UK banking system might evolve if recent headwinds to bank profitability persist or intensify. It incorporated weak global growth, persistently low interest rates, stagnant world trade and cross-border banking activity and increase competitive pressure on large banks from smaller banks and non-banks. See Bank of England (2017a).

## Financial stability challenges of low for long: households and corporates

One of the main drivers of the downward shift in the trend real rate is demographics. An ageing population is likely to lead to an expansion of both sides of the household balance sheet. Even allowing for longer working lives, increased longevity is likely to lead to a longer period in retirement and possibly longer in morbidity.

Households will need to accumulate more wealth over their working lifetimes to fund this. This will tend to push down on real interest rates and push up on property prices. At the same time, younger households will be able to service a higher level of debt to fund consumption and higher housing costs.

A more leveraged household sector may not in itself generate a greater financial stability risk: a higher level of debt is more sustainable in a low for long world.<sup>20</sup> And, in aggregate, higher debt would be accompanied by higher savings.

But low for long, for the reasons I set out earlier, may incentivise a loosening of underwriting standards driving asset prices and debt levels above levels that could be justified by lower trend interest rates. This could be exacerbated by amplification mechanisms in the financial system such as an increase in collateral values.

A more leveraged real economy is also more vulnerable to macro-economic tail events. Analysis since the crisis had demonstrated that more highly indebted households cut back more heavily on consumption during downturns.<sup>21</sup> And a shock to house prices, for example as a result of a large adverse shock to employment, could generate strong negative wealth effects.

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<sup>19</sup> See Sushko and Turner (2018) and Anadu et al (2018).

<sup>20</sup> Current UK household debt is twice the 2002 level in aggregate but debt servicing cost is half so the debt service ratio is unchanged

<sup>21</sup> For example, micro data studies from the UK, US, Denmark and Norway have all found statistically significant correlations between higher levels of household debt and the size of consumption cuts in a shock. For example Andersen et al (2016), Kovacs et al (2018), Dynan and Edelberg (2013) and Fagereng and Halvorsen (2016).

One might expect to see similar effects in the corporate sector. And indeed, Bank staff estimate that the share of corporate debt owed by highly leveraged companies has now pretty much grown back to pre-crisis levels.<sup>22</sup>

This is a risk because we know that more leveraged firms cut back on investment and employment by more in a downturn.<sup>23</sup>

All else equal therefore – and crucially, absent policy – a low for long world is likely to be one with a less resilient and riskier financial system and a more leveraged real economy that, as a consequence, is more vulnerable to macro-economic shocks.

### **Financial stability challenges of low for long: the risk of more severe downturns**

And this brings me to the third challenge of low for longer for financial stability – the risk that in such an environment, economic downturns will on average be more severe.

Low for long makes demand management of the economy more difficult in downturns, reducing the space for monetary policy easing with conventional tools. This is because, for a given inflation target and with the reduction in long-run real rates, policy rates are closer to their effective lower bound. Changes in the structure of the financial system as a result of low for long may also weaken the transmission mechanism.

Monetary policy, to be clear, is not powerless at the effective lower bound. As post crisis experience has demonstrated, ‘unconventional’ monetary policy tools can and have provided stimulus when interest rates are at or near the effective lower bound. These are now very much a part of central bank toolkits.<sup>24</sup>

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<sup>22</sup> For example, the share of corporate debt owed by UK companies with a ratio of net debt to EBITDA greater than four was 35% in 2018, compared to 28% in 2007.

<sup>23</sup> See Bank of England (2019), Chart F.6.

<sup>24</sup> See, for example, a recent BIS paper that conducts a cross-country analysis of unconventional monetary policy tools. Potter, Smets et al (2019).

And the challenges are very different in different jurisdictions, not least because of differences in the structure and effectiveness of monetary policy transmission mechanisms.<sup>25</sup>

But, taken together with other changes in the economy – such as changes in the labour market which appear to have led to some flattening of the wage Phillips curve and changes in the pass-through of labour costs to consumer prices – the probability is that demand management will need to use more tools to stimulate demand in downturns and work harder to prevent macro-economic tail events.

There is a lively debate over the extent to which aggressive use of monetary policy tools to stimulate demand creates financial stability risks by inflating asset prices and encouraging risk taking and the build-up of debt. My own view is that this can be overdone. There are, as I have said, deep-seated underlying structural drivers of low for long.

We have not seen an explosion of real economy debt in advanced economies in recent years even with very low rates (**Chart 2**). Debt-to-GDP has not risen in advanced economies, although there has been a rotation from private sector to public sector debt.

