Financial Stability Report

November 2016 | Issue No. 40

BANK OF ENGLAND

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Financial Stability Report

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The primary responsibility of the Financial Policy Committee (FPC), a committee of the Bank of England, is to contribute to the Bank of England's objective for maintaining financial stability. It does this primarily by identifying, monitoring and taking action to remove or reduce systemic risks, with a view to protecting and enhancing the resilience of the UK financial system. Subject to that, it supports the economic policy of Her Majesty's Government, including its objectives for growth and employment.

This *Financial Stability Report* sets out the FPC's view of the outlook for UK financial stability, including its assessment of the resilience of the UK financial system and the current main risks to financial stability, and the action it is taking to remove or reduce those risks. It also reports on the activities of the Committee over the reporting period and on the extent to which the Committee's previous policy actions have succeeded in meeting the Committee's objectives. The *Report* meets the requirement set out in legislation for the Committee to prepare and publish a *Financial Stability Report* twice per calendar year.

In addition, the Committee has a number of duties, under the Bank of England Act 1998. In exercising certain powers under this Act, the Committee is required to set out an explanation of its reasons for deciding to use its powers in the way they are being exercised and why it considers that to be compatible with its duties.

This document was delivered to the printers on 29 November 2016 and, unless otherwise stated, uses data available as at 18 November 2016. This page was revised on 11 April 2018.

The *Financial Stability Report* is available in PDF at www.bankofengland.co.uk.

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Executive summary

Since the UK referendum on membership of the European Union, UK financial stability has been maintained through a challenging period of uncertainty around the domestic and global economic outlook. Substantial moves in financial market prices have not been amplified by the UK financial system.

- Over the period, there have been significant movements in UK asset prices, including a marked fall in the sterling exchange rate index of around 12%, falling commercial real estate (CRE) prices, falls in real government bond yields and a rise in market measures of inflation expectations.

- More recently, global asset prices have reacted sharply following the US election. US ten-year government bond yields have increased by around 50 basis points, the US dollar exchange rate index has appreciated by almost 4%, and equity prices in emerging market economies (EMEs) have fallen by 6%.

- Core financial markets have functioned effectively throughout the period, despite spikes in uncertainty and risk aversion, and with trading volumes at many multiples of normal levels at times. In the United Kingdom, bank funding costs remain significantly lower than during episodes of severe stress and credit conditions have not tightened.

- The ability of the UK financial system to accommodate these changes, rather than amplify their effect on the real economy, reflects the resilience of the system that has been built consistently over recent years.

The outlook for UK financial stability remains challenging. The UK economy has entered a period of adjustment following the EU referendum. The likelihood that some UK-specific risks to financial stability could materialise remains elevated.

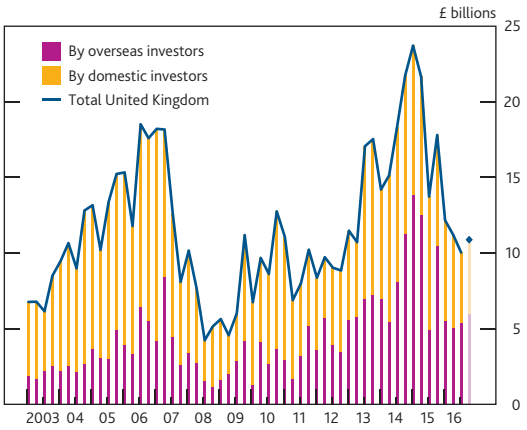
- It will take time to clarify the United Kingdom's new relationships with the European Union and the rest of the world as well as for the UK economy to adjust to these changes. The nature of, and path to, these new relationships will be the subject of forthcoming negotiations between the UK Government and the European Union. The orderliness of the adjustment will influence the risk to financial stability.

- Indicators of UK economic activity and business sentiment have recovered from their low points immediately following the EU referendum and are materially stronger than had been expected in July. Nevertheless, the economic outlook remains weaker than in the first half of the year.

- In the UK commercial real estate market, activity slowed further in 2016 Q3 (**Chart A**) and prices have fallen by 2.6% since the referendum. Despite signs of stabilisation more recently, there is a risk of further adjustment given the reliance of the market in recent years on inflows of foreign capital and, in some segments, stretched valuations. Further price falls could reduce companies' access to finance, given the use of CRE as collateral.

Chart A UK CRE transactions fell further in 2016 Q3

UK CRE transactions (gross quarterly flows)(a)



Sources: The Property Archive and Bank calculations.

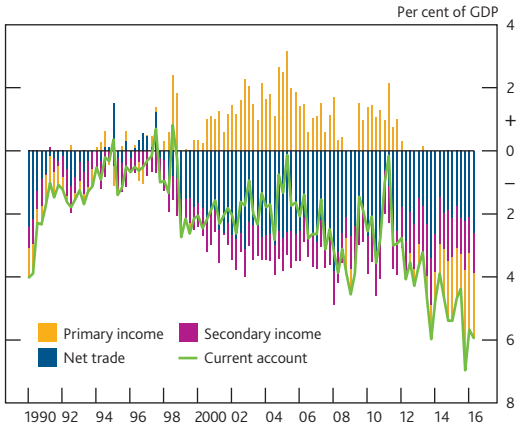
(a) Final data points are the sum of three months to October 2016.

- The United Kingdom's large current account deficit (**Chart B**) is vulnerable to a reduction in foreign investor appetite for UK assets. This could be triggered by global factors, such as a reduction in international capital flows, or by UK-specific factors, such as perceptions of weaker long-run UK growth prospects. These would necessitate a sharper-than-expected narrowing of the current account.

- UK banks have materially reduced their reliance on short-term overseas borrowing, and the depreciation of sterling acts to improve the United Kingdom's net foreign asset position. But a sharp adjustment in the current account could test financial stability indirectly through its impact on the real economy. It would be associated with

Chart B The UK current account deficit remains large

Decomposition of the UK current account[a]

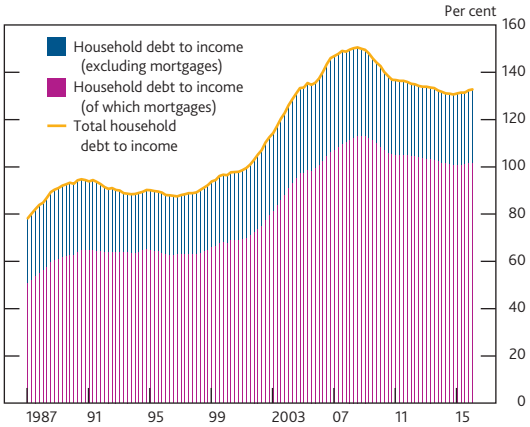


Sources: ONS and Bank calculations.

(a) Primary income mainly consists of compensation of employees and net investment income. Secondary income consists of transfers.

Chart C UK household debt is high relative to income

UK household debt to income ratio[a][b][c]



Sources: ONS and Bank calculations.

(a) Total household debt to income is calculated as gross debt as a percentage of a four-quarter moving sum of disposable income. Includes all liabilities of the household sector except for the unfunded pension liabilities and financial derivatives of the non-profit sector. The household disposable income series is adjusted for financial intermediation services indirectly measured (FISIM).
(b) Mortgage debt to income is calculated as total debt secured on dwellings as a percentage of a four-quarter moving sum of disposable income. The household disposable income series is adjusted for FISIM.
(c) Non-mortgage debt to income is the residual of mortgage debt to income subtracted from total debt to income.

higher funding costs for real economy borrowers and a further depreciation of sterling, worsening the trade-off between growth and inflation.

- The 12% reduction in the sterling exchange rate since the referendum seems to reflect perceptions that the United Kingdom's future trading arrangements will be less open for a period, requiring a lower real exchange rate to maintain competitiveness. There has not to date been any material change to the United Kingdom's ability to finance its current account deficit, though there have been some indications of reduced investor appetite for CRE and equities.

- The level of UK household indebtedness remains high (**Chart C**), and the ability of some households to service their debts could be challenged by a period of higher unemployment. These households could affect broader economic activity by cutting back sharply on expenditure in order to service their debts.

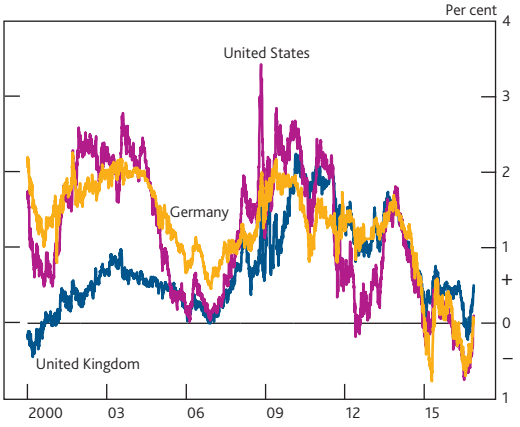
- **Following a review, the Financial Policy Committee (FPC) has agreed to maintain the Recommendations it made in June 2014 to insure against the risk of a marked loosening in underwriting standards in the owner-occupier mortgage market and a significant increase in the number of highly indebted households.**

Vulnerabilities stemming from the global environment and financial markets, which were already elevated, have increased further since July.

- Following the US election, expectations of expansionary fiscal policy in the United States have helped push up advanced economy sovereign bond yields. Despite this, term premia on advanced economy bonds are still low (**Chart D**), suggesting that the risk of a sharp adjustment in fixed-income markets remains.

Chart D Term premia in government bond markets are low

Estimates of term premia in ten-year nominal government bond yields[a][b]



Sources: Bloomberg, Federal Reserve Bank of New York and Bank calculations.

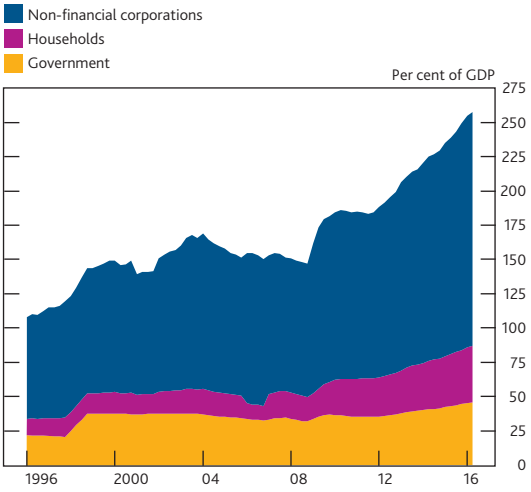
(a) UK and German estimates are derived using the model described in Malik, S and Meldrum, A (2016), 'Evaluating the robustness of UK term structure decompositions using linear regression methods', *Journal of Banking & Finance*, Vol. 67, June, pages 85–102. US estimates are available from www.newyorkfed.org/research/data_indicators/term_premia.html.
(b) Estimates for the United Kingdom are calculated using data since October 1992. Estimates for Germany are calculated using data since January 1999.

- Increases in sovereign bond yields, coupled with risks of reduced global trade, have reinforced the vulnerabilities associated with those EMEs with high levels of debt.

- China has a particularly high ratio of non-financial sector debt to GDP, estimated at around 260% (**Chart E**). Growth is increasingly reliant on rapid credit expansion, currently at around twice the rate of nominal GDP growth. Estimated net capital outflows picked up to near-record levels in 2016 Q3, and the renminbi has depreciated by 3% against the US dollar since the July *Report*.

Chart E Debt has increased rapidly in China

China non-financial sector debt[a]



Sources: BIS total credit statistics and Institute of International Finance (IIF).

(a) Non-financial debt data are to 2016 Q1. Includes lending by all sectors at market value as a percentage of GDP, adjusted for breaks. Q2 figure uses IIF estimate.

- In some euro-area economies, sovereign debt positions remain vulnerable to a further rise in the cost of borrowing for governments or a weakening in growth prospects, perhaps associated with a reduction in global trade. Uncertainty is further heightened over the coming months by the forthcoming Italian referendum and a number of elections in the euro area.

- Challenges also remain to the resilience of the euro-area banking system. Price to book ratios are very low, including in Italy, where non-performing loan rates are high relative to provisions. Uncertainty about potential fines for past misconduct and concerns about the longer-term viability of business models are also weighing heavily on the valuations of some banks across the continent.

- Additional risks from the euro area could emerge as a consequence of the United Kingdom's withdrawal from the European Union. Firms incorporated in the United Kingdom are estimated to be involved in over half of debt and equity issuance by EU (excluding UK) borrowers. UK firms also facilitate access to hedging instruments. Within the European Union, for example, over three-quarters of foreign exchange and over-the-counter interest rate derivatives trading takes place in the United Kingdom. Changes to the trading relationship between the United Kingdom and the European Union may require firms to alter their operations and the services they provide. If any such adjustments take place in a short timeframe, there could be a greater risk of disruption to services provided to the European real economy, which could spill back to the UK economy through trade and financial linkages.

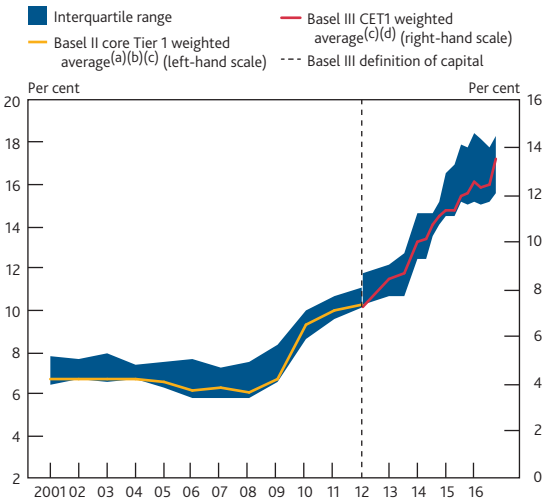
Financial stability depends on the resilience of the system to risks. The UK banking system is capitalised to sustain the provision of financial services, including the supply of credit, to severe stresses such as those that could face the United Kingdom and global economies.

- Previous stress tests of major UK banks have tested their resilience to a range of risks, including a snap back of interest rates, sharp adjustment in UK property markets, and severe stress in the euro area and in China and emerging markets. The Bank's 2016 stress test comprised a severe, synchronised UK and global recession with associated shocks to financial market prices. It also incorporated a misconduct cost stress. The FPC judges that, as a consequence of the stress test, the UK banking system is in aggregate capitalised to support the real economy in this scenario.

- UK banks have built up capital resources since the global financial crisis. The aggregate common equity Tier 1 capital of major UK banks was 13.5% of risk-weighted assets in September 2016 (**Chart F**).

Chart F UK banks have built their capital resilience over time

Major UK banks' capital ratios



Sources: PRA regulatory returns, published accounts and Bank calculations.

(a) Major UK banks' core Tier 1 capital as a percentage of their risk-weighted assets. Major UK banks are Banco Santander, Bank of Ireland, Barclays, Co-operative Banking Group, HSBC, LBG, National Australia Bank, Nationwide, RBS and Virgin Money. Data exclude Northern Rock/Virgin Money from 2008.
(b) Between 2008 and 2011, the chart shows core Tier 1 ratios as published by banks, excluding hybrid capital instruments and making deductions from capital based on FSA definitions. Prior to 2008 that measure was not typically disclosed; the chart shows Bank calculations approximating it as previously published in the *Report*.
(c) Weighted by risk-weighted assets.
(d) From 2012, the 'Basel III common equity Tier 1 capital ratio' is calculated as CET1 capital over risk-weighted assets, according to the CRD IV definition as implemented in the United Kingdom. The Basel III peer group includes Barclays, Co-operative Banking Group, HSBC, LBG, Nationwide, RBS and Santander UK.

- In July, the FPC reduced the countercyclical buffer rate (CCyB) on banks' UK exposures from 0.5% to 0%. **The FPC has agreed to maintain the UK CCyB rate at 0% and reaffirms that it expects, absent any material change in the outlook, to maintain this rate until at least June 2017.**

- Reducing the UK CCyB rate was a response to greater uncertainty around the UK economic outlook and an increased possibility that material domestic risks could crystallise in the near term. The FPC was concerned that banks could respond to these developments by hoarding capital and restricting lending. That position has not changed. The availability of banks' capital resources, and their use to absorb shocks if risks materialise, insures against a tightening of bank credit conditions.

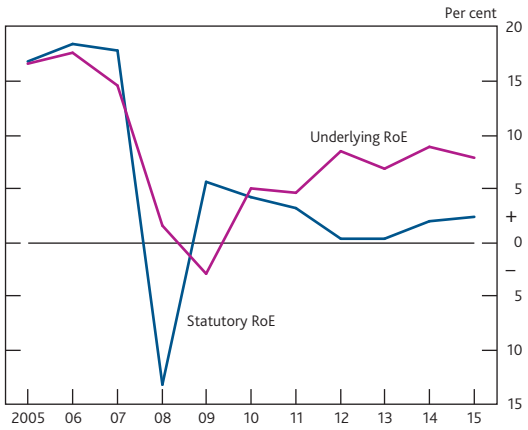
- The reduction of the UK CCyB rate is intended to reinforce the FPC's expectation that all elements of capital and liquidity buffers are able to be drawn on, as necessary, to maintain the provision of services to the real economy. Consistent with this, the FPC supports the expectation of the Prudential Regulation Authority (PRA) Board that firms do not increase dividends and other distributions as a result of this action.

The FPC remains focused on the ability of the UK banking system to maintain this resilience in future.

- Some major UK banks continue to face the challenge of weak profitability (**Chart G**), which is reflected in market valuations of their equity. Weak profitability diminishes banks' future ability to rebuild capital following a shock while also maintaining credit supply. The Bank will run an 'exploratory' scenario alongside the 2017 annual cyclical scenario to assess the impact on the UK banking sector of weak global supply growth, persistently low interest rates, and a continuation of declines in both world trade relative to GDP and cross-border banking activity.

Chart G UK banks' profitability remains low

UK banks' statutory and underlying return on equity (RoE)[(a)(b)(c)]



Sources: Published accounts and Bank calculations.

(a) Weighted average by average shareholders' equity.
(b) Statutory RoE is defined as net income attributable to shareholders divided by average shareholders' equity. Underlying RoE strips out misconduct costs as well as one-time charges such as restructuring costs.
(c) UK banks are Barclays, HSBC, LBG and RBS.

- Changes to financial firms' business models and structures as the United Kingdom withdraws from the European Union could have implications for the resilience of the financial system in the United Kingdom and more broadly. The FPC is working with supervisors to assess these implications as firms begin to plan for the United Kingdom's new relationship with the European Union. Possible implications include disruption of services, particularly if any adjustment cannot be made smoothly, a further weakening of investment banking profitability and the potential for greater complexity in firms' legal structures — which could place greater demands on firms' risk management and on supervisory oversight, and pose challenges for effective resolution.

- Cyber and technology-enabled attacks continue to be a serious threat to the resilience of the UK financial system. High-profile incidents in 2016 have raised awareness of the importance for institutions of ensuring that they have appropriate controls and measures in place to counter fraud. In response to the recent incident at Tesco Bank, the UK authorities activated a contingency plan, as part of the Authorities' Response Framework, to share intelligence across firms, allowing other institutions to review their own resilience to such threats.

- Following FPC Recommendations, important progress is being made in building cyber resilience in the UK financial sector. The FPC has reviewed this progress against its Recommendations and will consider next steps in 2017 Q1.

Recent market developments further highlight the importance of the resilience of markets, and of market-based finance, to sharp market moves. The resilience of market liquidity remains uneven.

- On 7 October, sterling depreciated by around 9% against the US dollar in less than 40 seconds, before quickly retracing much of the move. As with other recent episodes, this 'flash event' proved to be short-lived and without immediate consequences for financial stability. Nevertheless, such disruptions underscore the concern that liquidity in some markets may have become more fragile in recent years. The FPC, drawing on the work of the Bank for International Settlements Markets Committee, will seek to examine the potential implications of these developments for financial stability.

- Market liquidity could also be challenged during a period of adjustment related to the United Kingdom's new relationship with the European Union. Any change in arrangements could have implications for levels of activity in exchanges and other trading venues. It could also affect the level of market-making activity by intermediaries as they adjust business structures. The FPC continues to assess these risks.

- The Bank is developing a system-wide stress simulation to assess the dynamics of markets under stress. It will include an analysis of the behaviour of various sectors — such as open-ended investment funds, insurance companies and dealers. That exercise will identify any material gaps in the data needed to assess risks.

- Relatedly, the FPC has assessed procyclicality in insurers' investment activities. The current design of the 'risk margin' element of Solvency II rules could, in future, encourage procyclical investment behaviour. It should be addressed, including through the forthcoming review of Solvency II by the European Commission. Such incentives should also be avoided in the International Capital Standards for insurers, which are being developed by the International Association of Insurance Supervisors.

- The FPC has further concluded that unit-linked insurance products share some economic similarities with open-ended investment funds, with investors able to switch between funds at short notice. There is tentative evidence that this flexibility could lead to procyclical investment behaviour, particularly during times of stress. The Bank will include unit-linked funds in its system-wide stress simulation.

- The FPC has asked the Bank to complete an in-depth assessment of the financial stability risks associated with derivative transactions. This will examine progress towards implementation of the post-crisis reforms in derivatives markets and consider the implications for the resilience of the financial system. This will also contribute to a broader review by the Financial Stability Board.

The FPC remains committed to robust prudential standards in the UK financial system.

- The United Kingdom's position as the leading internationally active financial centre, with a financial system that is, by asset size, around ten times GDP, means that the FPC's statutory responsibility of protecting and enhancing the resilience of the UK financial system is particularly important for both the domestic and global economies.

- Irrespective of the particular form of the United Kingdom's future relationship with the European Union, and consistent with its statutory responsibility, the FPC will remain committed to the implementation of robust prudential standards in the UK financial system. This will require a level of resilience to be maintained that is at least as great as that currently planned, which itself exceeds that required by international baseline standards.

- The FPC will need to ensure that the regulatory framework continues to evolve alongside international standards and the risk environment. It notes the importance to achieving its statutory objectives of having the macroprudential flexibility to align the resilience of the financial system to the risks it faces.

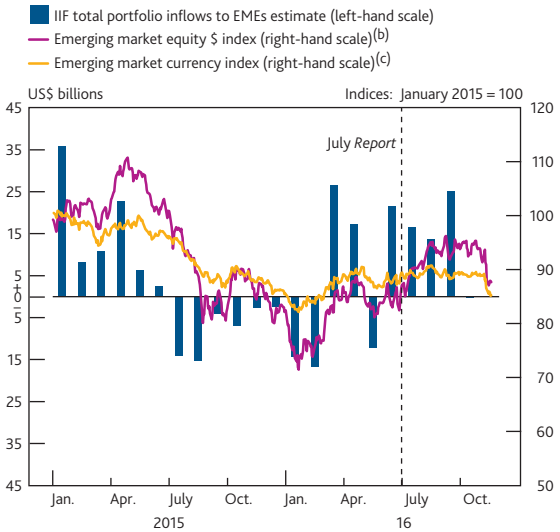
Part A of this *Report* sets out in detail the Committee's analysis of the major risks and action it is taking in the light of those risks. Part B summarises the Committee's analysis of the resilience of the financial system.

Global environment

Risks associated with the global environment remain elevated. Following the US election, increases in advanced economy sovereign bond yields, coupled with risks of reduced global trade, have reinforced vulnerabilities associated with those emerging market economies with high levels of debt. China has a particularly high ratio of non-financial sector debt to GDP and growth is increasingly reliant on rapid credit expansion. Estimated net capital outflows from China picked up to near-record levels in 2016 Q3, and the renminbi has depreciated by 3% against the US dollar since the July *Report*. In some euro-area economies, sovereign debt positions remain vulnerable to a further rise in the cost of borrowing for governments or a weakening in growth prospects, perhaps associated with a reduction in global trade. Uncertainty is further heightened over the coming months by the forthcoming Italian referendum and a number of elections in the euro area. Challenges also remain to the resilience of the euro-area banking system. Reflecting these risks, the 2016 stress test of major UK banks incorporated a very severe global downturn.

Chart A.1 Risk appetite for emerging market assets has fallen

IIF total portfolio inflows to EMEs estimate and equity and currency indices(a)



Sources: Bloomberg, JPMorgan, MSCI, Institute of International Finance (IIF) and Bank calculations.

(a) IIF emerging market portfolio inflows estimate available to end-October.
(b) Equity index is MSCI Emerging Market Index (US$). The MSCI Inc. disclaimer of liability, which applies to the data provided, is available at www.bankofengland.co.uk/publications/Documents/fsr/2016/fsr16nov1.xlsx.
(c) Currency index is JPMorgan Emerging Markets Currency Index.

The US election has reinforced existing vulnerabilities…

Following the US election, there have been significant changes in global asset prices. Expectations of expansionary US fiscal policy have contributed to an increase in advanced economy sovereign yields, reversing much or all of their falls observed earlier in the year (see Financial market fragility chapter). The US dollar has appreciated by 4% since 8 November, and 6% since the July *Report*.

The rise in advanced economy sovereign yields, coupled with risks of reduced global trade, has reinforced the vulnerabilities associated with those emerging market economies (EMEs) with high levels of debt. Since the US election, emerging market currencies have depreciated by 3% on average, and equity prices have fallen by 6%, largely reversing rising valuations that had occurred, supported by a strong period of capital inflows since July (**Chart A.1**).

These market developments have occurred against a backdrop of an already subdued outlook for EME economic growth. In the IMF's October 2016 *World Economic Outlook* (*WEO*), EME growth was expected to remain weak in 2016, at just 4.2%, down from an average of 5.4% from 2010–15.

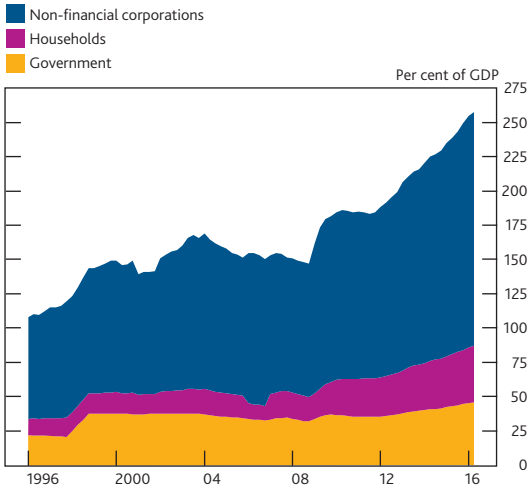
…and vulnerabilities in China continue to increase…

Financial market volatility in China has fallen since the start of 2016, following a series of government stimulus measures which reduced concerns over China's near-term prospects.

However, domestic vulnerabilities have continued to build as China's growth has become increasingly reliant on rapid

Chart A.2 Debt has increased rapidly in China

China non-financial sector debt[a]

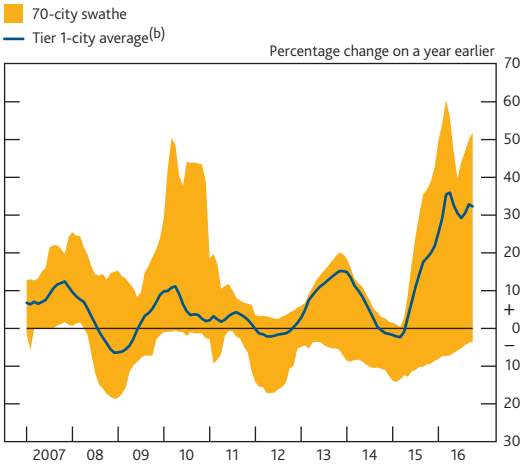


Sources: BIS total credit statistics and IIF.

(a) Non-financial debt data are to 2016 Q1. Includes lending by all sectors at market value as a percentage of GDP, adjusted for breaks. Q2 figure uses IIF estimate.

Chart A.3 Property valuations have risen sharply in China

House price inflation in China[a]



Sources: Thomson Reuters Datastream and Bank calculations.

(a) House prices for second-hand residential buildings.
(b) Tier 1-city average refers to average house price inflation in Beijing, Guangzhou, Shanghai and Shenzhen.

credit expansion. Since the global financial crisis, non-financial sector debt has risen by around 100 percentage points relative to GDP. It now has a particularly high ratio of non-financial sector debt to GDP, estimated to be around 260% (**Chart A.2**).

Total social financing, a broad measure of private sector credit provision, grew at an annual rate of around 16% in Q3.[1] This is around twice the rate of nominal GDP growth. In the household sector, increases in mortgage lending have been associated with a rapid rise in property prices over the past year, particularly in some major cities (**Chart A.3**). But the level of household debt remains relatively low, at around 40% of GDP in Q2, compared to 170% in the corporate sector. The 2016 stress test incorporated a 35% fall in Chinese residential property prices.

China remains vulnerable to external shocks; net capital outflows are estimated by the IIF to have risen to around US$207 billion in Q3, close to the US$226 billion record outflow that occurred in 2015 Q3 following the surprise August depreciation of the renminbi and sharp falls in the Shanghai composite equity index. Since the July *Report*, the renminbi has fallen against the US dollar by 3%.

…while emerging market economies more generally are vulnerable to a further reduction in risk appetite.

In contrast to China, credit growth in other emerging market and Asian economies appears to have moderated. Private sector credit to GDP gaps generally declined in the year to Q1, although these remain elevated in several economies (**Chart A.4**).

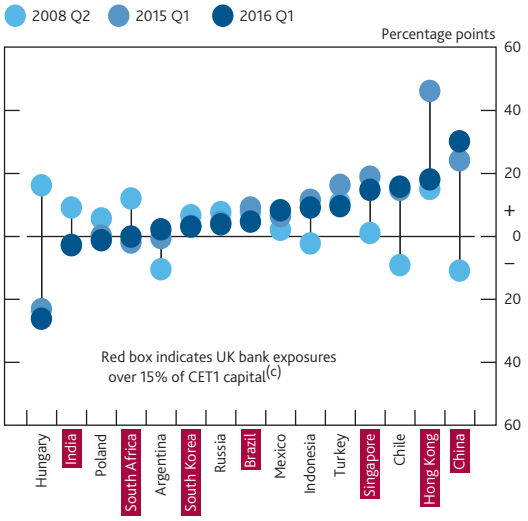
Some economies remain at risk of a further reduction in appetite for EME assets and a disorderly episode of deleveraging. Emerging market governments with large domestic and external vulnerabilities may face particular difficulty refinancing debt, particularly those that have been downgraded to 'junk' status, such as Brazil and Turkey, or are one to two notches above a sub-investment grade rating, such as South Africa. In these countries, government financing costs have already increased on average by 70 basis points since the US election. Many of the most vulnerable economies also have strong trade linkages to China. Around 20% of Brazilian goods exports and nearly 10% of South African goods exports are to China.

The FPC judges that risks associated with China, Hong Kong and emerging markets remain elevated. UK banks' exposures to these economies account for around 20% of their total assets. The FPC incorporated a very severe EME shock in its 2016 stress scenario: global GDP growth troughs at -1.9%, as

(1) After adjusting for the statistical effect of replacing local government borrowing through financing vehicles with the issuance of municipal bonds.

Chart A.4 Outside of China, credit gaps have been declining but remain elevated

Deviation of credit to GDP ratio from long-term trend: emerging economies and Asian newly industrialised economies[a][b]

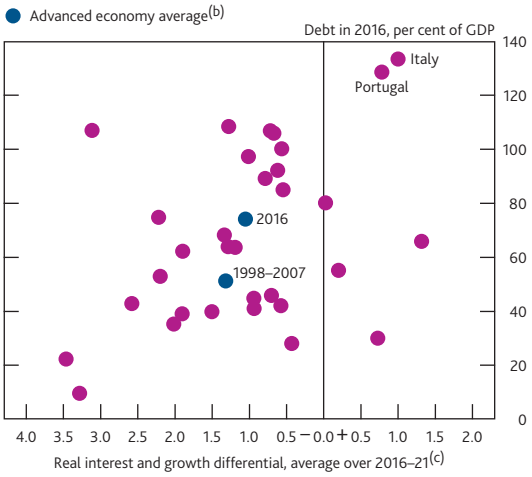


Sources: Bank of England, BIS total credit statistics, SNL financial and Bank calculations.

(a) Raw data have been adjusted for breaks.
(b) Credit to GDP gaps use a one-sided HP filter with a (BIS-consistent) smoothing parameter of 400,000. Credit by all creditors to domestic private non-financial sector.
(c) Claims on all sectors relative to CET1 in 2016 Q2. Claims on Brazil in Q3 expected to be significantly lower following the sale of HSBC Brazil to Banco Bradesco.

Chart A.5 Sovereign debt positions remain vulnerable in some countries

Forecast real effective interest rate on advanced economy government debt minus GDP growth and 2016 government debt to GDP ratio[a]



Sources: IMF *WEO* and Bank calculations.

(a) Japan (250% debt to GDP) and Greece (183% debt to GDP) not shown.
(b) Simple average of advanced economy interest-growth differential and debt to GDP over 1998–2007. 2016 average figure shows simple average of 2016-21 interest-growth differentials and 2016 average debt to GDP ratio.
(c) Refers to October IMF *WEO* forecast of average effective interest rate on outstanding government debt deflated by the GDP deflator, minus real growth.

it did during the 2008 global financial crisis, with growth in China and Hong Kong particularly adversely affected. Emerging market currencies depreciate against the US dollar, and commodity and other asset prices fall sharply, putting renewed pressure on commodity producers. UK banks' impairments on real economy lending in China and Hong Kong reaches £12 billion in this scenario. The UK banking system was shown to be capitalised to support the real economy in this scenario, even if synchronised with a UK slowdown and an independent stress of misconduct costs.

Sovereign debt positions remain vulnerable to rising bond yields.

In advanced economies, private sector debt has declined relative to GDP since the crisis. However, sovereign debt has increased, and is expected to reach around 75% of GDP on average in 2016, compared to 50% pre-crisis (**Chart A.5**).

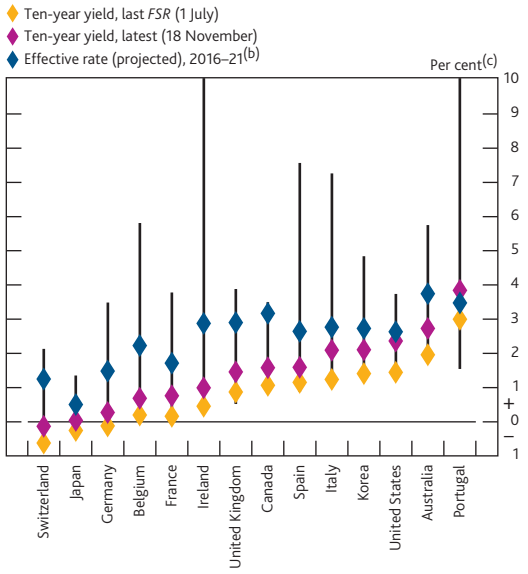
At the same time, on average, the differential between the real effective interest rate on government debt, and the growth rate of the economy, is expected to remain largely unchanged, as weaker growth is offset by lower interest rates. This differential is important as it drives the rate of increase of the ratio of debt to GDP for a given budget position and stock of debt. While the differential is expected to remain close to pre-crisis averages, higher average levels of debt will require relatively lower fiscal deficits (or larger surpluses) to stabilise debt positions. Several advanced economies, particularly Italy and Portugal, face both a large, positive differential and high debt stocks.

Debt positions remain vulnerable to a further rise in government borrowing costs or a weakening in growth prospects, perhaps associated with a reduction in global trade. For example, government yields in Italy and Portugal rose sharply following the US election, though currently remain well below levels observed in 2011–13, when previous concerns over debt sustainability surfaced (**Chart A.6**). There is also a risk that the Italian constitutional referendum and a number of forthcoming general elections could increase uncertainty and put further upwards pressure on bond yields.

UK banks' ownership of government debt issued by vulnerable European periphery economies is relatively small, at around 0.1% of total assets. But rising sovereign bond yields in the euro area more generally would spill over to bank and real economy funding costs and to domestic demand. UK banks' exposures to the euro area as a whole are large, at around 10% of assets. There are also strong economic links between the United Kingdom and the euro area, which accounts for two fifths of the United Kingdom's trade and more than one third of UK foreign direct investment.

Chart A.6 Periphery euro-area economies are vulnerable to a snapback in sovereign bond yields

IMF *WEO* projected effective interest rate on government debt and recent bond market developments[a]

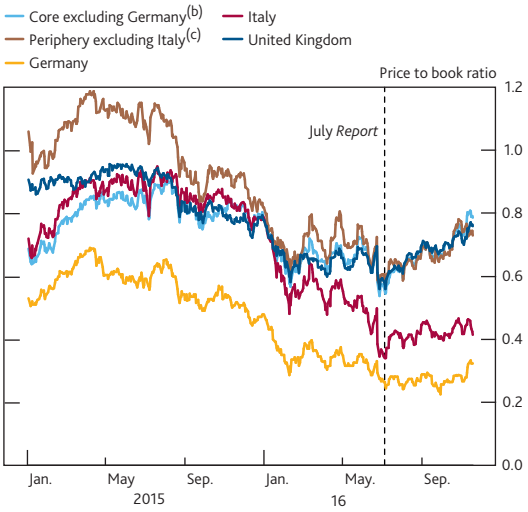


Sources: Bloomberg, IMF *WEO* and Bank calculations.

(a) Vertical bars indicate maximums and minimums for ten-year yields since 2011.
(b) Average (2016–21) of the effective interest rate projected in the IMF's October 2016 *WEO*.
(c) Axis restricted to 10%. Portugal's maximum closing yield was 16.6% and Ireland's was 13.8%.

Chart A.7 European bank price to book ratios have fallen over the year

Bank price to book ratios[a]



Sources: SNL financial, Thomson Reuters Datastream and Bank calculations.

(a) Aggregates weighted by total assets at end-2015.
(b) 'Core excluding Germany' refers to banks in Austria, Belgium, France and the Netherlands.
(c) 'Periphery excluding Italy' refers to banks in Ireland, Portugal and Spain.

Bank equity prices in Europe remain low.

Bank equity prices in Europe have staged a partial recovery since the July *Report*. However, price to book ratios remain significantly lower on average than in 2015, particularly in Germany and Italy (**Chart A.7**).

In some cases, this could reflect concerns over asset quality and perceptions of non-performing loans yet to be provisioned for. In Italy, for example, non-performing loans exceed total provisions and common equity Tier 1 (CET1). Uncertainty about potential fines for past misconduct and concerns about the longer-term viability of business models are also weighing heavily on the valuations of some banks across the continent.

The recent recovery in bank equity prices could reflect a steeper yield curve and expectations of less onerous regulatory requirements following the US election. However, there are some exceptions: bank equity prices in Italy have fallen, possibly reflecting heightened political uncertainty, while large emerging market exposures appear to have weighed on Spanish bank valuations.

Euro-area banks' CET1 ratios are significantly higher than before the crisis. But continued weak profitability could impair euro-area banking sector resilience in the event of further adverse shocks.

Additional risks from the euro area could emerge as a consequence of the United Kingdom's withdrawal from the European Union. Firms incorporated in the United Kingdom are estimated to be involved in over half of debt and equity issuance by EU (excluding UK) borrowers. UK firms also facilitate access to hedging instruments. Within the European Union, for example, over three-quarters of foreign exchange and over-the-counter interest rate derivatives trading takes place in the United Kingdom. Changes to the trading relationship between the United Kingdom and the European Union may require firms to alter their operations and the services they provide. If any such adjustments take place in a short timeframe, there could be a greater risk of disruption to services provided to the European real economy, which could spill back to the UK economy through trade and financial linkages.

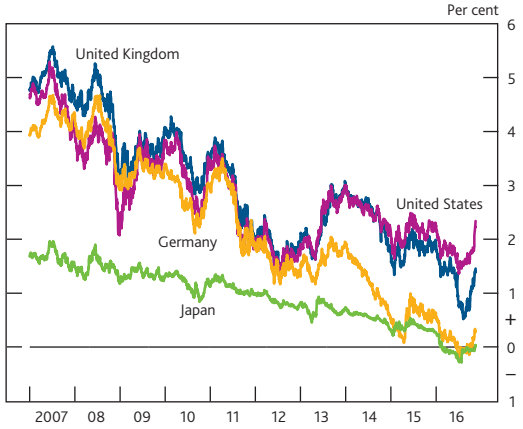
Overall, the FPC judges that risks associated with the euro area remain elevated. The FPC incorporated a very severe global scenario in its 2016 stress scenario, with euro area impairments on corporate and household lending contributing £5.5 billion to banking sector losses. The 2016 stress test results indicate that the UK banking system is capitalised to sustain the provision of financial services, including the supply of credit, under this scenario.

Financial market fragility

Following the US election, expectations of expansionary fiscal policy in the United States have helped push up advanced economy sovereign bond yields, partly or fully reversing their falls in the first half of 2016. Since the July *Report*, however, real yields in the United Kingdom have fallen and are close to historic lows. Term premia in advanced economy government bond yields have risen but remain low compared to historical averages. Alongside continued low levels of estimated liquidity risk premia in corporate bond spreads, the risk of a further adjustment in fixed-income markets remains. An adjustment could be amplified by fragile market liquidity, potentially impacting the supply of finance to the real economy.

Chart A.8 Advanced economy sovereign bond yields have increased markedly

International ten-year nominal government bond yields(a)



Source: Thomson Reuters Datastream.

(a) Yields to maturity.

Advanced economy equity prices have increased…

Since the July *Report*, equity prices have risen across a range of advanced economies. In the United Kingdom, equity prices have risen by 3.8%. Within the FTSE All-Share index, shares of firms whose business is more UK-focused have regained some of the losses experienced immediately following the UK referendum on membership of the European Union; however, their equity prices are still 11.1% lower than at the start of the year, compared to a 7.2% rise for the broader index. In the euro area, equity prices have increased by 4.8%, only partially reversing falls in the first half of the year. The S&P 500 has risen by 3.8%, approaching record-high levels; a marked increase after falls in the weeks ahead of the US election.

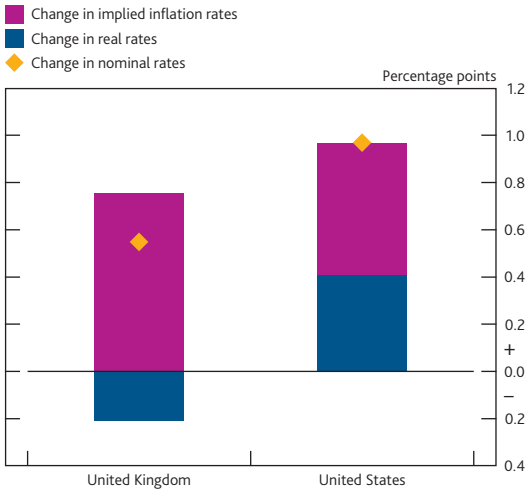
…and government bond yields have increased markedly…

Following the election, expectations of expansionary fiscal policy in the United States have helped push up advanced economy sovereign bond yields (**Chart A.8**). Since the July *Report*, UK and German ten-year nominal government bond yields have risen by 55 and 45 basis points respectively, and have partly reversed their falls in the first half of the year. US ten-year government bond yields have risen 97 basis points and are now back to levels last seen in November 2015.

Movements in nominal bond yields can be attributed either to changes in real yields or compensation for inflation (**Chart A.9**). In the United States, both components have risen. In contrast, while the compensation for inflation has risen markedly in the United Kingdom, real yields have fallen. Ten-year real yields — based on RPI inflation indexed bond yields — are now at -1.74% and remain close to their lowest levels on record, with market contacts suggesting that falls

Chart A.9 The causes of changes in nominal government bond yields differs across economies

Contributions to the increase in nominal ten-year interest rates since the July *Report*[a]

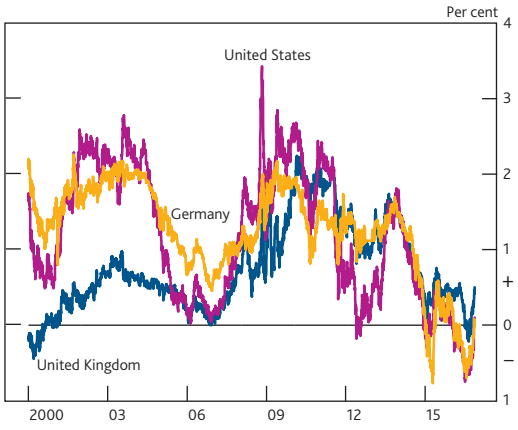


Sources: Bloomberg and Bank calculations.

(a) Zero-coupon rates derived from government bonds. The contribution of real rates and implied inflation to the change in nominal rates is calculated using index-linked gilts (which reference UK RPI) for the United Kingdom and Treasury inflation-protected securities (which reference US CPI) for the United States.

Chart A.10 Term premia in government bond markets are low

Estimates of term premia in ten-year nominal government bond yields[a][b]



Sources: Bloomberg, Federal Reserve Bank of New York and Bank calculations.

(a) UK and German estimates are derived using the model described in Malik, S and Meldrum, A (2016), 'Evaluating the robustness of UK term structure decompositions using linear regression methods', *Journal of Banking & Finance*, Vol. 67, June, pages 85–102. US estimates are available from www.newyorkfed.org/research/data_indicators/term_premia.html.
(b) Estimates for the United Kingdom are calculated using data since October 1992. Estimates for Germany are calculated using data since January 1999.

since the referendum in part reflect increased perceptions of downside risks to the longer-term growth outlook.(1)

…which could test risk appetite in some markets…

In recent years, the low interest rate environment in advanced economies has encouraged investors to rebalance their portfolios into riskier assets. This has been an intended consequence of monetary policy. A reversal of yields could lead to a reassessment of portfolio choices, and could potentially reduce risk appetite. For instance, the rise in advanced economy sovereign bond yields, coupled with some risk of reduced openness to global trade, has already prompted falls in some risky asset prices in emerging market economies (see Global environment chapter).

…while continued low levels of term and liquidity risk premia means the risk of a further adjustment in fixed-income markets remains.

In advanced economies, some measures of the compensation for risk suggest that fixed-income markets remain vulnerable to a further adjustment. Estimates of term premia — the compensation investors demand for holding longer-maturity assets — in government bond markets have risen, but remain below historical averages (**Chart A.10**). A reversal to more normal levels could be reflected in a range of asset prices, particularly if this did not coincide with a substantially improved macroeconomic outlook. In the United Kingdom, this could arise, for example, if there were to be a reduction in overseas investor appetite to hold sterling-denominated assets (see UK current account chapter).