Prices of real assets like housing have been growing at a moderate pace in most advanced economies. In the US, EA and UK house prices have broadly grown at or below the growth rate of the economy, and real house prices have actually *fallen* relative to their pre- global financial crisis levels.

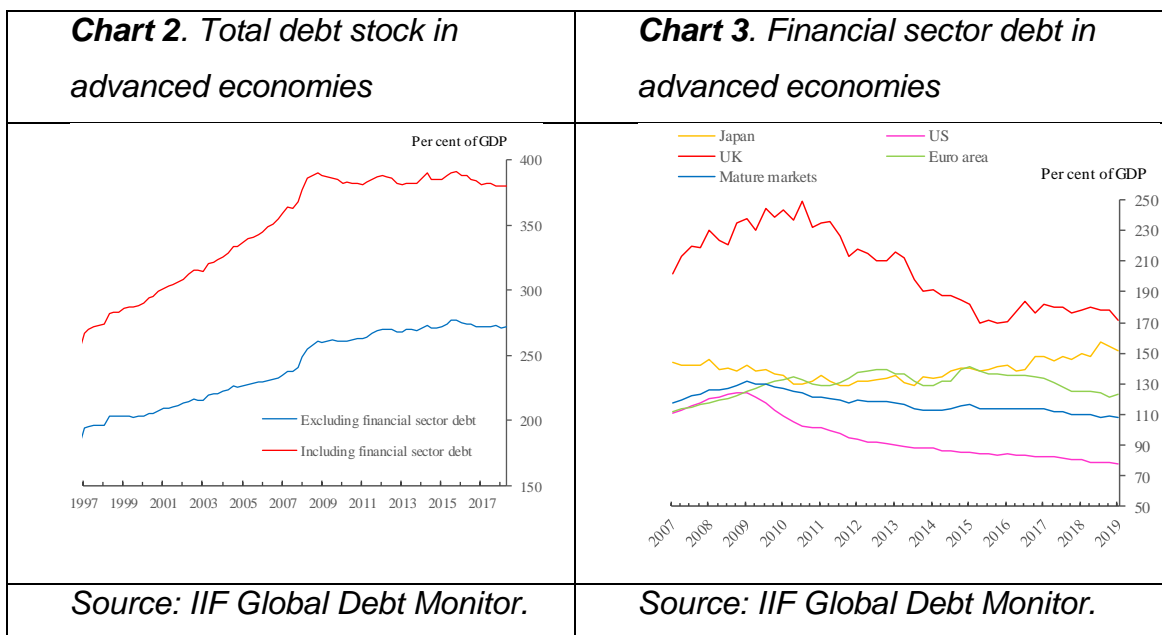
Since the crisis, there has also been a marked reduction in financial sector debt as a share of GDP, which suggests that reforms have reduced leverage and risk markedly within the financial sector (**Chart 3**).

This is not to be complacent.

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<sup>25</sup> The magnitude of interest rate cycles across the UK, US and EA have varied. Over both loosening and tightening cycles between 1994 and 2007, the average cumulative change in interest rates in the UK has been around 150bps in the UK, compared to around 250bps in the EA and around 275bps in the US.

Aggregates can hide significant problems. In some advanced economies, particularly the US, corporate debt has, as I have noted, been growing at a very fast rate accompanied by a loosening of underwriting standards. And to the extent that financial asset prices are being driven either by unrealistic expectations either of interest rates or of economic growth, there could be a sharp correction.



Moreover, debt in emerging markets grew much faster than GDP between 2011 and 2016. Chinese debt-to-GDP ratios have risen particularly sharply and are now very high.

Whilst the growth rate of the aggregated global debt stock has moderated more recently, the level remains high by historical standards – as one might expect in a low for long world. While this may not in itself cause or presage a correction, it could well amplify one, making the global economy more vulnerable to adverse macro-economic shocks<sup>26</sup>.

<sup>26</sup> Research suggests that it is the growth rate of debt rather than its actual level that is the leading indicator of financial crises. Bank of England work based on 130 downturns in 26 advanced economies since the 1970s suggests that a rapid build up of debt is the best early warning indicator of a recession. See for example Bridges et al (2017), Carney (2019b) and Schularick and Taylor (2012).

This perhaps illustrates that the risk to financial stability from monetary policy may come not so much from the use of monetary policy tools to stimulate demand.

Rather, it may come from the risk that in a low for long world monetary policy does not or cannot respond sufficiently vigorously to shocks to avoid macro-economic tail events that would severely stress a less resilient financial sector and more leveraged real economy.