Since the July *Report*, sterling corporate bond yields have not risen, despite the increase in risk-free rates (**Chart A.11**). This reflects, in part, falls in corporate bond spreads brought about by the launch of the Corporate Bond Purchase Scheme (CBPS) in August as part of the Monetary Policy Committee's package of measures to support the real economy.(2) The announcement of the CBPS was also followed by a sharp pick-up in investment-grade issuance by UK companies (see Market-based finance chapter).

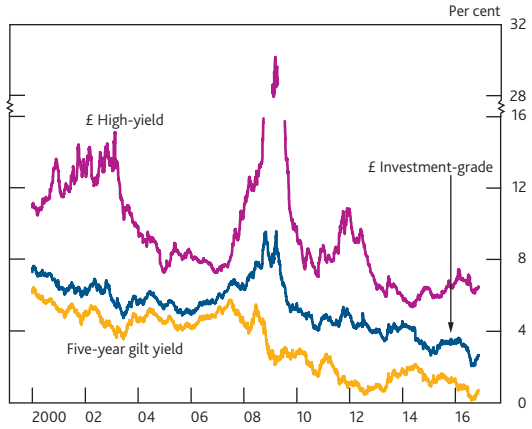
Yields on corporate bonds have broadly tracked sovereign bond yields down in recent years. As a result, they are vulnerable to an adjustment in risk-free rates due to increases in term premia.

Furthermore, estimates of the liquidity premium investors demand for holding corporate bonds (which remove credit risk compensation and risk-free yields from corporate bond yields) are below historical averages (**Chart A.12**). This

(1) See the August 2016 *Inflation Report* at www.bankofengland.co.uk/publications/Documents/inflationreport/2016/aug.pdf; and the November 2016 *Inflation Report* at www.bankofengland.co.uk/publications/Documents/inflationreport/2016/nov.pdf.
(2) See 'A monetary policy package to support the UK economy' on pages iii–viii of the August 2016 *Inflation Report*; and 'Developments in UK financial conditions since the August *Report*' on pages 2–3 of the November 2016 *Inflation Report*.

Chart A.11 Yields on sterling corporate bonds are low by historical standards

Yields on sterling corporate bonds and five-year gilts[a]

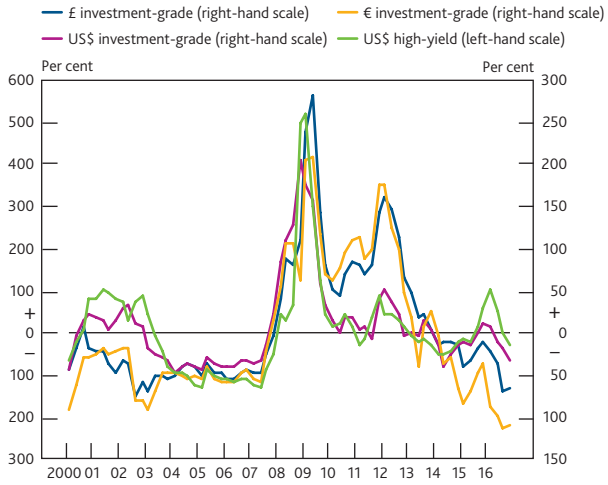


Sources: Bank of America Merrill Lynch Global Research and Thomson Reuters Datastream.

(a) The durations — the weighted average time until bond payments are due — for the investment-grade and high-yield corporate bond indices, are 5.13 years and 4.18 years, respectively.

Chart A.12 Liquidity risk premia in corporate bond markets are low

Deviations of estimated corporate bond liquidity risk premia from historical averages[a][b]



Sources: Bank of America Merrill Lynch Global Research, Bloomberg, Thomson Reuters Datastream and Bank calculations.

(a) Implied liquidity premia are estimated using a Merton model as in Leland, H and Toft, K (1996), 'Optimal capital structure, endogenous bankruptcy, and the term structure of credit spreads', *Journal of Finance*, Vol. 51, pages 987–1,019, to decompose corporate bond spreads.
(b) Quarterly averages of deviations of implied liquidity risk premia from sample averages. Sample averages are from 1999 Q4 for € investment-grade and 1997 Q1 for £ investment-grade, US$ investment-grade and US$ high-yield.

contrasts with an apparent reduction in underlying market liquidity for these securities in recent years, reinforcing the risk of a future adjustment in these markets.[1]

An adjustment in prices in bond markets could be amplified by fragile market liquidity.

Fragile market liquidity in bond markets could magnify an adjustment in fixed-income asset prices. Some types of investors have the potential to behave procyclically (see Market-based finance chapter). A sudden increase in demand to sell fixed-income assets following a fall in prices could cause order-flow imbalances, if the dealers that intermediate these markets are unwilling or unable to absorb sales. This could amplify the initial price move, leading to further asset sales.

In the limit, the supply of credit to the real economy, and transfer of risk to those who are best placed to manage it, could be impaired. A sharp fall in asset prices could further adversely impact the balance sheets of banks and other financial institutions at the core of the financial system, including through their holdings of traded assets.

The FPC included a financial market stress in the 2015 annual stress test, taking into account the liquidity of trading book positions (see December 2015 *Report*). Further, in the context of concerns around market liquidity, the Bank is developing a system-wide stress simulation, to assess the dynamics of markets under stress. It will include an analysis of the behaviour of various sectors — such as open-ended investment funds, insurance companies and dealers (see Financial stability risks and regulation beyond the core banking sector chapter). The FPC also supports the Financial Conduct Authority's intention to publish a discussion paper on the potential challenges associated with open-ended funds investing in illiquid assets, including commercial real estate.

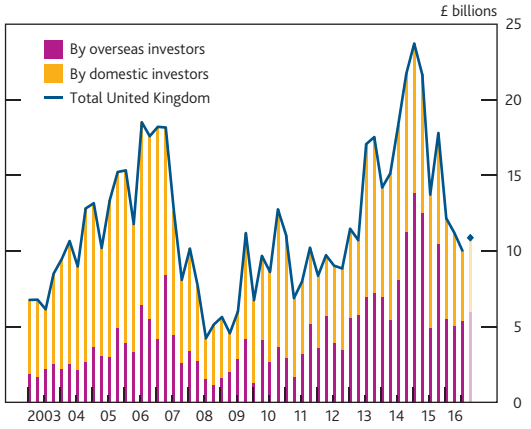
The FPC continues to emphasise the importance of market participants recognising the underlying risks in different asset classes, managing them prudently, and pricing them accordingly.

(1) See 'Developments in market liquidity' on pages 27–33 of the July 2016 *Financial Stability Report*; www.bankofengland.co.uk/publications/Documents/fsr/2016/fsrjul16.pdf.

UK commercial real estate

Previously identified risks from an adjustment in the UK commercial real estate (CRE) market have in part crystallised. Activity slowed further in 2016 Q3 and prices have fallen by 2.6% since the UK referendum on membership of the European Union. In the period immediately after the referendum, several open-ended funds investing in the CRE market suspended dealing following significant net outflows. Since then, there have been signs of stabilisation in the market. Most open-ended funds have now reopened. There is a risk, however, of further adjustment in the CRE market that could create financial stability risks, given the reliance of the market on inflows of foreign capital and, in some segments, stretched valuations. Further price falls could reduce companies' access to finance, given the use of CRE as collateral.

Chart A.13 UK CRE transactions fell further in 2016 Q3
UK CRE transactions (gross quarterly flows)[(a)]



Sources: The Property Archive and Bank calculations.

(a) Final data points are the sum of three months to October 2016.

Activity in the CRE market slowed and prices fell in the months immediately after the referendum…

Activity in the commercial real estate (CRE) market slowed sharply following the UK referendum on membership of the European Union, continuing a significant slowdown in 2016 H1. The value of transactions in 2016 Q3 fell by 10% on the previous quarter, and was 27% lower than a year ago (**Chart A.13**). Aggregate CRE prices have fallen by 2.6% since the referendum.

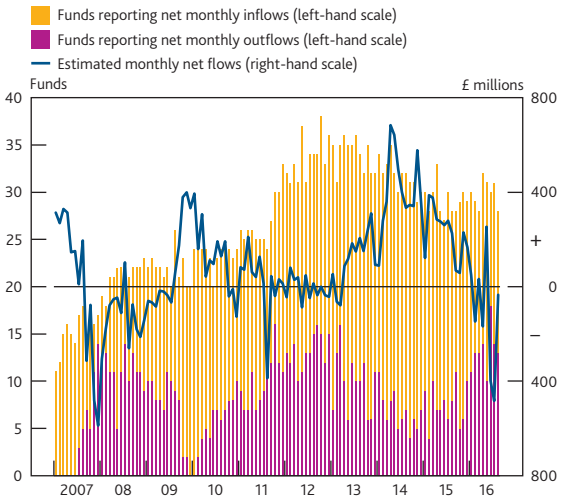
Uncertainty around valuations rose immediately following the referendum, with the Royal Institution of Chartered Surveyors (RICS) recommending that its members qualify valuations with uncertainty clauses. In addition, a significant number of investors made redemptions from open-ended funds investing in the CRE market, leading to sizable net outflows (**Chart A.14**). Given the illiquid nature of CRE holdings, this created liquidity pressures for funds, and several funds suspended dealing. There were some instances of funds selling assets at a significant discount relative to pre-referendum valuations to raise cash and meet redemptions quickly. However, widespread rapid sales of CRE assets were avoided. Spillovers to open-ended funds investing in other markets were also limited (see Market-based finance chapter).

…but market conditions appear to have stabilised since…

The level of transactions has since recovered and the RICS survey of CRE investors pointed to a stabilisation in investor enquiries in 2016 Q3. Monthly data suggest that CRE prices were broadly flat on the month in October, and uncertainty clauses on valuations have largely been lifted. Most suspended open-ended funds have either reopened or have announced their intention to reopen by the end of 2016.

Chart A.14 Open-ended CRE funds faced large net outflows immediately following the referendum

Net flows to open-ended UK CRE funds[a][b]

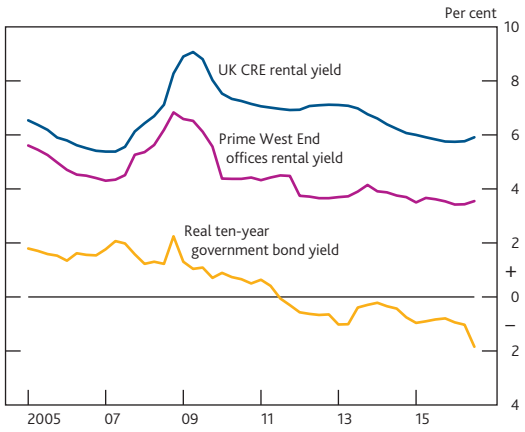


Sources: Morningstar and Bank calculations.

(a) Based on Morningstar Category 'Property — Direct UK' with the following definition: 'Property — Direct UK funds have the legal status of an investment fund, and directly invest in and/or manage real estate (ie they directly own or manage 'bricks and mortar' property). At least 50% of the total assets are invested directly in real estate properties in the UK.'
(b) Fund flows are excluded in any month where: inflows are greater than three standard deviations of inflows; outflows are greater than three standard deviations of outflows; total net assets are reported as less than £100; or where flows are skewed due to fund restructuring.

Chart A.15 The UK CRE rental yield remains low

Yields on UK assets



Sources: Bloomberg, MSCI Inc. and Bank calculations.

There is some tentative evidence that conditions in some segments in the market are stabilising more quickly than others. For example, industry contacts suggest that liquidity in the CRE market is tiered, with more liquidity available for assets with longer leases or those in central locations, and less liquidity in riskier parts of the market, including new development.

…although risks remain to the downside.

Despite the recent fall in prices, valuations in some segments of the market continue to appear stretched. CRE rental yields remain low, particularly for prime London offices (**Chart A.15**), suggesting that prices are elevated relative to rents and at greater risk of correction, with financial stability implications. In recent years, these yields have fallen broadly in line with government bond yields, suggesting that, in aggregate, investors' perceptions of risks around the CRE market and expectations about future rental growth have not changed materially. There remains a risk that any fall in rental expectations or increase in risk premia could cause yields to correct sharply.

One way of assessing valuations in the CRE market is to use an investment valuations model. A sustainable valuation is calculated as the discounted sum of rental income earned over the next five years and the sale price in five years' time. The future sale price, in turn, is determined by rents at the point of sale, risk-free interest rates, investors' risk premia, and expected long-term rental growth.

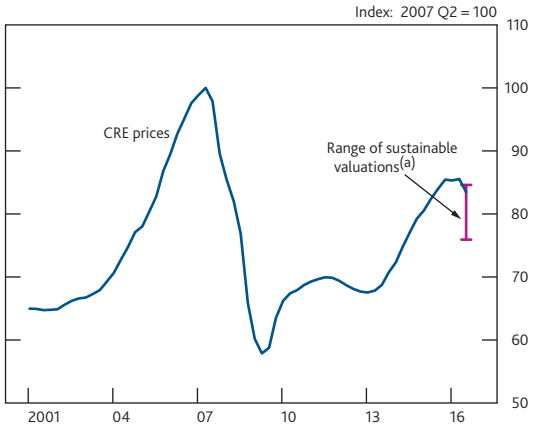
A number of assumptions about the determinants of the future sale price can be made to generate a range of plausible sustainable valuations (**Chart A.16**). In one scenario, CRE yields remain low in the medium term. That would be consistent with assuming that the current low level of risk-free interest rates persists, and that both the risk premium and long-term rental growth expectations remain unchanged from current levels. In this case, current valuations would be a little below estimated sustainable levels (the higher bound of estimates in **Chart A.16**).

In another scenario, the average historical relationship between risk-free yields, risk premia and rental growth expectations is reasserted, such that CRE yields return to historical averages. This would suggest that current valuations are above estimated sustainable levels (the lower bound of estimates in **Chart A.16**). Such a scenario could be delivered in two different ways. In one, risk-free rates, the risk premium and long-term rental growth expectations all return to historical average levels. In another, risk-free rates remain low but are associated with a fall in rental growth expectations or a rise in risk premia relative to historical averages, consistent with a subdued outlook for medium-term growth.

Overall, this approach suggests there may continue to be a risk of further adjustment in the commercial property market.

Chart A.16 There is a wide range of sustainable CRE valuations

Commercial real estate prices in the United Kingdom and range of sustainable valuations

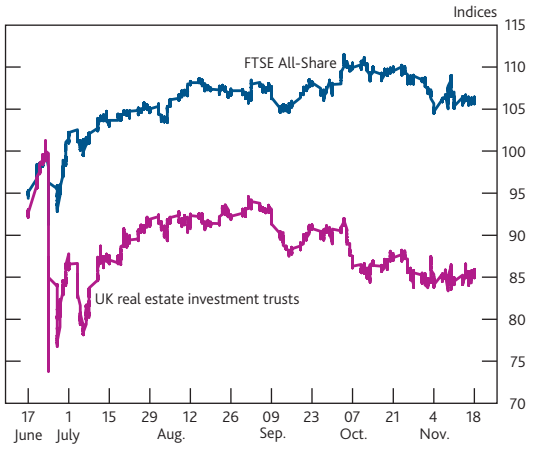


Sources: Bloomberg, Investment Property Forum, MSCI Inc. and Bank calculations.

(a) Sustainable valuations are estimated using an investment valuation approach and are based on an assumption that property is held for five years. The sustainable value of a property is the sum of discounted rental and sale proceeds. The rental proceeds are discounted using a five-year gilt yield plus a risk premium, and the sale proceeds are discounted using a 20-year, five-year forward gilt yield plus a risk premium. Expected rental value at the time of sale is based on Investment Property Forum Consensus forecasts. The range of sustainable valuations represents varying assumptions about the rental yield at the time of sale: either rental yields remain at their current levels (at the upper end), or rental yields revert to their fifteen-year historical average (at the lower end). For more details, see Crosby, N and Hughes, C (2011), 'The basis of valuations for secured commercial property lending in the UK', *Journal of European Real Estate Research*, Vol. 4, No. 3, pages 225–42.

Chart A.17 UK real estate investment trust share prices fell in September and October

UK real estate investment trusts and FTSE All-Share indices, 17 June–18 November 2016(a)



Sources: Bloomberg and Bank calculations.

(a) 100 = closing price on 23 June.

However, the market is uneven, and valuations in some segments of the market — such as in parts of London — appear more stretched than the aggregate picture.

Some market indicators corroborate the risk of a further adjustment. Share prices of UK real estate investment trusts fell further in September and October, having recovered from their post-referendum lows (**Chart A.17**). Consensus forecasts from the Investment Property Forum, published in November, also point to average price falls, of around 8% by end-2017.

Price adjustments could be driven by the behaviour of overseas investors…

One factor that may be weighing on demand in the CRE market is a reduction in overseas investors' risk appetite associated with uncertainty about the United Kingdom's future relationship with the European Union. Overseas investment, which has accounted for around half of CRE transactions since 2012 and is therefore likely to have been an important determinant of prices, has fallen sharply in 2016 (**Chart A.13**). While the 15% fall in the sterling effective exchange rate since the start of the year may attract some foreign investors, the volatility in sterling may deter others. According to a survey by JLL in September, while 72% of international investors viewed the fall in sterling as an opportunity to invest in the United Kingdom, 45% intended to wait before doing so. And 67% of domestic investors thought that capital flows into UK CRE would decline if the United Kingdom no longer had full access to the European Single Market.

…and amplified by investors in open-ended funds…

Future price falls in the CRE market could be amplified by the behaviour of investors in open-ended commercial property funds. While suspensions helped to avoid widespread, rapid sales of CRE following the referendum, the underlying vulnerability that could arise from the liquidity mismatch between these funds' assets and liabilities remains. Future shocks to the CRE market could therefore trigger similar cycles of redemptions, suspensions and discounted sales. The FPC supports the FCA's intention to publish a discussion paper on the potential challenges associated with open-ended funds investing in illiquid assets, including CRE.

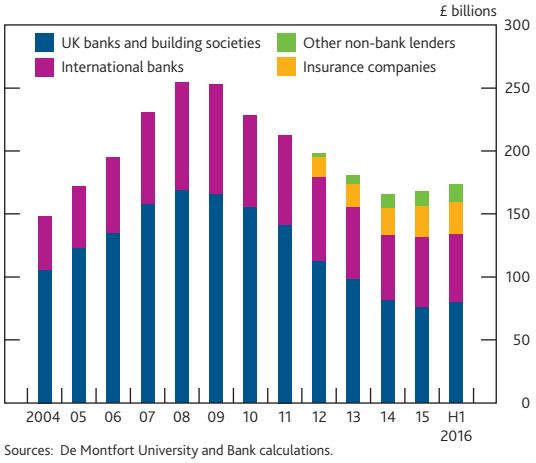
…as well as by leveraged investors in a downturn.

Leveraged investors may seek to sell properties in a downturn, either to limit losses of their own equity, or because they cannot refinance their debt. Such sales would act to amplify any stress in the market. As comprehensive data on debt in the CRE market are not available, the Bank is engaging with the industry on proposals to develop a CRE debt database.(1) Available evidence suggests that, while the stock

(1) For further details see Brazier, A (2015), 'Nurturing resilience to the financial cycle'; www.bankofengland.co.uk/publications/Pages/speeches/2015/850.aspx.

Chart A.18 Debt financing in the UK CRE market has risen a little

UK CRE debt reported to De Montfort University survey[a]

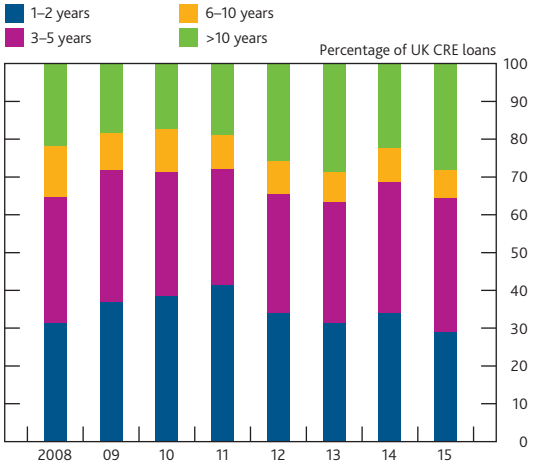


Sources: De Montfort University and Bank calculations.

(a) The composition of the survey sample was altered in 2012 to include insurance companies and other non-bank lenders as a separate category. Data exclude commercial mortgage-backed securities.

Chart A.19 A third of UK banks' CRE loans typically mature in the near term

Remaining time to maturity for UK banks' and building societies' outstanding UK CRE loans[a]



Sources: De Montfort University and Bank calculations.

(a) Maturity profiles of outstanding loans at year-end. Respondents are asked for annual maturity profiles of their outstanding loans.

of debt used to finance UK CRE investment remains 32% below its 2008 peak, it has risen slightly since 2014 (**Chart A.18**).

Investors may find it harder or more expensive to refinance their loans if CRE prices were to fall substantially. Survey evidence suggests that around a third of UK banks' CRE loans typically mature in the near term (**Chart A.19**). If prices were to fall in line with Investment Property Forum Consensus forecasts, Bank staff estimate that the proportion of loans with loan to value ratios exceeding 70% is likely to remain relatively low, at around a fifth of major UK banks' CRE loan books, compared with the current proportion of around 10%. Refinancing could, however, pose more of a challenge in the event of larger price falls, particularly for highly leveraged borrowers.

The FPC will continue to monitor closely developments in the UK CRE market and potential amplification channels.

While stress in the market could lead to tighter credit conditions facing the real economy, there is little evidence of this so far…

CRE is widely used as collateral for corporate borrowing: a 2015 Bank of England review of bank lending to small and medium-sized companies suggested that 75% of those companies that borrow from banks use CRE as collateral. An amplified downturn in the CRE market could be transmitted to the real economy by reducing companies' access to bank loans and their ability to undertake new investment. As discussed in the Bank's 2016 Q3 *Credit Conditions Review*, there is little evidence so far of a tightening in bank credit availability to companies outside the CRE sector.

…and the 2016 stress test suggests that major UK banks have become more resilient to stresses in the CRE market.

Although foreign banks and non-bank lenders have gained market share in recent years (**Chart A.18**), UK banks continue to have material exposures to the CRE sector — averaging around 50% of common equity Tier 1 capital at end-2015 for those firms involved in the 2016 stress test.(1) The exposures have fallen substantially since the crisis, with the stock of UK banks' CRE lending having halved in value since 2008. Major UK banks have also broadly maintained their underwriting standards in recent years.

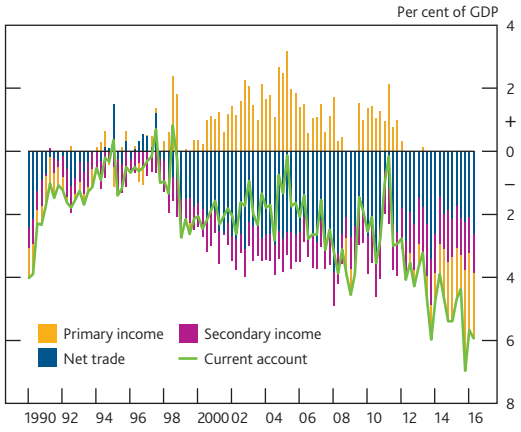
Reflecting this improvement in asset quality, UK CRE impairment rates in the Bank's 2016 stress test are projected to be materially lower than those incurred by banks in the period following the financial crisis.(2) That is despite banks facing price falls in the stress of around 40%, broadly similar to those observed during the financial crisis.

(1) The figure includes gross on balance sheet exposures as well as committed credit lines, and exposures booked in Jersey and Guernsey. Standard Chartered Bank is excluded, as it has minimal UK CRE exposures.
(2) See 'Stress testing the UK banking system: 2016 results'; www.bankofengland.co.uk/publications/Pages/news/2016/stresstesting.aspx. Impairments following the financial crisis are estimates based on banks' annual SEC filings and reports.

UK current account

The UK current account deficit remains large by historical and international standards. Its financing is reliant on material inflows of portfolio and foreign direct investment and is vulnerable to a reduction in foreign investor appetite for UK assets. This could be triggered by global factors, such as a reduction in international capital flows, or by UK-specific factors, such as perceptions of weaker long-run UK growth prospects. There has not to date been any material change to the United Kingdom's ability to finance its current account deficit, though there have been some indications of reduced investor appetite for commercial real estate and equities. UK banks have materially reduced their reliance on short-term overseas borrowing, and the deprecation of sterling acts to improve the United Kingdom's net foreign asset position. But a sharp adjustment in the current account could test financial stability indirectly through its impact on the real economy. It would be associated with higher funding costs for real economy borrowers and a further depreciation of sterling, worsening the trade-off between growth and inflation.

Chart A.20 The UK current account deficit remains large
Decomposition of the UK current account[(a)]



Sources: ONS and Bank calculations.

(a) Primary income mainly consists of compensation of employees and net investment income. Secondary income consists of transfers.

The current account deficit remains large, with substantial uncertainty around its outlook.

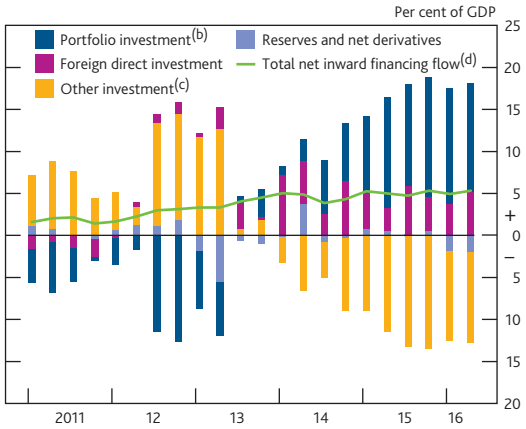
The UK current account deficit remains large by international and historical standards, at 5.9% of GDP in 2016 Q2 (**Chart A.20**). The deficit has widened significantly since 2011, largely reflecting a marked deterioration in the primary income balance on account of weaker foreign direct investment (FDI) earnings. In contrast, the trade balance has been broadly stable since 2011.

The sterling exchange rate index has depreciated by 15% since the start of 2016, including a fall of around 12% since the UK referendum on EU membership. Market contacts suggest that this depreciation is likely to have been associated with perceptions that the United Kingdom's future trading arrangements with the European Union will be less open for a period. This would require a lower real exchange rate to maintain competitiveness.

Other things equal, the fall in the exchange rate should help to smooth the adjustment of the current account over time, by improving both trade and net income flows. But there are substantial risks around the outlook for the current account, particularly as details of the United Kingdom's future trading relationships with the European Union and other countries are as yet unknown. For example, some service sectors such as financial services currently benefit from relatively open access to EU markets. The surplus in financial services trade is around 3% of GDP, around 1¼% percentage points of which is with the European Union.

Chart A.21 There have been material inflows of portfolio investment and FDI over the past few years

Net inward financing flows[a]

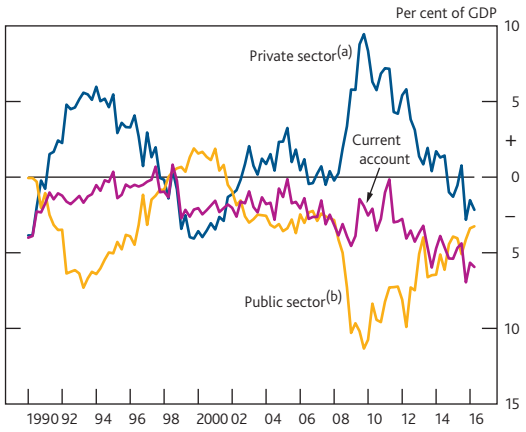


Sources: ONS and Bank calculations.

(a) This is the change in UK foreign liabilities, less the change in UK foreign assets, for each category of investment. Four-quarter moving average.
(b) Portfolio investment consists of debt securities (including government debt), equities and investment fund shares.
(c) Other investment consists mostly of loans and deposits.
(d) The total net inward-financing flow is equal in magnitude to the current account deficit (plus net errors and omissions).

Chart A.22 Both the UK private and public sectors were net borrowers in 2016 Q2, and ultimately rely on funding from abroad

Net lending as a share of GDP by sector



Sources: ONS and Bank calculations.

(a) Includes households, non-profit institutions serving households, private non-financial corporations and financial corporations.
(b) General government plus public corporations.

The financing of the deficit remains vulnerable to a disruption in capital flows.

Over the past few years, the financing of the deficit has relied on continuing material inflows of portfolio investment and FDI, which have more than offset cross-border bank deposit flows (**Chart A.21**).

While the current account deficit remains large, this financing remains vulnerable to a reduction in foreign investor appetite for UK assets. This could be triggered by global factors, such as a reduction in international capital flows, or by UK-specific factors, such as perceptions of weaker long-run UK growth prospects, or a rise in the risk premium on UK assets.

A disruption in financing flows could be associated with further sterling depreciation, a fall in asset prices and tighter credit conditions for UK borrowers. As both the UK private and public sectors are net borrowers (**Chart A.22**), and ultimately rely on funding from abroad, any deterioration in funding conditions could be associated with a downward adjustment in domestic demand. The crystallisation of these risks could also coincide with a build-up in inflationary pressures associated with a decline in the exchange rate, worsening the trade-off between growth and inflation. The combination of these factors would probably drive an increase in banks' non-performing loans.

A disruption in cross-border capital flows could also interact with other vulnerabilities. For example, falls in asset prices arising from a sharp reduction in portfolio debt and equity inflows could be amplified by the behaviour of investors in open-ended funds and lead to disruption in some financial markets (see Market-based finance chapter).

A disruption in flows has not materialised, but investor appetite for some sterling assets appears to have decreased since the referendum.

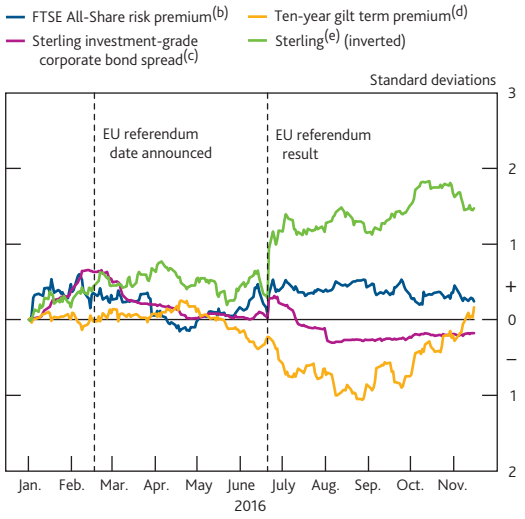
There has not to date been any material change to the United Kingdom's ability to finance its current account deficit, though there have been some indications of reduced investor appetite for commercial real estate and equities.

The equity risk premium for the FTSE All-Share index rose following the referendum and has remained elevated in October and November (**Chart A.23**). That is consistent with data on non-residents' net purchases of UK equities, which show that purchases have moderated relative to levels seen in 2015 (**Chart A.24**). The Bank of America Merrill Lynch Global Fund Manager survey also suggests reduced appetite for UK equities, with a net balance of 35% of asset managers reporting their portfolios were underweight equities in November, the highest level in six months.

In the UK commercial real estate sector, flows from overseas investors have fallen, consistent with a reduction in risk

Chart A.23 There has not been a widespread rise in risk premia on sterling assets in 2016

Sterling ERI and implied risk premia on sterling assets[a]

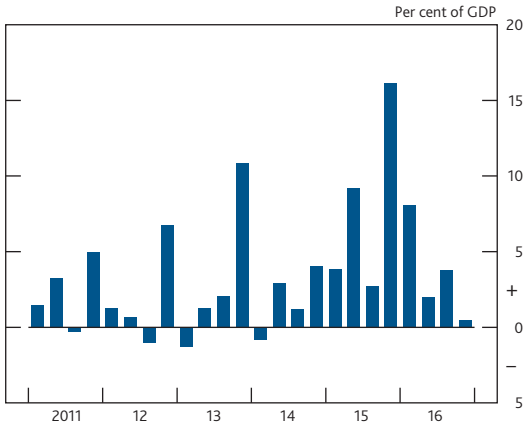


Sources: Bank of America Merrill Lynch Global Research, Bank of England, Bloomberg, IMF, Thomson Reuters Datastream and Bank calculations.

(a) Series are normalised to have an average of zero and a standard deviation of one over the period 1 January 2000 to 18 November 2016. Data show the changes in these normalised series since 4 January 2016.
(b) As implied by a dividend discount model.
(c) Option-adjusted spreads. Sterling-denominated corporate bonds issued in domestic or eurobond markets.
(d) Derived using the model described in Malik, S and Meldrum, A (2016), 'Evaluating the robustness of UK term structure decompositions using linear regression methods', *Journal of Banking & Finance*, Vol. 67, June, Pages 85–102.
(e) Sterling effective exchange rate index.

Chart A.24 Overseas investors' net purchases of UK equities have fallen in recent quarters

Changes in non-resident net holdings of FTSE 100 shares[a][b][c][d]



Sources: ONS, S&P Global Market Intelligence and Bank calculations.

(a) Quarterly net changes in non-resident holdings of FTSE 100 companies' shares, as listed on the index at 15 November 2016.
(b) The estimate for the change in the holding of shares in 2016 Q4 is based on data up to 15 November 2016. Both the 2016 Q3 and Q4 changes in the holding of shares are shown as percentages of quarterly nominal GDP in 2016 Q2.
(c) The change in the holding of shares is weighted at each quarterly period by the price of the underlying stock. These data are updated on the date on which a change in shareholding is formally registered, not the date on which the transaction itself takes place, which may be earlier. Data are non seasonally adjusted.
(d) The S&P's disclaimer of liability, which applies to the data provided, is available at www.bankofengland.co.uk/publications/Documents/fsr/2016/fsr16nov4.xlsx.

appetite in that market. This sector is particularly vulnerable to a change in foreign investor preferences, as overseas investment has accounted for roughly half of overall commercial property transactions in recent years (see UK commercial real estate chapter).

In contrast, there has been little evidence of a reduction in investor appetite for gilts or corporate bonds following the referendum. The gilt term premium — the compensation investors demand to hold longer-term UK government bonds — has picked up recently but fell immediately following the referendum (**Chart A.23**) and remains low compared to historical averages (see Financial market fragility chapter). Data on overseas investors' purchases of gilts, which are only available up to 2016 Q3, suggest that purchases were a little lower than in Q2, but remained positive. And market contacts continue to report little change in investors' preferences for holding gilts in October and November. Investors' appetite for holding sterling corporate bonds is reported to have improved following the announcement of the MPC's policy package in August, consistent with falls in corporate bond spreads.

Taken together, the available indicators of capital inflows, as well as the more timely developments in measures of risk premia and funding costs, suggest little evidence of an abrupt disruption in cross-border flows to date. Given the substantial uncertainty around the economic outlook, the FPC judges that the likelihood that the risk of a fall in overseas investor appetite could materialise remains elevated. The FPC will continue to monitor all forms of capital inflow and risk premia on a range of UK assets.

Currency depreciation has improved the United Kingdom's overall external balance sheet position…

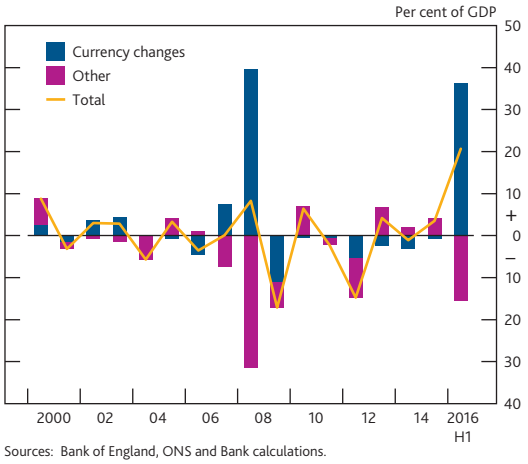
Currency mismatches in a country's external balance sheet can amplify risks associated with a large current account deficit. For example, domestic residents who use foreign currency funding to finance domestic currency assets could incur losses. In aggregate, the United Kingdom is in the opposite position. Estimates suggest that around 60% of the stock of external liabilities is denominated in foreign currency, compared with more than 90% of the stock of external assets. As a result, the depreciation in sterling has increased the value of external assets relative to liabilities, improving the United Kingdom's net foreign asset position in 2016 H1 (**Chart A.25**).

…and the risk of amplification from currency mismatches on companies' and banks' balance sheets appears limited.

Within that aggregate picture, non-financial companies have large borrowings in foreign currency: estimates suggest these are in the region of around £300 billion, compared with foreign currency denominated assets of £200 billion. The majority of large companies make use of financial market foreign currency hedges in the short term. The cost of this financial hedging — for example, as proxied by the

Chart A.25 Sterling depreciation has improved the UK net foreign asset position

Annual changes in the United Kingdom's net international investment position[a]

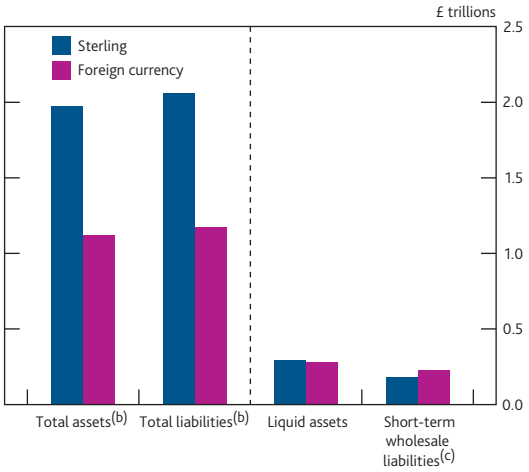


Sources: Bank of England, ONS and Bank calculations.

(a) Bank staff estimates of annual changes in the net international investment position, based on the model outlined by Taylor, C (2016), 'Analysis of the UK's international investment position: 2016'. Estimates for 2015 and 2016 H1 may be subject to large revisions as the ONS incorporates annual survey data when they become available. Estimates do not include financial derivatives and employees' stock options.

Chart A.26 UK banks' short-term foreign currency liabilities are large

UK banks' balance sheets by currency[a]



Sources: Bank of England and Bank calculations.

(a) Data as on 30 September 2016, for the seven largest UK banks, UK-resident entities only.
(b) Total assets (liabilities) includes gross reverse repo (repo) and group lending (funding). Total foreign currency assets (liabilities) calculated as total assets (liabilities) less sterling only assets (liabilities). Sterling assets and liabilities include foreign currency swaps.
(c) Wholesale funding with a maturity of three months or less. Shown on a net repo basis and excluding group funding.

cross-currency basis swap rate, and as reported by contacts of the Bank's Agents — appears to have risen a little over the past year. But the risk of significant losses from sterling depreciation is likely to be limited, as available data further suggest that many companies with foreign currency borrowings have large overseas revenues, and so are naturally hedged.

UK banks' short-term foreign currency liabilities have fallen materially since the financial crisis. But they nevertheless represent a significant proportion of their overall short-term wholesale liabilities. Foreign currency short-term liabilities remain covered, in aggregate, by banks' foreign currency denominated liquid assets (**Chart A.26**).

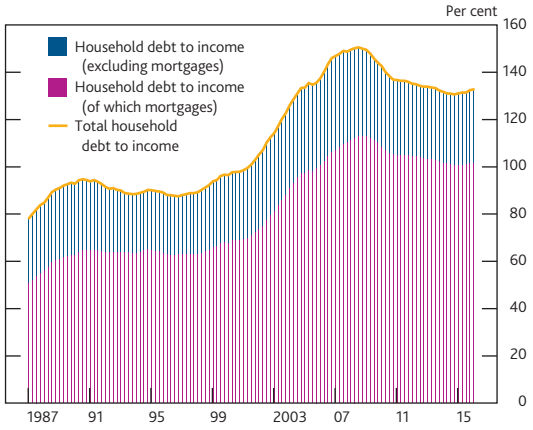
As part of the Bank's contingency planning ahead of the UK referendum on EU membership, PRA supervisors engaged with banks to ensure that they had sufficient short-term liquid assets in each material currency to meet short-term liabilities and potential wholesale outflows under a severe wholesale stress scenario. The Bank also offered additional liquidity through its regular operations. In the event, banks retained access to foreign currency swap markets throughout the period of sterling volatility.

Previous annual stress tests have assessed the resilience of the UK banking system to a range of relevant risks. In the 2014 stress-test scenario, concerns over the sustainability of the United Kingdom's internal and external debt positions led to a reassessment of prospects for the economy, a sharp depreciation of sterling and a rise in borrowing costs. At the time, the FPC judged that the stress-test results and banks' capital plans, taken together, suggested that the banking system would have the capacity to maintain its core functions in that stress scenario. Banks' resilience to funding market stresses was also assessed in the 2014, 2015 and 2016 stress tests.

UK household indebtedness

The level of household indebtedness in the United Kingdom remains high by historical standards. Although average debt servicing ratios remain low, the ability of some households to service their debts could be challenged by a period of higher unemployment. These households could affect broader economic activity by cutting back sharply on expenditure in order to service their debts. It is important that mortgage underwriting standards do not slip and contribute unduly to higher levels of household indebtedness. Activity in the housing market has softened in recent months, but the outlook is highly uncertain. The FPC has agreed to maintain the Recommendations it made in June 2014 to insure against the risk of a marked loosening in underwriting standards in the owner-occupier mortgage market and a significant increase in the number of highly indebted households.

Chart A.27 Household debt is high relative to income
UK household debt to income ratio[a][b][c]



Sources: ONS and Bank calculations.

(a) Total household debt to income is calculated as gross debt as a percentage of a four-quarter moving sum of disposable income. Includes all liabilities of the household sector except for the unfunded pension liabilities and financial derivatives of the non-profit sector. The household disposable income series is adjusted for financial intermediation services indirectly measured (FISIM).
(b) Mortgage debt to income is calculated as total debt secured on dwellings as a percentage of a four-quarter moving sum of disposable income. The household disposable income series is adjusted for FISIM.
(c) Non-mortgage debt to income is the residual of mortgage debt to income subtracted from total debt to income.

The level of UK household indebtedness remains high by historical standards…

After a prolonged period of retrenchment following the financial crisis, household debt began to rise again relative to incomes in early 2015. In 2016 Q2, the aggregate household debt to income (DTI) ratio was 133% (**Chart A.27**).

Highly indebted households are particularly vulnerable to shocks, such as falls in incomes or increases in interest rates, which threaten their ability to service their debts. If these households cut consumption sharply in order to service their debts, this may amplify any downturn in economic activity. Alternatively, if households default on their debts, this can test the resilience of lenders directly.

The increase in household indebtedness over the past three decades has been almost entirely driven by mortgage debt, the outstanding stock of which has doubled from 51% of household income in 1987 to 102% in 2016 Q2 (**Chart A.27**). Over the same period, households' non-mortgage debt has been broadly flat, at around 30% of income.

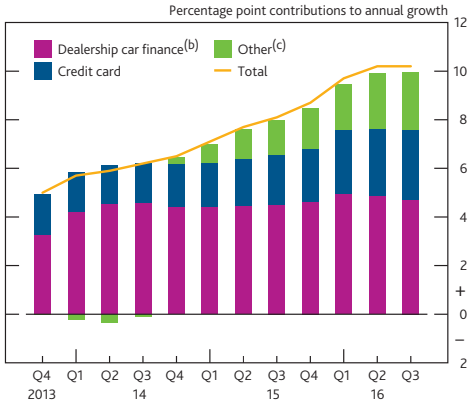
…and total lending to households has been increasing…

Total lending to households grew by 4.1% in the twelve months to September 2016, close to the fastest growth rate since the global financial crisis. The annual growth rate of mortgage lending was 3.2% in the same period. This was slightly below its level earlier in 2016 but higher than at any other time since the end of 2008.

Consumer credit represents 13% of the stock of household debt and has expanded rapidly in recent years, reaching an annual growth rate of 10.2% in the twelve months to September 2016 (**Chart A.28**). Growth in dealership car finance has been particularly strong in the past three years, though recent months have seen an increased contribution to

Chart A.28 Consumer credit has been growing rapidly

Contributions from different forms of lending to consumer credit growth[a]

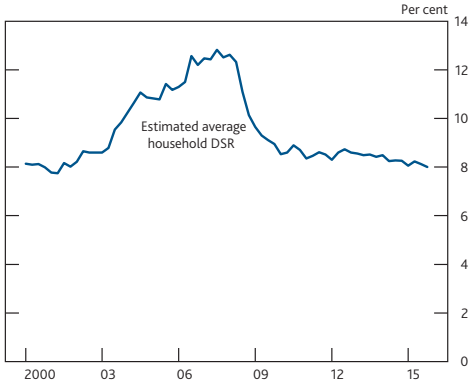


Sources: Bank of England, Finance & Leasing Association and Bank calculations.

(a) Sterling net lending by UK MFIs and other lenders to UK individuals excluding student loans. Non-seasonally adjusted.
(b) Dealership car finance net lending is estimated using change in outstanding stock. It may therefore reflect breaks in the series as well as underlying flows.
(c) Other is estimated as total consumer credit lending minus dealership car finance (as provided by the Finance & Leasing Association) and credit card lending.

Chart A.29 Average household debt servicing ratios have been flat since 2009

Estimated average household DSR[a]

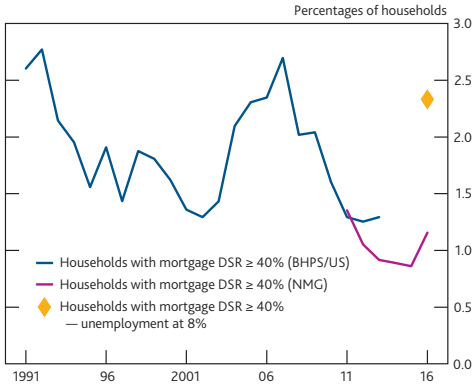


Sources: ONS and Bank calculations.

(a) Household DSRs estimated using household interest payments plus mortgage principal repayments as a share of household disposable income (adjusted for FISIM). This estimate does not capture principal repayments on consumer credit which also contribute to household debt servicing costs.

Chart A.30 An increase in unemployment could double the proportion of vulnerable households

Percentage of households with mortgage debt servicing ratios of 40% or greater[a][b][c]



Sources: British Household Panel Survey (BHPS), NMG Consulting Survey, Understanding Society (US) and Bank calculations.