Perhaps the most important lesson we learned from the crisis is that financial stability is a necessary condition for macro-economic and monetary stability. Over longer time horizons there is no trade-off between the two.<sup>27</sup>

But there is also some truth in the converse. Financial stability depends in part on effective demand management. It can be severely tested by macro-economic tail events even when the financial sector itself is not the source of the shock.

## **Policy responses**

Taken together, therefore, a low for long world is likely to be a more challenging environment for financial stability.

The first and, in my view, most important policy conclusion to draw from this is the need for active and powerful macro-prudential institutions and policy.

Effectively used, in relation to both lender and borrower balance sheets, it can constrain risk taking or ensure that higher risk is accompanied by greater resilience. It can address pockets of higher risk as they emerge, as for example the Financial Policy Committee has done in the UK in relation to consumer lending.<sup>28</sup> It can address mechanisms in the financial system that could first encourage an overshoot in risk taking and then amplify economic downturns.

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<sup>27</sup> The 'GDP at risk' framework for financial stability pioneered by the IMF illustrates this point well. See International Monetary Fund (2017).

<sup>28</sup> See Bank of England (2017b).

It can also, through rigorous stress testing of the banking sector, ensure that banks have the ability to absorb losses in macroeconomic tail events.

And it can operate counter-cyclically in downturns through the release of macro-prudential capital buffers in the core banking system.

Releasing buffers can have a powerful effect in a downturn by reducing the pressure on banks to cut back on lending and so avoid a credit crunch amplifying the macro-economic shock.

Such buffers have been part of the macro-prudential armoury for some years now though not all jurisdictions have used them. The question perhaps is whether that buffer needs to be made more powerful in a low for long world given the greater risk of severe downturns.

The macro-prudential toolkit is not complete. In most jurisdictions it is far better equipped with tools to identify and mitigate risks arising in the banking and insurance sectors than in market based finance. This gap needs in my view to be addressed.

And macro-prudential policy cannot solve all problems. It may fall to other authorities and policy instruments to respond to any adverse structural effect from changing business models on the provision of financial services to some sectors of the economy, for example credit to SMEs.

While it can create space for demand management by monetary policy authorities and prevent the financial system from amplifying macro-economic shocks in a low for long world, it is not in itself a demand management tool.

Whether and how monetary, and perhaps fiscal, frameworks should adapt to a world of structurally low interest rates is a related but separate issue which is receiving considerable attention from academic research and, more recently, policy makers in some jurisdictions.<sup>29</sup>

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<sup>29</sup> See, for example Clarida (2019) and Wilkins (2018).

Discussion is at a relatively early stage and these are, in my view, issues that would need a great deal of careful deliberation. It is not my purpose today to enter that debate. I would only make two observations from a financial stability perspective.

The first is that while I am a firm believer in the ‘separation of powers’, to quote my colleague Ben Broadbent<sup>30</sup>, between in the conduct of monetary and macro-prudential policy, the financial stability dimension needs to play a part in any discussion of demand management. My intuition is that, from a financial stability perspective, not all demand management frameworks are equal. And if there is a role for fiscal policy, then that also affects the financial stability calculus<sup>31</sup>.

The second, and related point, is that the financial stability dimension needs to be taken in the round. The impact of monetary policy on financial assets and leverage, for example, is a very important consideration. But we should not, on the other hand, lose sight of the fact that a world in which downturns may be more severe and more persistent because demand management is less effective would also be a significant and perhaps a greater challenge for financial stability.

## Conclusion

Jane Austen’s Navy Fives, as I noted at the start, gave her nominal annual return of nearly 6%. But her real return, when she purchased them in 1815, was closer to 20%. Britain was entering a severe recession that year at the end of the Napoleonic wars with deflation of more than 10%. The annual return in 1817, the year of Jane’s death, was actually *negative* 2% as inflation rebounded.

A few years later Britain reverted to its pre-war monetary standard by restoring Sterling’s convertibility to gold. Over the following 50 years, nominal interest rates came down a little but stayed in the 3-5% range.

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<sup>30</sup> Broadbent (2018).

<sup>31</sup> From a narrow financial stability perspective, growth of own currency sovereign debt, especially when financed internally, is not a good predictor of financial crises. See Cunliffe (2019).



But real returns on the Navy Fives and similar fixed rate securities continued to be highly volatile reflecting the very large swings in inflation for much of period – a period that was punctuated by frequent financial crises.

That perhaps illustrates that there is a great deal more to stability - both financial and monetary - than nominal interest rates.

## References

- Anadu, K., M. Kruttli, P. McCabe, E. Osambela and C.H. Shin (2018), The shift from active to passive investing: Potential risks to financial stability?, *Working Paper PRA 18-04*, Federal Reserve Bank of Boston.
- Andersen, A., C. Duus, and T. Jensen (2016), Household debt and spending during the financial crisis: Evidence from Danish micro data, *European Economic Review*, 89, pp. 96-115.
- Avery Jones, J. (2019), Jane Austen's income: insights from the Bank of England archives, *Bank Underground Blog*, 2 August 2019
- Bank of England (2019), *Financial Stability Report*, Issue No. 45, July 2019. Bank of England (2018), *Inflation Report*, August 2018.
- Bank of England (2017a), *Stress testing the UK banking system: key elements of the 2017 stress test*, March 2017.
- Bank of England (2017b), *Financial Stability Report*, Issue No 42, November 2017.
- Borio, C. (2017), Secular stagnation or financial cycle drag?, Keynote speech, National Association for Business Economics, 33rd Economic Policy Conference.
- Brainard, L. (2017), Rethinking monetary policy in a new normal, Presented at the Rethinking Macroeconomic Policy Peterson Institute conference, Washington, DC.
- Bridges, J., C. Jackson and D. McGregor (2017), Down in the slumps: the role of credit in five decades of recessions, *Staff Working Paper No. 659*, Bank of England.
- Broadbent, B. (2018), Monetary and macro-prudential policies: The case for a separation of powers, Speech at Reserve Bank of Australia, Sydney.
- Caballero, R., E. Farhi and P. Gourinchas (2017), The safe assets shortage Conundrum, *Journal of Economic Perspectives*, Vol. 31 (3), pp. 29-46.
- Carney, M. (2019a), Pull, push, pipes: sustainable capital flows for a new world order, Speech at the 2019 Institute of International Finance Spring Membership Meeting, Tokyo.
- Carney, M. (2019b), The global outlook, Speech.
- Clarida, R. (2019), The Federal Reserve's Review of its monetary policy strategy, tools, and communication practices, Speech at the "Fed Listens: Distributional Consequences of the Cycle and Monetary Policy" Conference.
- Dynan, K. and W. Edelberg (2013), The relationship between leverage and household spending behavior: Evidence from the 2007-2009 Survey of Consumer Finances, *Federal Reserve Bank of St. Louis Review*, 95(5), pp. 425-48.
- Eggertsson, G. B., N. R. Mehrotra, and J. A. Robbins (2017), A model of secular stagnation: Theory and quantitative evaluation, *NBER Working Paper*.
- Fagereng, A. and E. Halvorsen (2016), Debt and household consumption responses, Norges Bank, Staff Memo.
- Gagnon, E., B. K. Johanssen, and D. Lopez-Salido (2016), Understanding the new normal: The role of demographics, *Finance and Economics Discussion Paper*, Federal Reserve Board of Governors.

Holston, K., T. Laubach and J.C. Williams (2017), Measuring the natural rate of interest: International trends and determinants, *Journal of International Economics*, vol. 108(S1), pp. 59-75.

International Monetary Fund (2017), *Global Financial Stability Report: Is Growth At Risk?*, October 2017.  
King, M. and D. Low (2014), Measuring the "world" real interest rate, *NBER Working Paper*.

Kovacs, A., M. Rostom and P. Bunn (2018), Consumption response to aggregate shocks and the role of leverage, *Discussion Paper 1820*, Centre for Macroeconomics (CFM).

Potter, S., F. Smets et al (2019), Unconventional monetary policy tools: A cross-country analysis, *CGFS Paper no. 63*, Bank for International Settlements.

Rachel, L. and T. D. Smith (2017), Are low real interest rates here to stay?, *International Journal of Central Banking*, Vol. 13 (3), pp. 1-42.

Rule, D. (2019), An annuity is a very serious business: Part Two, Speech at the Westminster and City Bulk Annuities Conference.

Schularick, M. and A. Taylor (2012), Credit booms gone bust: Monetary policy, leverage cycles and financial crises, 1870-2008, *American Economic Review*, Vol. 102(2), pp. 1029-61.

Sushko, V. and G. Turner (2018), The implications of passive investing for securities markets, *BIS Quarterly Review*.

Vlieghe, Gertjan (2017), Real interest rates and risk, Speech at the Society of Business Economists' Annual conference, London.

Wilkins, C. (2018), Choosing the best monetary policy framework for Canada, Remarks at McGill University Max Bell School of Public Policy.