(a) Mortgage DSR calculated as total mortgage payments as a percentage of pre-tax income.
(b) Percentage of households with mortgage DSR above 40% is calculated using British Household Panel Survey (1991–2008), Understanding Society (2009–13), and the online waves of NMG Consulting Survey (2011–16).
(c) A new household income question was introduced in the NMG survey in 2015. Data from 2011 to 2014 surveys have been spliced on to 2015 data to produce a consistent time series.

consumer credit growth from other forms of unsecured lending, such as personal loans. Strong growth in unsecured lending stands in stark contrast to market expectations of a weakening in the outlook for the UK economy, as reflected, for example, by falls in real risk-free interest rates (see Financial market fragility chapter). To the extent that this tension is maintained going forward, it raises the prospect of a further rise in household indebtedness as increases in unsecured debt outpace growth in household incomes.

…with some households vulnerable to a period of higher unemployment or a severe fall in income.

The ability of households to service their debts has been supported in recent years by the low level of interest rates, contributing to reduced borrowing costs. Reflecting this, as set out in the Bank's 2016 Q3 *Credit Conditions Review*, mortgage arrears rates have been falling since 2009 and write-off rates on consumer credit are at historically low levels. Average debt-servicing ratios (DSRs), which compare debt interest and repayment amounts with disposable incomes, fell after the crisis and have been flat since (**Chart A.29**). But there are signs that the number of vulnerable households, with particularly high mortgage DSRs, has stopped declining (**Chart A.30**).

An uncertain macroeconomic environment raises the prospect that households could face challenges to their ability to service their debts. As an illustration, Bank staff have estimated the impact on UK household DSRs from a rise in unemployment to 8%, and a severe fall in household income, similar to the 2008 recession. With all other factors held equal, the proportion of households with high mortgage DSRs would double, to a level last seen in 2007 (**Chart A.30**).

House prices have been rising relative to incomes in recent years…

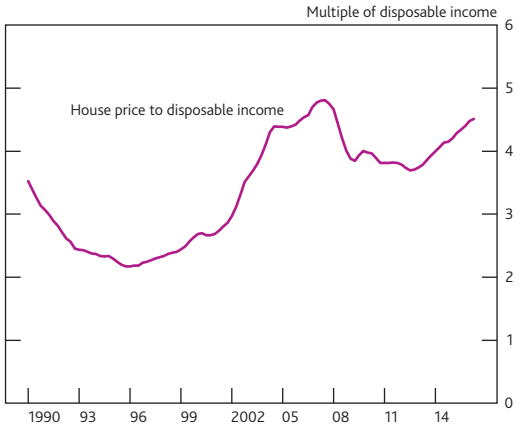
House prices have been rising in recent years. Average UK house prices were 4.5 times average incomes in 2016 Q2, which is high by historical standards (**Chart A.31**). Rising house prices reflect a range of factors, including household income and, importantly, the supply of housing. In the years following the crisis, a persistent gap has opened between the number of new homes being constructed and the natural growth in demand. In the years 2010–15, construction began on an average of 150,000 houses per year in the United Kingdom, while the average annual increase in the number of households was over 230,000.

…highlighting the importance of mortgage underwriting standards…

Macroprudential policy cannot address underlying structural issues related to the supply of housing. But as house prices rise, it is important that mortgage underwriting standards do not slip and contribute unduly to higher levels of household indebtedness. Policy measures that target the flow of new lending guard against this, including the FPC's 2014

Chart A.31 House prices have risen relative to incomes

UK house price to income ratio[a]

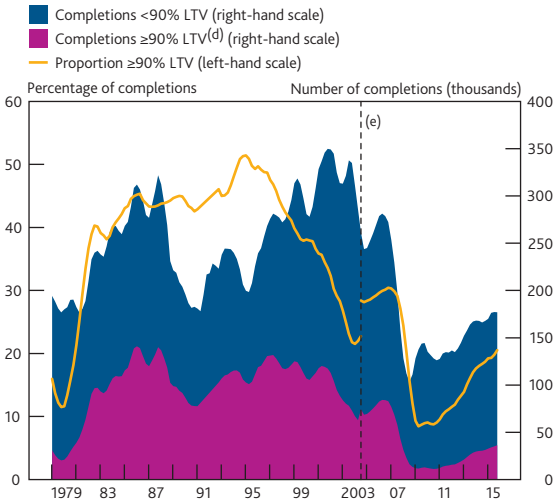


Sources: Department for Communities and Local Government, Halifax/Markit, Nationwide, ONS and Bank calculations.

(a) The ratio is calculated using a four quarter moving average of gross disposable income of the UK household and non-profit sector per household as the denominator. Aggregate household disposable income is adjusted for FISIM and changes in pension entitlements. Historical UK household population estimated using annual GB data assuming linear growth in the Northern Ireland household population between available data points.

Chart A.32 High-LTV lending has increased from post-crisis lows

Total volume and proportion of new mortgages for house purchase extended at LTVs of 90% or greater[a][b][c]



Sources: Council of Mortgage Lenders (CML), FCA Product Sales Database (PSD) and Bank calculations.

(a) Data are shown as a four-quarter moving average.
(b) Data include loans to first-time buyers, council/registered social tenants exercising their right to buy and home movers.
(c) The PSD includes regulated mortgage contracts only.
(d) The number of completions for house purchase ≥90% LTV is calculated using the aggregate number of mortgage completions for house purchase from the CML and the proportion of completions for house purchase ≥90% LTV from the PSD.
(e) Data from the FCA's PSD are only available since 2005 Q2. Data from 1993 to 2005 are from the Survey of Mortgage Lenders, which was operated by the CML, and earlier data are from the 5% Sample Survey of Building Society Mortgages. The data sources are not directly comparable: the PSD covers all regulated mortgage lending whereas the earlier data are a sample of the mortgage market. Data for the first three quarters of 1992 are missing, chart values are interpolated for this period.

Recommendations on owner-occupier mortgage underwriting standards. These have helped guard against the risk of an increase in lending at high loan to income multiples (see The FPC's review of its 2014 mortgage market Recommendations chapter).

Mortgagors with high loan to value (LTV) ratios are another potential source of vulnerability in the household sector. While high LTV mortgages may be appropriate in some cases, these borrowers are more likely to experience negative equity in the event of a fall in house prices. This can threaten the resilience of lenders, as the value of the housing collateral will not be sufficient to cover the mortgage loan in the event of a default. It can also prevent households from borrowing against their homes to mitigate the negative impact of income shocks on their expenditures. Evidence from the United States, for example, suggests that households with high LTV mortgages cut their consumption by more than other households during the crisis.(1)

The provision of high LTV lending has increased from its post-crisis lows, though both the proportion and total volume of high LTV lending remains lower than at any point between 1982 and 2008 (**Chart A.32**). At the same time, LTV ratios for outstanding loans have fallen as a result of house price growth and mortgagors repaying existing debt. As a result, only 3% of mortgagors had an LTV above 90% at end-2015.

In September, HM Treasury announced that the Help to Buy: mortgage guarantee scheme would close at the end of 2016, as planned. The FPC had previously judged that the scheme had not posed material risks to financial stability over the previous three years and that, in current market conditions, its closure would be unlikely to affect significantly the provision of mortgage finance.(2)

…and the resilience of lenders to a downturn in the market.

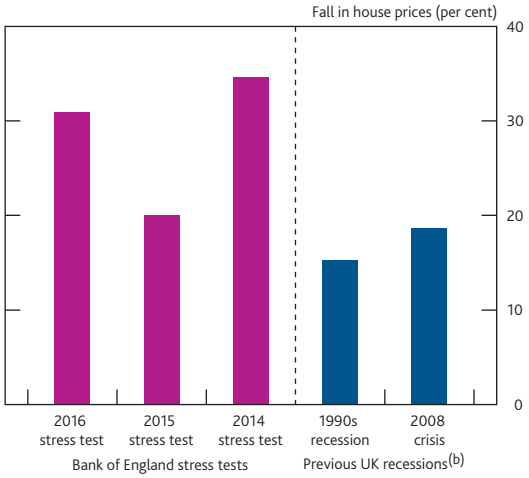
The housing market has softened in recent months, though it has performed more strongly than some indicators had suggested in July and August. This softening in part reflects increases in stamp duty land tax for additional properties in April, which created an incentive for transactions to be moved forward to the start of the year. Three-month on three-month annualised house price growth slowed from a peak of 9% in February to 2.8% in October.

Looking ahead, the majority of respondents to the October RICS survey of chartered surveyors, and the September NMG survey of households, continue to expect increases in house prices, albeit at a weaker rate than in previous years. But the outlook for the housing market is highly uncertain.

(1) Mian, A and Sufi, A (2014), *House of debt*, The University of Chicago Press.
(2) For more details, see the September 2016 letter from the Governor to the Chancellor on Help to Buy, available at www.bankofengland.co.uk/financialstability/Documents/fpc/letters/governorletter160922.pdf.

Chart A.33 Bank of England stress tests have included severe house price falls

Peak-to-trough falls in nominal house prices in Bank of England stress-test scenarios and previous UK recessions(a)

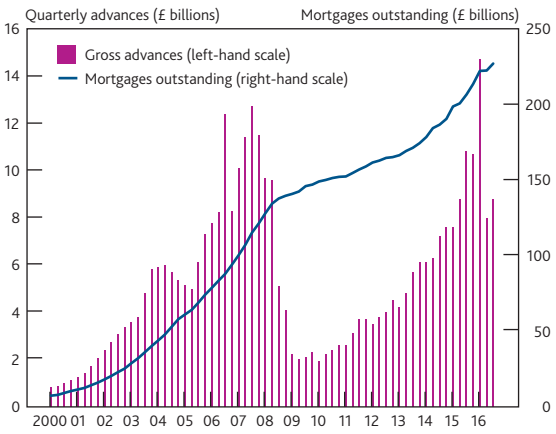


Sources: Halifax/Markit House Price Index, Nationwide and Bank calculations.

(a) The UK residential property price index used to calculate peak to trough falls in each scenario is a quarterly average of Halifax and Nationwide property price indices (seasonally adjusted).
(b) '1990s recession' covers the period 1989 Q3 – 1992 Q4. '2008 crisis' covers the period 2007 Q3 – 2009 Q2.

Chart A.34 Buy-to-let lending has expanded since the early 2000s

Buy-to-let mortgage lending 2000–16: gross advances and total outstanding mortgages(a)



Source: Council of Mortgage Lenders.

(a) Not seasonally adjusted.

The resilience of the banking sector to severe house price falls has been assessed in successive stress tests of UK banks, which included greater price falls than those experienced in either the financial crisis or the recession of the early 1990s (**Chart A.33**).

The FPC continues to monitor behaviour in the buy-to-let sector.

The buy-to-let sector has expanded steadily over the past fifteen years, with the stock of outstanding buy-to-let mortgages growing from less than £10 billion in 2000 to over £220 billion in 2016 Q3 (**Chart A.34**). While buy-to-let transactions have slowed in recent months, there is no evidence of a widespread sell-off by investors associated with the softening of the market. The number of buy-to-let properties listed for sale since the referendum is in line with levels seen earlier in 2016 and in 2015.

In September 2016, the PRA published a Supervisory Statement setting out its expectations for underwriting standards for buy-to-let mortgage contracts. On 16 November 2016, HM Treasury laid legislation before Parliament to grant the FPC powers of Direction over buy-to-let mortgage lending. The FPC subsequently published a draft Policy Statement setting out how it would use these powers (see Annex 1).

The FPC's assessment is consistent with the identification of risks by international bodies.

The European Systemic Risk Board (ESRB) recently concluded an assessment of housing market vulnerabilities across the European Union. As part of this process, the ESRB issued warnings to eight Member States of the European Union, including the United Kingdom. The risk channels identified by the ESRB are consistent with those previously identified by the FPC. The International Monetary Fund (IMF) also identified financial stability risks from UK household indebtedness as part of its 2016 Financial Sector Assessment Programme for the United Kingdom.

Both the ESRB and IMF acknowledged that the FPC has taken action to mitigate risks from household indebtedness, and concluded that the UK authorities should continue to monitor developments closely and be prepared to adjust macroprudential policy as necessary.

Following a review, the FPC has agreed to maintain the Recommendations it made in June 2014 to insure against the risk of a marked loosening in underwriting standards in the owner-occupier mortgage market and a significant increase in the number of highly indebted households (see the FPC's review of its 2014 mortgage market Recommendations chapter).

The FPC's review of its 2014 mortgage market Recommendations

In June 2014, the Financial Policy Committee (FPC) put in place a package of policy measures to insure against the risk of a marked loosening in underwriting standards in the owner-occupier mortgage market and a significant increase in the number of highly indebted households.

Excessive household debt has the potential to threaten financial stability. Highly indebted borrowers are more likely to face difficulties repaying their mortgages, threatening the resilience of lenders. And they are more likely to cut back spending sharply in response to adverse shocks, amplifying any downturn in economic activity.

The policy package introduced in 2014 consisted of two FPC Recommendations:

- **Loan to income (LTI) flow limit:** The Prudential Regulation Authority (PRA) and the Financial Conduct Authority (FCA) should ensure that mortgage lenders do not extend more than 15% of their total number of new residential mortgages at loan to income ratios at or greater than 4.5.

- **Affordability test:** When assessing affordability, mortgage lenders should apply an interest rate stress test that assesses whether borrowers could still afford their mortgages if, at any point over the first five years of the loan, Bank Rate were to be 3 percentage points higher than the prevailing rate at origination.(1)

The FPC reviews these Recommendations on a regular basis to assess whether they remain appropriate.(2)

In concluding its 2016 review, the FPC has agreed to maintain both Recommendations at their current calibration.

The following judgements underpin this decision:

- **The FPC judges that the calibration of the affordability test remains proportionate. The market-implied path for Bank Rate has fallen since 2014. But the FPC judges that, given the long-term nature of mortgage contracts, it would be imprudent to rely too heavily on potentially volatile market-implied measures of future interest rates. In addition, the current calibration of the affordability test strengthens resilience in the face of adverse income and unemployment shocks.**

- **Both Recommendations continue to provide insurance against a future deterioration in underwriting standards. The FPC assesses that the Recommendations have had only a modest effect on mortgage lending to date.**

- **In the event that the Recommendations were to become binding in the future, they would strengthen resilience, without incurring substantial economic costs.**

The FPC has further decided to conduct a review of its overall strategy for setting policy to guard against risks stemming from the mortgage market in 2017.

In parallel to the FPC's 2016 review, the PRA and the FCA have been reviewing the implementation of the LTI flow limit. Overall, their assessment is that implementation has not raised significant operational challenges for lenders, but the current fixed quarterly nature of the LTI flow limit could make it harder for some firms to manage their business pipeline. The PRA and the FCA are therefore consulting on moving to a four-quarter rolling limit.(3)

Background on the motivation of the policy package

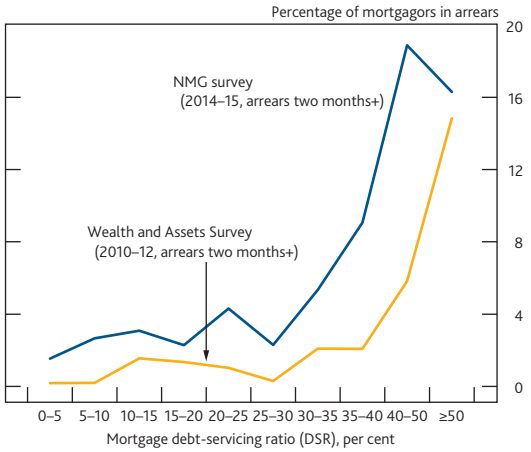
The FPC's Recommendations were introduced in 2014 to insure against a marked loosening in lenders' underwriting standards and a significant increase in the number of highly indebted households.

The FPC has outlined two channels through which highly indebted households can threaten financial stability: a direct channel, which stems from the risk that mortgage losses could pose to lender resilience; and an indirect channel, which arises from the impact highly indebted households can have on wider economic activity.

Mortgages are the largest loan exposure on the UK banking sector's domestic balance sheet, accounting for around two thirds of major UK banks' loans to UK borrowers. Poorly performing mortgages can threaten lender resilience. And empirical evidence suggests that the share of mortgagors experiencing repayment difficulties can rise sharply as the

(1) The affordability test Recommendation builds on existing FCA rules, which require lenders to have regard to future interest rate rises (see FCA rule MCOB 11.6.18).
(2) The FPC has a statutory obligation to review its Recommendations at regular intervals and to assess whether they ought to be withdrawn.
(3) *PRA Consultation Paper CP44/16*, 'Amendments to the PRA's rules on loan to income ratios in mortgage lending'; www.bankofengland.co.uk/pra/Pages/publications/cp/2016/cp4416.aspx.

Chart A Mortgage debt-servicing ratios and arrears[a]



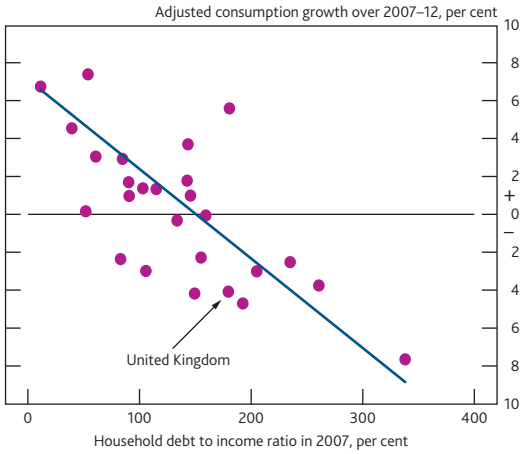
Sources: NMG Consulting survey, Wealth and Asset Survey and Bank calculations.

(a) The share of mortgagors who have been in arrears for at least two months. The mortgage debt-servicing ratio (DSR) is calculated as total mortgage payments (including principal repayments) as a percentage of pre-tax income. Calculation excludes those whose DSR exceeds 100%. Reported repayments may not account for endowment mortgage premia.

share of income spent on servicing mortgage debt increases beyond a certain level — as evidenced in their mortgage debt-servicing ratios (DSRs) (**Chart A**).

Mortgages are also the largest liability on the balance sheet of the UK household sector, accounting for around three quarters of total UK household debt. In the event of a fall in incomes or an increase in interest rates, a highly indebted household sector may cut back sharply on spending in order to keep servicing its mortgage debt. This could amplify any downturn in economic activity. Indeed, cross-country evidence shows that, during the recent crisis, countries which initially had higher levels of household debt relative to income saw larger falls in aggregate consumption (**Chart B**).

Chart B Household debt and consumption growth over 2007–12[a]

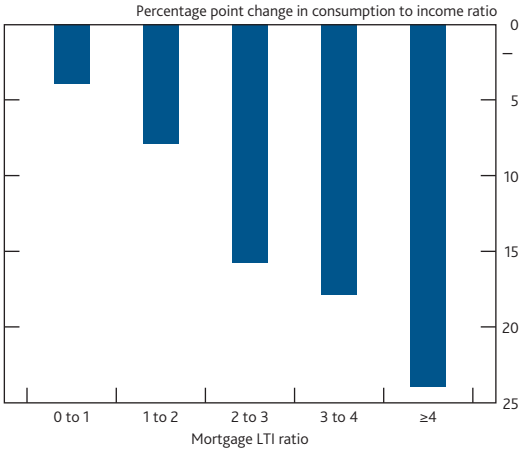


Sources: Flodén (2014) and OECD National Accounts.

(a) Change in consumption is adjusted for the pre-crisis change in total debt, the level of total debt and the current account balance. See Flodén, M (2014), 'Did household debt matter in the Great Recession?' available at http://martinfloden.net/files/hhdebt_supplement_2014.pdf.

Analysis of household-level data also suggests that individual households with larger mortgage debt relative to income adjust spending more sharply in response to shocks. For example, data from the Living Costs and Food Survey show that, during the recent crisis, the fall in the consumption to income ratio among UK households with LTI ratios above 4 was around three times larger than the fall for those with LTI ratios between 1 and 2 (**Chart C**). Econometric studies of UK, Danish and Norwegian data confirm these results, even after controlling for other household characteristics (**Table 1**).

Chart C Change in consumption relative to income among mortgagors with different LTI ratios between 2007 and 2009[a][b][c]



Sources: Living Costs and Food (LCF) Survey, ONS and Bank calculations.

(a) Change in average non-housing consumption as a share of average post-tax income (net of mortgage interest payments) among households in each mortgage loan to income category between 2007 and 2009.
(b) LCF survey data scaled to match National Accounts aggregates (excluding imputed rental income, income received by pension funds on behalf of households and FISIM). Loan to income ratio is calculated using secured debt only as a proportion of gross income.
(c) Repeat cross-section methodology used, with no controls for other factors, or how households may have moved between LTI categories between 2007 and 2009.

Table 1 Cuts in consumption between 2007 and 2009 among mortgagors with different LTI ratios

LTI ratio	United Kingdom[a] (per cent)	Denmark[b][c] (percentage points)	Norway[b][d] (percentage points)
0 to 1	-1.4	1.2	1.9
1 to 2	-4.2	1.9	-6.3
2 to 3	-7.0	1.0	-11.5
3 to 4	-9.8	-2.3	-21.3
4 to 5	-12.6	-5.8	-28.9
5 to 6	n.a.	-7.9	n.a.

Sources: Andersen *et al* (2014), Bunn and Rostom (2015), Fagereng and Halvorsen (2016) and Bank calculations.

(a) Predicted change in non-housing consumption between 2006/07 and 2009/10 associated with loan to income ratio in 2006/07. Loan to income calculated using mortgage debt only. Estimated using a synthetic panel approach with a range of control variables. See Table 2 in Bunn, P, and Rostom, M (2015), 'Household debt and spending in the United Kingdom', *Bank of England Staff Working Paper No. 554*; www.bankofengland.co.uk/research/Documents/workingpapers/2015/swp554.pdf.
(b) Average predicted change in consumption between 2007 and 2009 as a share of income in 2007 for households. Loan to income calculated using total mortgagor debt, including unsecured loans. Estimated using econometric analysis of household-level administrative data featuring a range of control variables.
(c) See Chart 4 in Andersen, A L, Duus, C and Jensen, T L (2014), 'Household debt and consumption during the financial crisis: evidence from Danish micro data', Danmarks NationalBank Working Paper No. 89.
(d) See Fagereng, F and Halvorsen, E (2016), 'Debt and household consumption responses', *Norges Bank Staff Memo No. 1*. Figures provided by author to allow comparison with Andersen *et al* (2014) paper.

How the two Recommendations work together

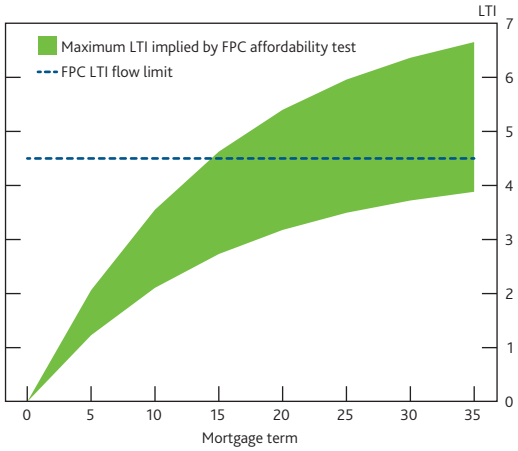
The LTI flow limit and affordability test are complementary measures. They are applied in different ways, but they both work by constraining the amount that prospective mortgagors can borrow relative to their incomes. Both measures guard against a deterioration in underwriting standards, including by ensuring that risk-taking behaviour by a small number of lenders does not drive down overall market standards over time.

The LTI flow limit is a simple measure — the LTI ratio depends only on loan value and gross income. The affordability test is more complex. When assessing affordability, FCA rules require lenders to take into account a range of factors specific to each borrower, including mortgage term, spending and credit commitments.

By constraining the amount that can be borrowed, the affordability test effectively sets an LTI cap for each individual borrower. For example, a borrower who can dedicate up to 35% of their gross income to mortgage repayments (once other commitments have been taken into account), is seeking a 35-year mortgage, and applies to a lender that uses a stress interest rate of 7%, could borrow up to 4.5 times their income.

The relationship between the effective LTI cap implied by the affordability test and mortgage term is illustrated by **Chart D**. The swathe reflects how the share of income available for mortgage repayments can vary, depending on borrower-specific circumstances and the precise approach used by lenders. The bottom edge of the swathe is associated with 30% of income being available to support repayments, while the top edge is associated with 50%.

Chart D Relationship between the affordability test and the LTI flow limit in constraining lending[a][b]



Source: Bank of England.

(a) Swathe for affordability test assumes borrowers have 30% to 50% of gross income available to support mortgage repayments, and lenders assess affordability at stress interest rates of 6.75% to 7%. A majority of loans completed in 2016 Q3 were affordability tested at a stress interest rate of 7%.
(b) The FPC flow limit restricts the share of new mortgages at LTIs of 4.5 or greater to 15%.

Chart D shows that, for borrowers seeking a relatively short mortgage term, the affordability test effectively places a lower cap on LTIs than the threshold implied by the LTI flow limit. This is because, at short terms, a given loan amount will have higher debt-servicing costs due to high capital repayments. **Chart D** also shows how the LTI flow limit can serve as a simple backstop against the more complex affordability test: the LTI flow limit would be more likely to bind if mortgage terms increased, or if lenders loosened the standards with which they assess affordability.

Impact of the Recommendations so far

Both Recommendations continue to provide insurance against a future deterioration in underwriting standards. The FPC assesses that the Recommendations have had only a modest effect on mortgage lending to date.

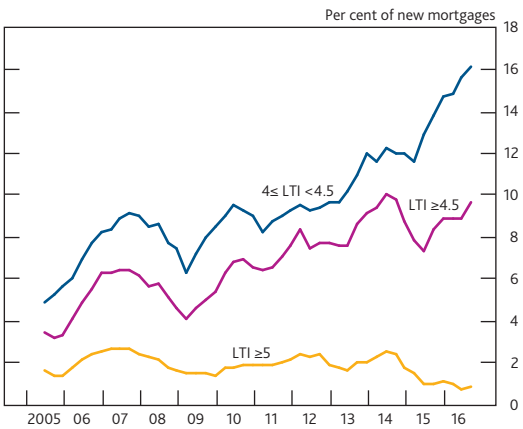
When introduced, the FPC's Recommendations were not expected to have a material impact on mortgage lending or housing transactions in the near term. Most lenders were already adhering to the standards set by the FPC. Instead, the Recommendations were intended to provide insurance against the possibility of a marked loosening of underwriting standards and a significant increase in the number of highly indebted households.

Consistent with that, the FPC's assessment is that its Recommendations have not been excluding a significant number of prospective mortgagors from the market and their effect on loan size has been modest.

LTI flow limit

In aggregate, the flow of mortgages with an LTI above 4.5 has never been close to the 15% limit, and is currently around 10% (**Chart E**). In part, this is because lenders tend to manage their business pipeline in response to the FPC's 15% flow limit by applying lower internal limits. So it is unlikely that the

Chart E Flow of new mortgages by LTI[a]



Sources: FCA Product Sales Database and Bank calculations.

(a) FCA Product Sales Database includes regulated mortgage contracts only. Loan to income ratio calculated as loan value divided by the total reported gross income for all named borrowers. Chart excludes lifetime mortgages, advances for business purposes and remortgages with no change in the amount borrowed.

aggregate share of lending at LTIs above 4.5 would actually reach 15%. But a majority of lenders are advancing fewer than 10% of new loans at LTIs above 4.5. So there remains headroom for further high-LTI lending in aggregate.

One feature of recent lending has been a 'bunching' of loans just below the FPC's 4.5 LTI limit. In part, this is likely to represent some individuals being constrained to smaller loans than they would have otherwise obtained. Bank staff estimate the size of this impact to be small in aggregate: if the share of borrowers with an LTI between 4 and 4.5 were to return to its level before the FPC Recommendations were made, and all additional borrowers entering this category were to obtain an LTI of 5 instead, the value of total mortgage lending would increase by less than 1%.

Affordability test

The impact of the FPC's affordability test is more difficult to assess because the total number of prospective borrowers who fail is not directly observable. Nevertheless, the FPC assesses that the Recommendation has not been excluding a significant number of borrowers for four reasons.

First, data from mortgage intermediaries suggest that the proportion of mortgage applications being rejected has not changed materially since the introduction of the FPC Recommendations in 2014.

Second, information received from a small number of lenders does not suggest that the calibration of the affordability test is resulting in a material proportion of mortgage enquiries being rejected, even prior to the formal application stage.

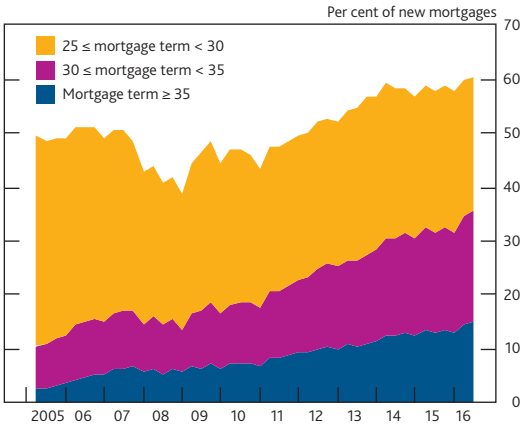
Third, there has not been an unusual pickup in mortgage tenor since the policy was introduced. Were the affordability test to be excluding a large number of prospective mortgagors, borrowers could, in principle, seek to pass the test by lengthening mortgage tenor, which lowers monthly repayments. There has been a long-run trend towards longer mortgage terms since the crisis but no acceleration in that trend since the introduction of the affordability test (**Chart F**).

And fourth, first-time buyers, who might have been expected to be most affected by any measure that restricts loan size relative to income, have maintained their share of total mortgage lending at just over a third since 2014.

Do the Recommendations remain proportionate?

The FPC's 2016 review considered both the LTI flow limit and the affordability test, as set out in this chapter. An important element of this review was the calibration of the affordability test, given the substantial change in the path of Bank Rate implied by market prices since the Recommendation was introduced. In June 2014, financial market prices implied a central expectation that Bank Rate would rise by around

Chart F Share of new mortgages with long terms[a]



Sources: FCA Product Sales Database and Bank calculations.

(a) FCA Product Sales Database includes regulated mortgage contracts only. Chart excludes lifetime mortgages, advances for business purposes and remortgages with no change in the amount borrowed.

225 basis points over five years. This compares to market expectations of a rise in Bank Rate of 75 basis points over five years on average in November 2016.

The FPC assesses that the calibration of the affordability test remains proportionate. This reflects two judgements. First, given the long-term nature of mortgage contracts, it would be imprudent to rely too heavily on potentially volatile market-implied measures of future interest rates. And second, the current calibration of the affordability test strengthens resilience in the face of adverse income and unemployment shocks.

Market expectations of future interest rates at longer horizons can adjust materially in light of economic news. Measures of long-term, trend interest rates — although very uncertain — are potentially more relevant. As set out in the November 2016 *Inflation Report*, these are determined by the balance between saving and investment preferences, which are likely to evolve slowly over time. The 300 basis points interest rate stress test is consistent with interest rates increasing only a little above some estimates of global, long-term, trend interest rates.(1)

Although the affordability test is specified using an interest rate stress, it can also be viewed more generally as constraining the amount that households can borrow relative to their current income. In doing so, it introduces a general 'safety margin' between current incomes and mortgage repayments. So, as well as ensuring that the household sector in aggregate can avoid loan repayment difficulties if interest

(1) For example, Rachel and Smith (2015), estimate that the global neutral real rate might settle at or slightly below 1% in the long to medium run. Given an inflation target of 2%, this would imply nominal interest rates of around 3%. See Rachel, L and Smith, T D (2015), 'Secular drivers of the global real interest rate', *Bank of England Staff Working Paper No. 571*; www.bankofengland.co.uk/research/Documents/workingpapers/2015/swp571.pdf.

rates were to rise, this safety margin also ensures that the household sector is better able to withstand fluctuations in growth, income and employment.

Analysis by Bank staff suggests that the margin of safety created by assessing affordability against a 300 basis point rise in Bank Rate also affords protection for the household sector to a downturn associated with a 2–3 percentage point rise in unemployment. Specifically:

- The proportion of households that would have a DSR greater than 40% in the face of an interest rate shock of 300 basis points is broadly equivalent to the proportion of households that would have a DSR greater than 40% in the face of an unemployment shock of around 3%.

- Empirical relationships between aggregate arrears and macroeconomic variables suggest that the proportion of households that would be in arrears if interest rates were to rise by 300 basis points is broadly equivalent to the proportion of households that would be in arrears if unemployment increased by just under 2%.

How valuable is the resilience to shocks?

The FPC judges that, in the event that the Recommendations were to become binding in the future, they would meaningfully strengthen resilience, without incurring substantial economic costs.

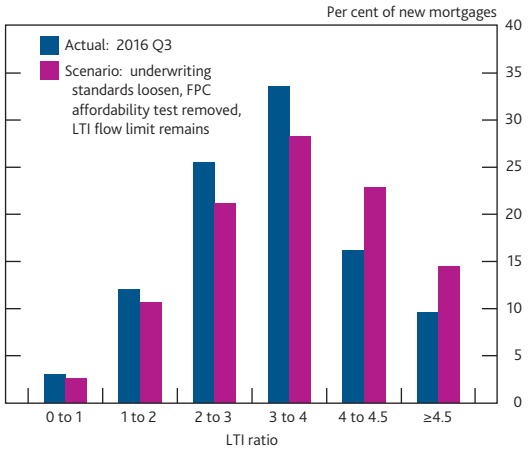
To assess how its Recommendations strengthen resilience, the FPC has considered a scenario whereby lenders' underwriting standards are assumed to loosen materially, so that the current calibration of the Recommendations both excludes a significant number of prospective mortgagors and restricts the loan size of those obtaining a mortgage.

In this scenario, if the FPC's affordability test were to be removed, mortgage approvals would increase by around 7% and the value of new mortgage lending by around 16%. Further increases in mortgage lending would be constrained by the LTI flow limit, which is assumed to remain in place for the purposes of this scenario.

These assumptions result in the distribution of new mortgage lending shifting materially towards higher loan to income ratios. The share of new mortgages extended at an LTI multiple over four would increase from just under a quarter, to over 35% (**Chart G**). Over time, this would lead to a significant deterioration in the distribution of the stock of household debt.

This could materially reduce the resilience of household spending to adverse shocks. There are significant uncertainties in quantitatively mapping the impact of the distribution of debt on the volatility of consumption. But based on estimates

Chart G LTI distribution of flow of new mortgage lending[a][b]



Sources: FCA Product Sales Database and Bank calculations.

(a) See footnotes on **Chart E** for a description of how data for 2016 Q3 are calculated.
(b) Magenta bars show the distribution of the mortgage loan to income ratio distribution for the flow of new mortgage lending under the scenario where lenders' underwriting standards are loosen, the FPC affordability test Recommendation is removed, but the LTI flow limit is retained. In this scenario, approvals are 7% higher and it is assumed that 50% of borrowers also take out a larger loan. As a consequence the total value of lending is around 16% higher.

in **Table 1**, the responsiveness of consumption to adverse shocks in this scenario could be up to 20% higher without the FPC's affordability test in place. In addition, a scenario where lenders loosen underwriting standards and the FPC's affordability test is removed would lead to higher mortgage arrears. These impacts could be even bigger if the LTI flow limit was also removed.

The macroeconomic costs of the FPC's Recommendations arise only if lenders loosen underwriting standards to such an extent that the measures become binding. If underwriting standards do not loosen, the Recommendations do not impose an independent cost.

The costs would arise from tighter-than-otherwise credit constraints facing some households, which in turn could affect economic activity, at least in the short term. The Bank has previously published quantitative estimates of the impact of different FPC housing tools on short-run GDP.[1] Using a similar methodology, Bank staff estimate that removing the FPC affordability test in the above scenario would increase the level of nominal GDP by only 0.1% in three years' time.

However, the Committee considers it unlikely that a restriction on household credit supply would have a material effect on the longer-term level or growth rate of the economy's productive capacity. So any costs would be temporary, while the resilience benefits of reduced macroeconomic volatility in response to shocks would persist over the long term.

(1) Bank of England (2015), 'The Financial Policy Committee's powers over housing tools', A Policy Statement; www.bankofengland.co.uk/financialstability/Documents/fpc/policystatement010715.pdf.

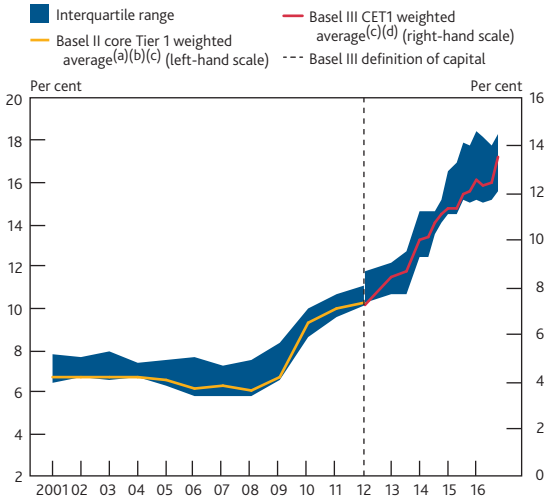
Banking sector resilience

The resilience of the UK banking sector is grounded on substantial capital and liquidity positions. The aggregate common equity Tier 1 capital of major UK banks was 13.5% of risk-weighted assets in September 2016. The aggregate leverage ratio was 4.7%. As a consequence of the 2016 annual stress test, the UK banking sector is, in aggregate, capitalised to support the real economy in a severe global and domestic stress. This resilience is reflected in banks' funding costs.

Some major UK banks continue to face the challenge of weak profitability, which is reflected in market valuations of their equity. While net interest margins are stable, major UK banks continue to face a range of headwinds including redress for past misconduct and weak investment banking returns. Changes to financial firms' business models and structures as the United Kingdom withdraws from the European Union could have implications for the resilience of the financial system in the United Kingdom and more broadly. A prolonged period of low returns could harm banks' ability to absorb the impact of future shocks through retained earnings and threaten the resilience of the provision of financial services to the real economy, a risk that will be assessed in the 2017 exploratory scenario.

Chart B.1 UK banks have built their capital resilience over time

Major UK banks' capital ratios



Sources: PRA regulatory returns, published accounts and Bank calculations.

(a) Major UK banks' core Tier 1 capital as a percentage of their risk-weighted assets. Major UK banks are Banco Santander, Bank of Ireland, Barclays, Co-operative Banking Group, HSBC, LBG, National Australia Bank, Nationwide, RBS and Virgin Money. Data exclude Northern Rock/Virgin Money from 2008.
(b) Between 2008 and 2011, the chart shows core Tier 1 ratios as published by banks, excluding hybrid capital instruments and making deductions from capital based on FSA definitions. Prior to 2008 that measure was not typically disclosed; the chart shows Bank calculations approximating it as previously published in the *Report*.
(c) Weighted by risk-weighted assets.
(d) From 2012, the 'Basel III common equity Tier 1 capital ratio' is calculated as CET1 capital over risk-weighted assets, according to the CRD IV definition as implemented in the United Kingdom. The Basel III peer group includes Barclays, Co-operative Banking Group, HSBC, LBG, Nationwide, RBS and Santander UK.

UK banks' capital positions remain strong…

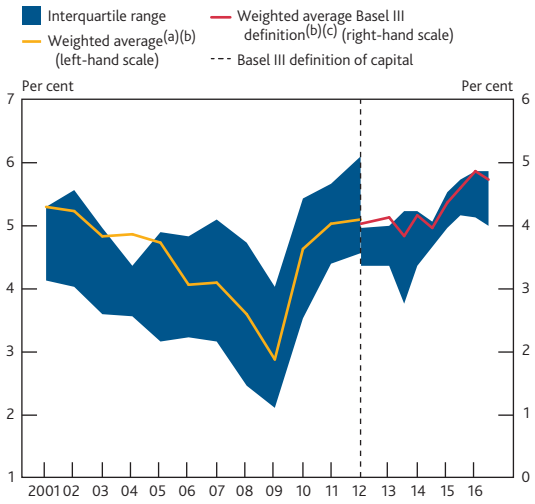
UK banks have built up capital resources since the global financial crisis. In September 2016, the aggregate common equity Tier 1 (CET1) ratio of major UK banks was 13.5% of risk-weighted assets (**Chart B.1**), while the Tier 1 capital ratio was 15.2% of risk-weighted assets. These ratios are in line with those levels that the Financial Policy Committee (FPC) has judged appropriate for the UK banking system, in aggregate, given prevailing risk-weight measures.(1)

On a Basel III basis, the major UK banks' aggregate leverage ratio is 4.7% of total exposures, above the current total of minimum requirements and buffers of 3.2% (**Chart B.2**). On 4 August 2016, the FPC announced its decision to exclude central bank reserves from the exposure measure in the UK leverage ratio framework, to ensure that the leverage ratio does not act as a barrier to the effective implementation of policy measures that might lead to an increase in central bank reserves.(2) This exclusion mechanically reduces the nominal amount of capital required to meet the current leverage ratio standard. However, the FPC intends to recalibrate the

(1) For further details on the FPC's judgement on the appropriate level of capital for the banking system; www.bankofengland.co.uk/publications/Documents/fsr/2015/fsrsupp.pdf.
(2) This change was initially made on a temporary basis following an FPC Recommendation. Subject to its 2017 review, the FPC intends to take steps to ensure that the change can be put in place on a permanent basis, including by asking HM Treasury to change the relevant statutory instrument.

Chart B.2 Leverage positions have strengthened since the crisis

Major UK banks' leverage ratios

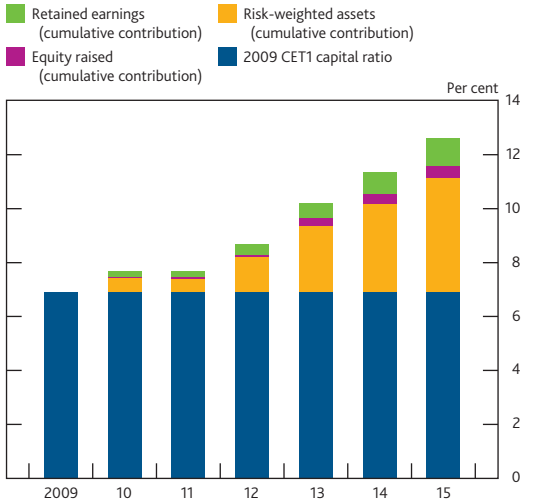


Sources: PRA regulatory returns, published accounts and Bank calculations.

(a) Prior to 2012, data are based on the simple leverage ratio defined as the ratio of shareholders' claims to total assets based on banks' published accounts (note a discontinuity due to introduction of IFRS accounting standards in 2005, which tends to reduce leverage ratios thereafter). The peer group used in **Chart B.1** also applies here.
(b) Weighted by total exposures.
(c) The Basel III leverage ratio corresponds to aggregate peer group Tier 1 capital over aggregate leverage ratio exposure. Up to 2013, Tier 1 capital includes grandfathered capital instruments and the exposure measure is based on the Basel 2010 definition. From 2014 H1, Tier 1 capital excludes grandfathered capital instruments and the exposure measure is based on the Basel 2014 definition. The Basel III peer group used in **Chart B.1** also applies here.

Chart B.3 Most capital building to date has reflected falls in risk-weighted assets

Estimated allocation of changes to UK banks' CET1 ratios due to equity raising, retained earnings and RWA reduction(a)(b)(c)



Sources: PRA regulatory returns, published accounts and Bank calculations.

(a) UK banks' estimated CET1 capital as a percentage of their risk-weighted assets, calculated according to the CRD IV definition as implemented in the United Kingdom. UK banks are Barclays, HSBC, LBG, Nationwide, RBS and Santander UK.
(b) Up to 2013, the chart shows Bank calculations approximating CET1 capital ratios.
(c) From 2014, the chart shows CET1 capital ratios as reported by banks.

standard to offset this impact as part of its planned review of the leverage ratio framework in 2017.

Steady improvements in major UK banks' capital and leverage positions since 2010 largely result from reductions in balance sheet size (**Chart B.3**), including through the sale or closure of non-core businesses, such as investment banking or overseas retail banking subsidiaries. The three largest UK-focused banks reduced their non-core assets by around £250 billion between 2013 and 2015, representing over half of their reduction in total assets over that period. The largest UK banks have also increased their capital by around £31 billion since 2010, through both equity issuance and retained earnings.

The Financial Stability Board (FSB) recently updated its list of global systemically important banks (G-SIBs) using end-2015 data.(1) The exercise will result in the G-SIB end-state regulatory capital buffers for two major UK banks being reduced by 0.5 percentage points.

…as highlighted by the results of the 2016 stress test.

The Bank's 2016 stress test comprised a severe, synchronised UK and global recession with associated shocks to financial market prices. It also incorporated a misconduct redress cost stress. The FPC judges that, as a consequence of the stress test, the UK banking system is in aggregate capitalised to support the real economy in this scenario.

UK banks have further strengthened their liquidity and funding positions.

Major UK banks have continued to strengthen their liquidity and funding positions. Their aggregate Liquidity Coverage Ratio, which measures the ratio of a bank's liquid assets to the net outflows it might face under stressed conditions, was 121% in September 2016. Under proposals from the Basel Committee on Banking Supervision banks will also be subject to a Net Stable Funding Ratio (NSFR) requirement, whereby long-term assets will need to be backed by stable sources of funding. The implementation date for the NSFR requirement in the European Union is still to be confirmed. In aggregate, major UK banks have sufficient stable funding to meet the amount required under the provisional proposals.

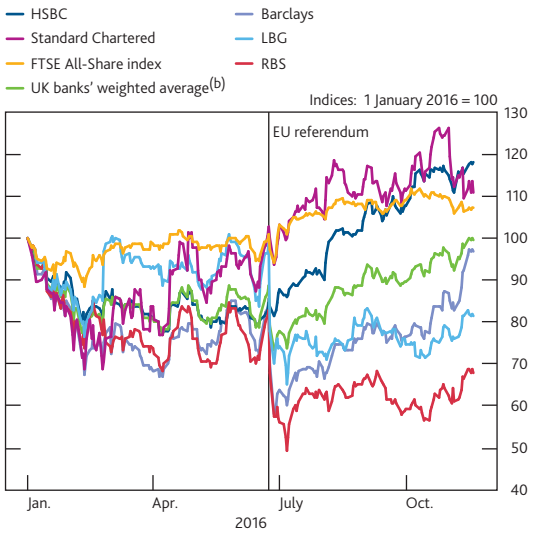
UK-focused banks' share prices remain low…

UK bank equity prices fell sharply following the UK referendum on membership of the European Union, but have since rebounded. On a weighted average basis, bank equity prices are back to their levels at the start of 2016 (**Chart B.4**). However, UK-focused banks have performed worse than internationally focused ones: the three largest UK-focused

(1) Changes in the ranking of banks' systemic importance reflected the combined effects of changes in business activity, data quality improvements and supervisory judgement. The FSB announcement is available at www.fsb.org/wp-content/uploads/2016-list-of-global-systemically-important-banks-G-SIBs.pdf.

Chart B.4 UK-focused banks' share prices remain low

UK bank share prices and FTSE All-Share index since 1 January 2016[a]



Sources: Thomson Reuters Datastream and Bank calculations.

(a) UK banks are Barclays, HSBC, LBG, RBS and Standard Chartered.
(b) Weighted average using market capitalisation.

Table B.1 Price to book ratios are well below pre-crisis levels

Price to book ratios for selected UK banks[a]

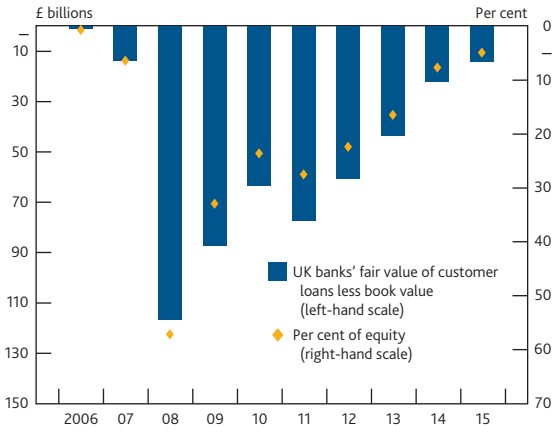
Date	Barclays	HSBC[b]	Lloyds Banking Group	Royal Bank of Scotland	Average
Pre-crisis (1 Jan. 2007)	2.00	1.70	2.66	1.25	1.90
1 Jan. 2016	0.62	0.83	1.12	0.66	0.81
July *Report* (5 July 2016)	0.38	0.64	0.78	0.34	0.53
Latest	0.60	0.82	0.91	0.45	0.70

Source: Thomson Reuters Datastream.

(a) Relates the share price with the book, or accounting, value of shareholders' equity per share.
(b) Adjusted for currency movements.

Chart B.5 Fair value deductions have been falling for UK banks

The difference between the book and fair value of customer loans over time for UK banks[a]



Sources: Published accounts and Bank calculations.

(a) UK banks are Barclays, HSBC, LBG and RBS.

banks' share prices are down 18% on average since the beginning of the year.

UK banks' price to book ratios, which measure the market value of equity relative to the value of equity reported on banks' balance sheets, remain low: the average ratio for the four largest UK banks is 0.7. This measure of bank value is considerably lower than pre-crisis levels (**Table B.1**).

…though asset quality has improved, suggesting investors are instead concerned about long-term profitability.

There is little evidence that low price to book ratios reflect perceptions of weak asset quality. Indicators of the quality of banks' assets have improved in recent years. For example, 'fair value deductions' — which indicate how the book value of banks' equity would be affected if they were required to take account of losses on customer loans not covered in the current accounting framework — have fallen materially for UK banks since the crisis (**Chart B.5**).

Similarly, measures of non-performing loans have improved substantially. UK banks have much lower 'Texas ratios' — the ratio of non-performing loans to total equity capital and loan-loss reserves — than many European counterparts with similar price to book ratios (**Chart B.6**).

Low price to book ratios instead appear to reflect a decline in UK banks' perceived 'franchise value': their ability to generate returns for shareholders over the medium term.

While net interest margins have been maintained…

UK banks' profitability has been persistently weak since the financial crisis. Their average reported return on equity (RoE) was 2% at end-2015, compared to an average of around 18% in 2005–07 (**Chart B.7**).

These falls in RoE have been contained to some extent as banks have maintained their net interest margins (NIMs) throughout a prolonged period of low rates. Falls in deposit rates have broadly offset lower lending rates (**Chart B.8**). Reflecting this, average reported NIMs in 2015 were around 2.3%, similar to their 2007 levels.[1] Margins are expected to remain stable, despite recent falls in interest rates. In August, the Monetary Policy Committee (MPC) announced a further cut in Bank Rate to 0.25%, but this was accompanied by a Term Funding Scheme allowing banks access to funding at rates reflecting the fall in Bank Rate. This was intended to help reinforce the transmission of the reduction in Bank Rate to the real economy to ensure that households and firms benefit from the MPC's actions. As set out in the November

(1) Estimate derived from published accounts for UK banks. The definition of net interest margin used differs by bank and over time, as the calculation is not prescribed under International Financial Reporting Standards.

Chart B.6 UK banks have stronger Texas ratios than other European banks with similar price to book ratios

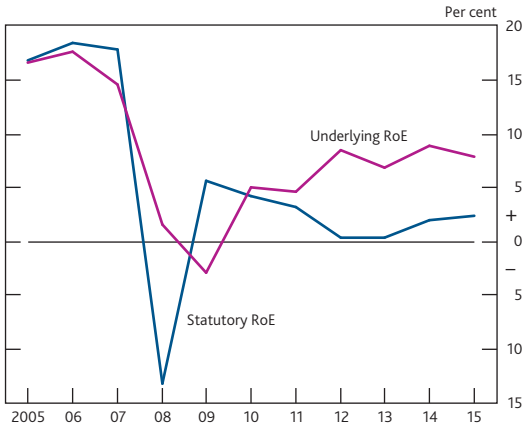
UK and European banks' Texas ratios and price to book ratios[a][b]

Sources: Thomson Reuters Datastream, SNL and Bank calculations.

(a) The Texas ratio is calculated as non-performing loans over CET1 capital and loan loss reserve.
(b) The price to book ratio relates the share price with the book, or accounting, value of shareholders' equity per share.

Chart B.7 UK banks' profitability remains low

UK banks' statutory and underlying return on equity (RoE)[a][b][c]



Sources: Published accounts and Bank calculations.

(a) Weighted average by average shareholders' equity.
(b) Statutory RoE is defined as net income attributable to shareholders divided by average shareholders' equity. Underlying RoE strips out misconduct costs as well as one-time charges such as restructuring costs.
(c) UK banks are Barclays, HSBC, LBG and RBS.

Inflation Report, the cut in Bank Rate has been largely passed through to lower rates on deposits and borrowing.

…concerns about profitability reflect a number of headwinds.

Against this background, investor concerns reflect the fact that UK banks face material headwinds to restoring profitability, including legacy misconduct issues and weak investment banking returns.

Costs related to past misconduct have been a persistent drag on UK banks' profitability. As an illustration, UK banks' 'underlying' RoE, which strips out misconduct costs as well as one-time charges such as restructuring costs, was 8% in 2015, more than double the RoE actually achieved (**Chart B.7**). Major UK banks have paid out around £40 billion in fines and other redress costs since the beginning of 2011, with an additional £18 billion set aside at end-2015 in provisions for future misconduct costs. A substantial proportion of misconduct costs for UK banks has related to the mis-selling of payment protection insurance (PPI). The Financial Conduct Authority has proposed a deadline of June 2019 for PPI mis-selling claims. A number of other misconduct issues are also ongoing in the United Kingdom and abroad. The 2016 stress test includes an aggregate stressed projection for misconduct costs over and above those incurred or provided for at end-2015 of around £40 billion between 2016 and 2020.

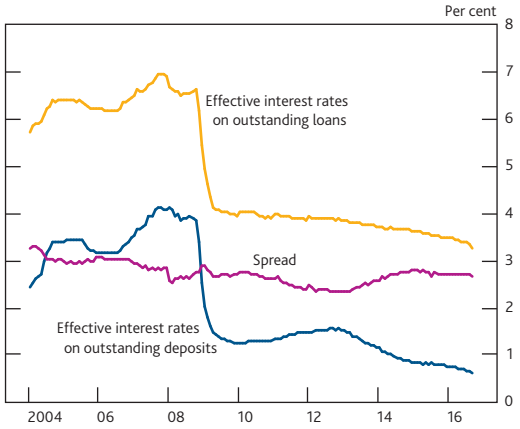
The profitability of the investment banking businesses of UK banks has been weak since the crisis, with estimated average returns below those for UK retail banking (**Chart B.9**). While some of this weakness is likely to be cyclical, structural changes may make improving these businesses' profitability challenging. Certain business lines, such as proprietary trading and some forms of securitisation, have shrunk materially. Demand for some other investment banking services and products, such as complex derivatives, may also have fallen following the crisis.

A prolonged period of low profitability would threaten banks' ability to rebuild capital following future shocks to their balance sheets. As the sale or closure of non-core businesses is completed, UK banks are likely to be increasingly reliant on their ability to retain earnings, or attract equity investment, in order to maintain credit supply in the event that they draw down their capital buffers following a shock. At current levels of profitability and typical dividend payout ratios, it would take the average UK bank over four years to increase its capital ratio by 1 percentage point through retained earnings.

The United Kingdom's withdrawal from the European Union could have further implications for the resilience of the UK financial system more broadly. To the extent that UK-incorporated banks risk losing their current ability to serve

Chart B.8 UK lending and deposit rates have fallen together

Effective rates on outstanding loans and deposits[a][b]

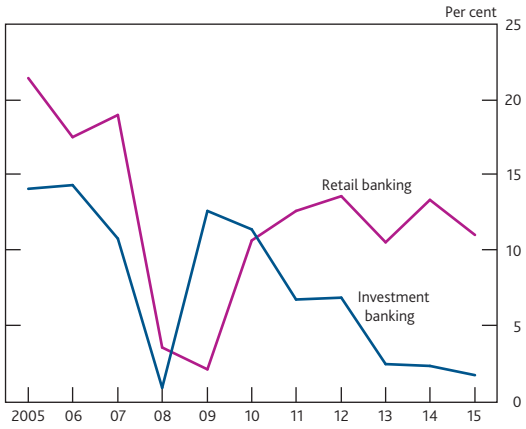


Sources: Bank of England and Bank calculations.

(a) The Bank's effective interest rate series are currently compiled using data from up to 19 UK monetary financial institutions. Data are non seasonally adjusted.
(b) Sterling-only average monthly effective rates on household and private non-financial corporation oustanding balances.

Chart B.9 Investment banking has been less profitable since the crisis

Estimated return on equity for UK banks' retail and investment banking divisions[a][b][c]



Sources: Published accounts and Bank calculations.

(a) Simple average of estimated return on equity by business segment for Barclays, HSBC and RBS. The exact scope of the business segments, and the allocation of income and costs to segments, varies across institutions depending on their public disclosures. In particular, the allocation of misconduct costs to business segments is not consistent across institutions.
(b) Net income for each business segment is estimated by applying the UK corporate tax rate to that segment's reported profits before tax.
(c) Equity is estimated for business segments based on their share of total group risk-weighted assets. This will vary over time reflecting changes to the regulatory regime as well as underlying exposures.

clients based in the European Economic Area (EEA) on a cross-border basis, some restructuring of corporate and investment banking businesses could be required in order to continue to serve those clients. Legal structures may need to be changed, regulatory permissions and authorisations obtained, and internal structures adjusted.

Such changes could raise the costs associated with some activities, posing further challenges to return on equity for corporate and investment banking units. The extent of this will depend on how far additional costs can be passed through to end clients and, where business volumes are cut back, how far costs can be reduced in line with revenues.

In addition, although affected firms are undertaking contingency planning, restructuring could test firms' operational resilience, particularly if there were to be insufficient time to implement changes smoothly once the United Kingdom's new arrangements with the European Union are known. The FPC is continuing to assess the extent of these risks, drawing on supervisory intelligence.

Market indicators support a view that resilience has improved…

Market indicators of low default risk are consistent with regulatory capital measures. Indicators of default risk have fallen since the July *Report*, and remain significantly below levels seen during past periods of market stress. These include funding spreads, which directly reflect the perceived risk of a bank defaulting on its creditors, and CDS premia, which measure the price of insuring against bank default (**Table B.2**).

On a historical comparison, some market indicators of bank risk (such as CDS premia or covered bond spreads) remain at or above their pre-crisis levels. There are two plausible reasons for this, other than suggesting that banks are now more or equally risky.

First, risk was mispriced before the crisis, as market participants paid insufficient regard to the possibility of bank failures, either because there had been a long period of stability, or because the size or riskiness of many exposures were not visible to them. Reforms since the crisis have mandated significant improvements in the transparency of banks' balance sheets.

Second, market participants previously expected systemic institutions to receive state support in stress, in part due to the absence of a credible resolution regime for banks. The development of such a regime since the crisis means that investors can no longer rely on this implicit subsidy and therefore have to internalise some of the cost of default, with consequences for funding costs for these banks.

Table B.2 Market indicators do not suggest concerns about banks' resilience

Selection of market indicators for UK banks[a][b]

	Pre-crisis (1 Jan. 2007)	Global financial crisis	Euro sovereign debt crisis	July *Report*	Latest
Price to book ratio[c]	1.90	0.33	0.43	0.53	0.70
Additional Tier 1[d]	–	–	–	737	660
Senior CDS[e]	5	222	319	134	97
Senior unsecured bonds[f]	–	368	322	96	59
Covered bonds[g]	-24	218	127	11	3

Sources: Bank of England, Bloomberg, Datastream, Markit Group Limited and Bank calculations.

(a) UK banks are Barclays, HSBC, LBG and RBS.
(b) Funding spreads are measured in basis points.
(c) Relates the share price with the book, or accounting, value of shareholders' equity per share. Price to book ratios are adjusted for currency movements.
(d) Simple average of secondary market spreads over government bonds.
(e) Simple average of five-year euro senior CDS premia.
(f) Constant-maturity simple average of secondary market spreads to mid-swaps for five-year euro senior unsecured bonds, or a suitable proxy when unavailable.
(g) Constant-maturity simple average of secondary market spreads to swaps for five-year euro-denominated covered bonds or a suitable proxy.

…and progress on establishing an effective resolution regime has continued, though EU withdrawal may pose challenges.

In the United Kingdom, the Bank published on 8 November its policy approach to determining the minimum amount of loss-absorbing resources that a firm should hold in order to make it resolvable (known as the minimum requirement for own funds and eligible liabilities, or MREL).[1] For a firm that provides essential functions to the economy, MREL is necessary to ensuring that the resolution strategy can maintain the continuity of these services to households and businesses. Such firms will need to raise MREL resources, including through restructuring existing liabilities in order to meet their interim requirements in 2020 and the full requirement that is due to come into force in 2022.

Restructuring of banking businesses in response to a change in the United Kingdom's relationship with the European Union could lead firms to seek to operate more complex business models to serve EEA-based clients. As well as placing greater demands on firms' own risk management and supervisory oversight, this complexity could present challenges to firms' resolvability. While resolution action taken at the top of a banking group can generally avoid the need to address the operational intricacy below it, the scale of these challenges will depend on the extent and precise nature of any changes. The FPC, together with the Prudential Regulation Authority and the Bank, will monitor the evolution of these risks in coming months. The Bank has legal powers to direct firms to address impediments to resolvability, including to ensure operational continuity of critical services in resolution.

Low profitability may pose a risk to resilience in future.

The FPC judges that the UK banking system's capital and liquidity positions would be resilient to a severe near-term stress. However, weak profitability diminishes banks' future ability to rebuild capital following a shock while also maintaining credit supply.

The Bank will run an 'exploratory' scenario alongside the 2017 annual cyclical scenario to consider the impact of weak global supply growth, persistently low interest rates, a continuation of declines in world trade relative to GDP and cross-border banking activity. The focus of the test will be on the implications for banks' business models, the economic impact of any actions they would take to ensure their viability and the implications for their future resilience.

(1) www.bankofengland.co.uk/publications/Pages/news/2016/082.aspx.

Box 1
Results of the 2016 stress test of the UK banking system(1)

Summary
The 2016 stress test, which is the first conducted under the Bank's new approach to stress testing, examined the resilience of the system to a more severe stress than in 2014 and 2015.(2) It also judged banks against the Bank's new hurdle-rate framework, which held systemic firms to a higher standard reflecting the phasing-in of capital buffers for global systemically important banks.

The test incorporated a synchronised UK and global recession with associated shocks to financial market prices, and an independent stress of misconduct costs.

While the Prudential Regulation Authority (PRA) Board judged that some capital inadequacies were revealed for three banks(3) (The Royal Bank of Scotland Group, Barclays and Standard Chartered), these banks now have plans in place to build further resilience. The Financial Policy Committee (FPC) judged that, as a consequence of the stress test, the banking system is in aggregate capitalised to support the real economy in a severe, broad and synchronised stress scenario.

2016 stress-test scenario
The 2016 stress test assessed the resilience of the largest UK banks and building societies (hereafter referred to as 'banks') to a 'tail risk' scenario, the severity of which was based on the risk assessment the FPC and PRA Board made in March 2016.(4)

The 2016 scenario has annual global GDP growth reaching a trough at -1.9%, as it did during the 2008 global financial crisis. The level of UK GDP falls by 4.3%, accompanied by a 4.5 percentage point rise in the unemployment rate. The UK stress is roughly equivalent to that experienced during the financial crisis, albeit with a shallower fall in domestic output and a more severe rise in unemployment and fall in residential property prices.

What does the 2016 stress test tell us about bank resilience?
Performance in the test was assessed against the Bank's hurdle rate framework, comprising elements expressed both in terms of risk-weighted capital and leverage ratios. Importantly, the results of the test inform judgements by the FPC and PRA Board.

The results show that in aggregate the low-point common equity Tier 1 (CET1) capital ratio of 8.8% (8.4% before additional Tier 1 (AT1) conversion) was well above the 6.5% weighted average hurdle rate and 7.3% weighted average systemic reference point. The aggregate Tier 1 leverage ratio falls from 4.9% at the end of 2015 to a low point of 3.9%.

Compared to previous tests, the fall in the aggregate CET1 capital ratio from start to stressed low point was larger in the 2016 stress test, reflecting the greater severity of the stress scenario. Nevertheless, at 8.8%, that low point was well above the 7.6% reached in 2014 and 2015. This strength of banks' aggregate capital position in the 2016 stress reflects improvements in their starting capital positions.

What is driving the results?
Relative to the baseline, by the low point at end-2017 the stress reduces the aggregate CET1 capital ratio by 5.0 percentage points and leverage ratio by 1.4 percentage points. This reflects a range of factors, including:

- Loan impairment charges amount to £63 billion over the first two years of the stress, around £46 billion higher than projected in the baseline.
- Traded risk losses, including the shortfall of investment banking revenue net of costs, reduce bank capital by £20 billion by the end-2017 low point, relative to the baseline projection.
- Net interest income is around £3.5 billion lower in the stress relative to banks' aggregate baseline projection over the first two years of the stress. This reflects lower loan growth in response to weaker demand for credit, as well as tighter spreads between sterling loans and deposits.
- Stressed projections for misconduct costs beyond those provided for at the end of 2015. Around £30 billion of these additional misconduct costs are projected to be realised by the end of 2017.
- A projected 16% rise in aggregate risk-weighted assets in the first two years of the stress.

The impact of the stress is in part mitigated by significant cuts to ordinary dividends with payments modelled to be just £1.6 billion in the first two years of the stress.

The Bank has also modelled the conversion of AT1 instruments into CET1 capital for the three banks whose CET1 ratios fell below 7% in the stress. In aggregate, these conversions increase the CET1 ratio at the low point of the stress by 0.4 percentage points, from 8.4% to 8.8%.

(1) See Bank of England (2016), 'Stress testing the UK banking system: 2016 results'; www.bankofengland.co.uk/publications/Pages/news/2016/stresstesting.aspx.
(2) See Bank of England (2015), 'The Bank of England's approach to stress testing the UK banking system'; www.bankofengland.co.uk/financialstability/Documents/stresstesting/2015/approach.pdf.
(3) The seven participating banks and building societies are Barclays, HSBC, Lloyds Banking Group, Nationwide, The Royal Bank of Scotland Group, Santander UK and Standard Chartered.
(4) See Bank of England (2016), 'Stress testing the UK banking system: key elements of the 2016 stress test'; www.bankofengland.co.uk/financialstability/Documents/stresstesting/2016/keyelements.pdf.

Box 2
Building cyber resilience in the UK financial sector

Cyber and technology-enabled attacks continue to be a serious threat to the resilience of the UK financial system. High-profile incidents in 2016 have raised awareness of the importance for institutions of ensuring that they have appropriate controls and measures in place to counter fraud. This box summarises the important progress that has been made in building cyber resilience in the UK financial sector, following FPC Recommendations.

Cyber attack testing

Important progress has been made by many financial services firms, financial market infrastructures (FMIs) and regulators in building cyber resilience. In response to the FPC's June 2013 cyber Recommendation (which was replaced in June 2015), the UK authorities developed and implemented the CBEST framework (**Table 1**).

Table 1 FPC's cyber Recommendations

In June 2013, the FPC recommended that:
'HM Treasury, working with the relevant government agencies, the PRA, the Bank's financial market infrastructure supervisors and the FCA should work with the core UK financial system and its infrastructure to put in place a programme of work to improve and test resilience to cyber attack.'

In July 2015, the June 2013 Recommendation was replaced with the following Recommendation:
'The FPC recommends that the Bank, the PRA and the FCA work with firms at the core of the UK financial system to ensure that they complete CBEST tests and adopt individual cyber resilience action plans. The Bank, the PRA and the FCA should also establish arrangements for CBEST tests to become one component of regular cyber resilience assessment within the UK financial system.'

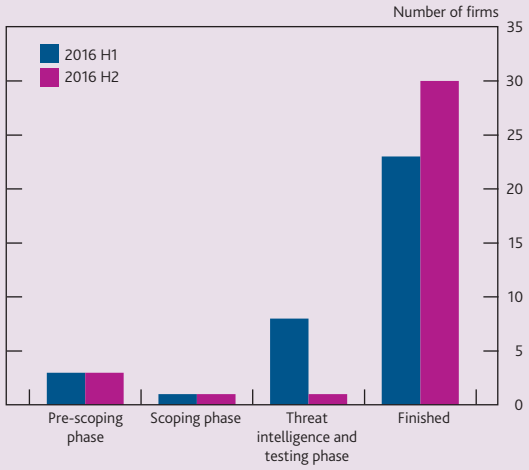
Source: Bank of England.

Under CBEST, firms and FMIs at the core of the UK financial system have been subject to simulated cyber attack, designed specifically for each firm and FMI, drawing on government and private sector intelligence and expertise. The first round of the CBEST vulnerability testing programme is now materially complete (**Chart A**). Thirty out of 35 core firms and FMIs have completed CBEST tests, three times the number at the time of the December 2015 *Report*.

CBEST has shown that financial sector resilience against cyber attack is increasing. Firms and FMIs have improved their resilience and are more alert to risks to critical economic functions. The tests have also highlighted and reinforced some core lessons for resilience to cyber attack. For instance:

- many cyber vulnerabilities can be traced back to weaknesses in basic controls that all organisations should have in place to protect the confidentiality, integrity and availability of systems and information;
- organisations need to invest in their capability to detect and limit the impact of penetration of their external defences to cyber attack, not just in the external defences themselves; and
- mitigation of cyber risk requires both technological solutions and investment in people, business practices and ways of working.

Chart A CBEST vulnerability testing of core firms and FMIs is materially complete
CBEST: current progress



Source: Bank of England.

Where weaknesses in individual firms' and FMIs' resilience have been identified by CBEST testing, remediation plans have been put in place. Where appropriate, these require expedient actions by firms and FMIs. Such firms and FMIs have been subject to close and continual review by the authorities and further tests to validate that remedial actions have been effective. Other components of firms' and FMIs' supervisory action plans have included: in-depth cyber reviews; demonstrations to the authorities of technical controls and processes; improvements to the governance of cyber risk management; and the introduction of processes to ensure firms and FMIs continually develop and improve cyber resilience. Company boards are ultimately accountable for remedying cyber vulnerabilities, for delivery of supervisory action plans and for their organisation's cyber risk management and resilience in general.

The future of cyber testing

Consistent with the FPC's Recommendation that CBEST testing becomes one component of regular cyber resilience assessment, the UK authorities have developed proposals to embed CBEST into the supervisory process.

The future CBEST framework will have three main elements:

- firms will be expected to conduct their own regular testing of cyber resilience;
- firms' own testing and resilience will be subject to regular 'spot checks'; and
- certain critical firms will be subject to regular concurrent cyber resilience testing, using a common 'scenario' or 'threat', set by the financial authorities in conjunction with government agencies, such as the new National Cyber Security Centre (NCSC).

This approach will embed cyber resilience testing as part of firms' and FMIs' general risk management, and will deliver comparable results across subsets of similar firms.

Broadening the assessment of cyber resilience

Cyber testing, such as CBEST, is just one component of the UK authorities' broader programme of work to improve cyber resilience in the financial system, which has been supported by the FPC and is vital given the rapidly evolving nature of cyber threats (**Table 2**). This programme is being pursued both domestically and internationally, given the cross-jurisdictional threat posed by cyber risk.

Table 2 UK authorities' cyber resilience plan: main elements

Firm specific — setting expectations for core firms which underpin the operational functioning of the financial system, with a supervisory toolkit to test firms' progress against these expectations.

Sector wide — taking a whole-of-sector view of cyber resilience and driving the right capabilities throughout the sector to address vulnerabilities and respond to incidents.

Recovery and response — defining the capabilities needed by firms to maintain and recover critical economic functions in the event of a catastrophic data loss or disruption to applications caused by a cyber attack.

International — developing consensus internationally on ways to manage dependencies on cross-border financial systems and working towards common standards.

Source: Bank of England.

The UK authorities plan to develop supervisory assessment of all elements of firms' and FMIs' cyber resilience capabilities. This will include those elements not directly or fully covered by the CBEST framework. The standards will be based on internationally developed guidance on cyber resilience for the financial sector, published by the G7 Cyber Expert Group, which is co-chaired by the Bank. Such an approach will help to ensure that firms' and FMIs' cyber risks will be subject to the same standard of regulatory requirements as prudential risks in future. These cyber resilience standards are consistent with existing guidance published by HM Government.

UK authorities, working with the NCSC, are further simplifying and improving mechanisms for information sharing across the financial sector. A single cross-market operational resilience group has been established. And firms have received guidance from the sector on the reporting of cyber incidents to government agencies and financial authorities.

In response to the recent incident at Tesco Bank, the UK authorities activated a contingency plan, as part of the Authorities' Response Framework, to share intelligence across firms, allowing other institutions to review their own resilience to such threats.

Firms, FMIs and financial authorities continue to improve their incident response capability. Following the UK and US authorities' joint exercise on cyber resilience in 2015,(1) communication protocols to assist firms and governments to respond to cyber incidents have been enhanced. And work is ongoing to improve intelligence and information handling. Reporting mechanisms are now aligned across the US and UK Authorities' Response Frameworks to aid joint communication and response activities. Further actions will be implemented in the coming months.

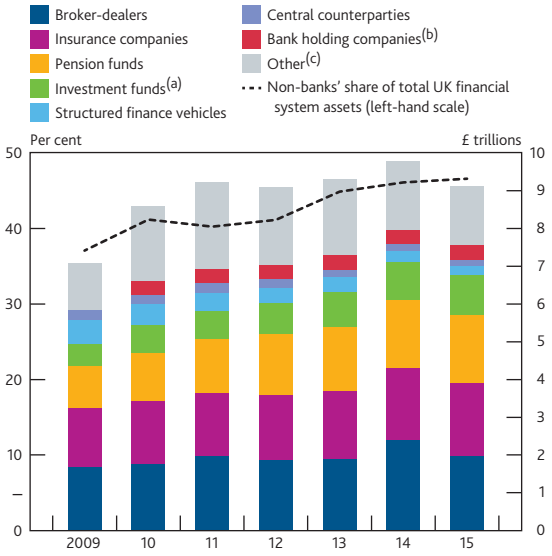
(1) www.bankofengland.co.uk/financialstability/fsc/Documents/statement121115.pdf.

Market-based finance

Market-based finance is an important component of the UK financial system, supporting the provision of financial services to the real economy. The provision of market-based finance relies on the resilience of market liquidity, which remains uneven. Core financial markets have functioned effectively since the July *Report*, though the 'flash event' in the sterling exchange rate underscores the concern that liquidity in some markets may have become more fragile in recent years. Core intermediaries, such as dealers, continue to be resilient. But the willingness of dealers both to extend repo financing and intermediate investment flows has been declining. Market liquidity could be tested by high demand for liquidity services during a stress, including from open-ended investment funds and insurers. It could also be challenged during a period of adjustment related to the United Kingdom's new trading relationship with the European Union.

Chart B.10 Market-based finance is an important component of the UK financial system

UK non-bank financial institutions' balance sheet assets



Sources: AFME, Bank of England, FCA, Morningstar, ONS and Bank calculations.

(a) Includes money market funds.
(b) Bank holding companies data start in 2010.
(c) Other includes real estate investment trusts, finance companies and statistical discrepancies (between bottom-up categories listed — except pension funds and insurance companies — and top-down aggregate ONS data for other financial intermediaries — OFIs). Work is under way at the Bank and ONS to identify further components of this category and to reduce the size of the residual.

Market-based finance is an important component of the UK financial system.

Market-based finance has become increasingly important over the past few years, as a means of providing financial services to the real economy. Non-bank financial institutions represent key sources of market-based finance and account for almost half of the UK financial system's total assets, up by 10 percentage points since 2009 (**Chart B.10**). These institutions provide finance to the real economy, predominantly by investing in capital markets, such as equity and corporate bond markets. Sterling investment-grade issuance by UK companies had fallen off around the UK referendum on membership of the European Union, but has since picked up sharply following the announcement by the Monetary Policy Committee of its intention to purchase corporate bonds (the Corporate Bond Purchase Scheme (CBPS)) (**Chart B.11**).

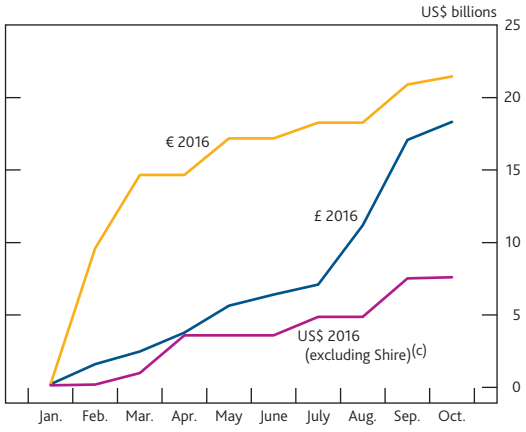
The provision of market-based finance is more likely to be stable when financial markets are liquid and function smoothly. Resilient financial markets are vital to the functioning of the economy, providing essential services to borrowers and savers and to financial institutions that intermediate credit to households and companies, including real money investors and commercial banks.

Core financial markets have functioned effectively…

Core markets have generally functioned well since the July *Report*, despite testing conditions. These include periods of extremely high trading volumes in foreign exchange and futures markets and, more recently, marked increases in advanced economy government bond yields (see Financial market fragility chapter). For example, on the day following

Chart B.11 Sterling investment-grade issuance by UK companies picked up sharply in August and September

UK PNFCs' cumulative gross bond issuance[a][b]

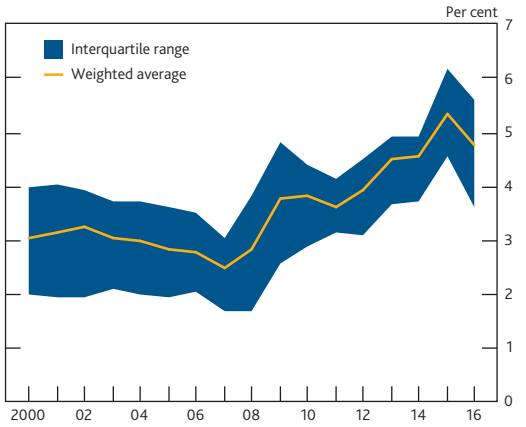


Sources: Dealogic and Bank calculations.

(a) Issuance by: PNFCs incorporated in the United Kingdom; PNFCs' finance vehicles, whose parent operates in the United Kingdom; and special purpose vehicles, where the parent is a PNFC operating in the United Kingdom. Excludes deals guaranteed by a foreign parent.
(b) Includes medium-term notes, which are classified as investment-grade bonds unless rated BB+ or lower.
(c) In September, Shire Plc, a UK pharmaceutical and biotech company, sold US$12.1 billion of debt via its Irish finance vehicle to lock in low borrowing costs and to fund its takeover of the US group Baxalta — one of the biggest issues of the year. Shire was established in the United Kingdom but its operational headquarters are in the United States, with UK workforce accounting for less than a tenth of its 5,500 staff globally.

Chart B.12 Dealers' leverage ratios remain high

Dealers' leverage ratios[a][b]



Sources: Banks' published accounts, SNL Financial, The Banker Database and Bank calculations.

(a) Leverage ratio defined as reported Tier 1 capital (or common equity where not available) divided by total assets, adjusted for accounting differences on a best-endeavours basis. This accounting measure differs from regulatory leverage ratios.
(b) Dealers included are Bank of America Merrill Lynch, Barclays, BNP Paribas, Citigroup, Credit Agricole, Credit Suisse, Deutsche Bank, Goldman Sachs, HSBC, JP Morgan, Mitsubishi UFJ, Morgan Stanley, RBS, Société Générale and UBS. Pre-crisis data also include Bear Stearns, Lehman Brothers and Merrill Lynch.

the US election, market contacts reported that bid-offer spreads — the difference between the price at which an asset can be sold by a client (the bid) and that at which it can be purchased (the offer) — in some foreign exchange and fixed-income markets were somewhat higher than usual but conditions normalised during the day. Market contacts also reported lower than normal depth in gilt future markets, which reversed the following day.

…with the exception of the 'flash event' in the sterling exchange rate.

A recent event in the sterling exchange rate market, however, illustrates how market functioning can become impaired, particularly during periods of relatively low liquidity. In the early hours of 7 October, sterling depreciated by around 9% against the US dollar in less than 40 seconds, during which the price impact of trades was unusually high and significant gapping was observed between traded prices (see Box 3). As with other recent episodes, this 'flash event' proved to be short-lived, without immediate consequences for financial stability. Nevertheless, such disruptions underscore the concern that liquidity in some markets may have become more fragile in recent years. The FPC, drawing on the work of the BIS Markets Committee, will seek to examine the potential implications of these developments for financial stability.

While dealers remain resilient, they continue to appear less willing to build inventory and extend repo financing.

The resilience of dealers has strengthened markedly since the global financial crisis. Although the aggregate leverage ratio of the world's largest dealers ticked down in 2016 H1, it remained high at 4.8% (**Chart B.12**).

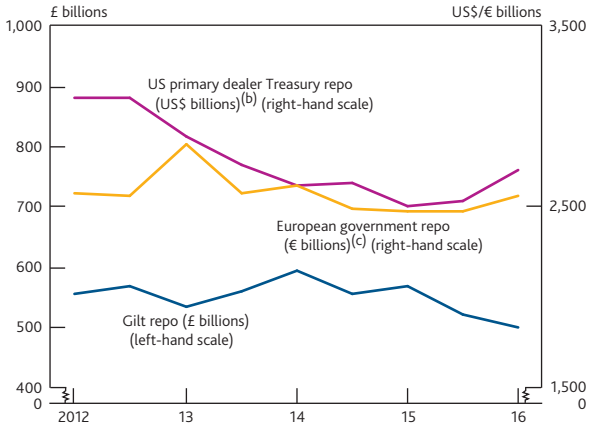
Dealers have an important role to play in ensuring market functioning, including through the provision of securities financing via the repo market. As set out in the July *Report*, repo market activity has declined over the past few years, particularly in the UK and US markets (**Chart B.13**).

In the United States, there has been a pick-up in repo market activity more recently. This may in part reflect the implementation of reforms in mid-October that aim to address risks associated with Money Market Fund (MMF) holdings of private sector assets. As a result of these reforms, there has been growth in US Government MMFs, which conduct a significant amount of repo with banks collateralised with government securities. In the United Kingdom, the latest Bank of England Money Market Liaison Committee (MMLC) survey, conducted in the first half of 2016, found that, on balance, perceptions of sterling secured market functioning improved in the six months to May (**Chart B.14**). However, the market was deemed to be functioning poorly overall.

Given its conclusion in the July *Report* that there has been some reduction in the liquidity of some government and

Chart B.13 Repo market activity has fallen in recent years, particularly in the United Kingdom and United States

UK, US and European government repo market activity[a]

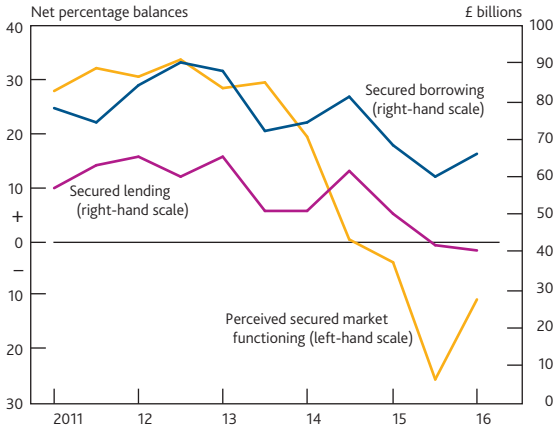


Sources: Bank of England, ICMA, SIFMA and Bank calculations.

(a) Includes both repo and reverse repo.
(b) Pre-2013 US data is approximate due to less detailed data set.
(c) European government repos include those backed by the central government of Austria, Belgium, Denmark, Finland, France, Germany, Italy, Netherlands and Spain.

Chart B.14 Despite recent improvement, perceptions of secured market functioning remain poor

Respondents' views of overall market functioning[a]



Sources: MMLC Sterling Money Market Survey and Bank calculations.

(a) 'Net percentage balance' is calculated as the difference between the balance of lenders reporting that, on a scale of 1–5, the market was functioning very poorly (1) to very well (5). The net percentage balances are scaled to lie between ±100: more extreme responses (1 and 5) attract a weight of 100%, less extreme responses (2 and 4) attract a weight of 50% and central responses (3) attract a weight of zero.

corporate bond markets in recent years, most markedly in the repo markets, the FPC welcomes the announcement that the Financial Stability Board (FSB) will undertake further monitoring and analysis on global market depth and funding liquidity conditions. This will include a cross-jurisdiction study of developments in repo markets by the Committee on the Global Financial System, given the importance of these financing markets for overall market liquidity and functioning.

Markets could be tested by high demand for liquidity, including from open-ended investment funds…

Dealers further support market liquidity through the direct provision of liquidity services, by intermediating flows between investors. These services are particularly important in the context of some fixed-income markets, including for corporate securities. In recent years, however, dealer inventories have been falling, for example, inventories of US corporate bonds held by US primary dealers have fallen to around 40% of their average level between 2002–05. This may be an indication of dealers' reduced willingness to allocate balance sheet capacity to the warehousing of securities that is necessary to intermediate between buyers and sellers in these markets.

Such reduction in the supply of liquidity services is in stark contrast to potential increases in the demand for liquidity including, for example, from open-ended investment funds.

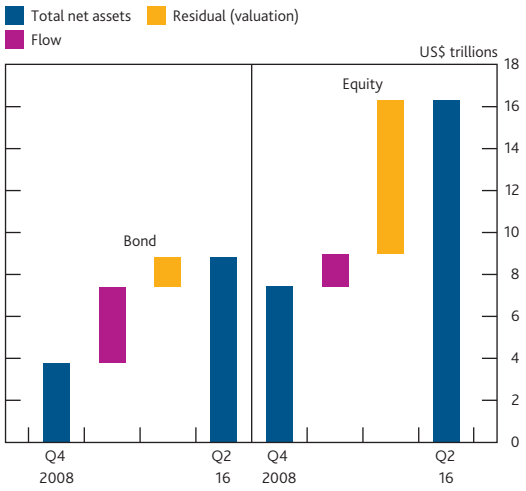
Total assets of open-ended investment funds worldwide have nearly doubled following the global financial crisis. While strong growth in equity funds' assets largely reflects valuation gains, net inflows have played a bigger role in the growth of bond funds (**Chart B.15**). Consistent with this, open-ended bond funds hold a larger proportion of the corporate bonds in issuance than in 2008 (**Chart B.16**).

High demand for liquidity from sterling corporate bond funds did not materialise during the period of heightened uncertainty around the UK referendum on EU membership. In contrast to outflows seen from UK commercial real estate funds (see UK commercial real estate chapter) and UK-focused equity funds, sterling corporate bond funds experienced net inflows. However, during this period, corporate bond prices typically rose, in line with those of sovereign bonds. The risk remains that, were prices of fixed-income securities, including corporate bonds, to fall, these funds could experience outflows. Large-scale redemptions could result in sales of securities by funds that might test the ability of dealers to intermediate them. Procyclical behaviour by investors (redeeming from funds as returns fall) could amplify these effects.

The FSB has developed proposals to address structural vulnerabilities related to asset management activities, which the FPC supports; in particular, that: (i) authorities give

Chart B.15 Total assets of open-ended funds worldwide have almost doubled since 2008

Growth in open-ended fund assets worldwide and flows[a]

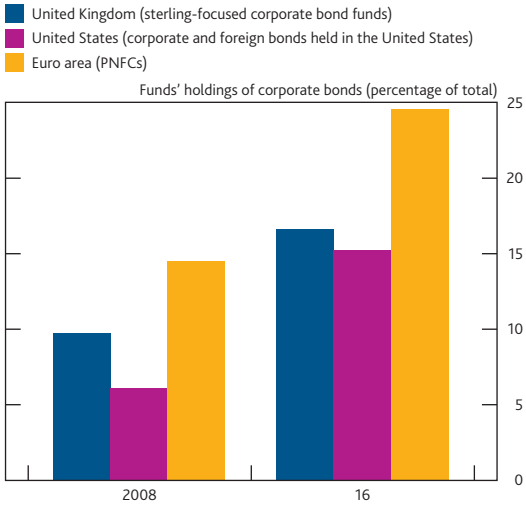


Sources: EFAMA, ICI and Bank calculations.

(a) Adjusted for a break in the series due to expanded coverage in 2014 Q4 on best endeavour basis. Including MMFs but excluding funds of funds where possible. In 2008 Q4, bond and equity funds accounted for half of all open-ended funds; in 2016 Q2 it was two thirds.

Chart B.16 Open-ended bond funds hold a larger proportion of the corporate bonds in issuance than in 2008

Open-ended investment bond funds' holdings of corporate bonds[a]



Sources: Bank of England, Dealogic, ECB, Federal Reserve, Morningstar and Bank calculations.

(a) United Kingdom: sterling corporate bond funds (open-ended and ETFs) total net assets as a share of all outstanding sterling corporate bonds. United States: mutual funds' holdings of corporate and foreign bonds as a share of all outstanding corporate and foreign bonds. Euro-area: euro-area open-ended holdings of bonds issued by euro-area non-financial corporations as a share of total. UK data until October 2016; US and euro-area data until 2016 Q2.

consideration to system-wide stress testing as a way to capture effects of collective selling by funds and other investors; (ii) funds' investment strategies should be consistent with the terms and conditions governing fund unit redemptions; and (iii) authorities should develop simple and consistent measure(s) of leverage in funds to enhance their understanding of related risks (see Financial stability risk and regulation beyond the core banking sector chapter).

…and procyclical investment behaviour of insurers.

Market perceptions of insurers' resilience appear to have improved since the July *Report*. Equity prices of UK insurers have recovered following significant falls in the immediate aftermath of the EU referendum (**Chart B.17**). However, the solvency position of life insurers could be adversely affected by a persistent low interest rate environment as low rates increase the present value of their liabilities, which are typically long term. Since the July *Report*, the UK ten-year swap rate has increased 45 basis points, but has fallen 59 basis points since the start of the year.

The FPC has assessed the propensity of UK life insurers to invest procyclically (see Risks to financial stability from insurers' investment behaviour chapter). It has concluded that the current design of the 'risk margin' element of Solvency II rules could, in future, encourage procyclical investment behaviour, and should be addressed, including through the forthcoming review of Solvency II by the European Commission. Such incentives should also be avoided in the International Capital Standards for insurers, which are being developed by the International Association of Insurance Supervisors.

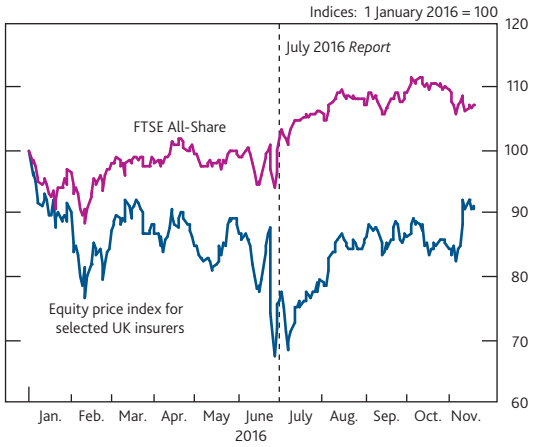
Market liquidity and market-based finance could also be challenged by the United Kingdom's new relationship with the European Union.

A period of adjustment related to the United Kingdom's new relationship with the European Union could also have implications for market liquidity. For example, it could impact levels of activity in exchanges and other trading venues. It could also affect the level of market-making activity by intermediaries as they adjust business structures.

Over time, the provision of market-based finance more generally could be affected. The UK financial system is diverse and combines large pools of capital, sourced from across the world, with the means of accessing that capital, through services provided to both domestic and international borrowers. This clustering — or agglomeration — of activity contributes to deep and liquid markets, which support the provision of market-based finance. If the United Kingdom's withdrawal from the European Union were to fragment capital markets, these benefits could eventually be eroded. This could result in a gradual shift in the financing of UK and EU companies towards banks and away from market-based

Chart B.17 The price of equity issued by UK insurers has increased after sharp falls following the United Kingdom's EU referendum

Equity price index for selected UK insurers[(a)] and the FTSE All-Share



Sources: Thomson Reuters Datastream and Bank calculations.

(a) Arithmetic mean of indexed share prices of selected UK insurance groups (Aviva, Legal and General, Prudential and Standard Life).

finance, reducing diversification and potentially diminishing the resilience of credit provision. The extent of this may also depend on how far loss of agglomeration benefits raises the costs of equity and debt issuance for real economy borrowers, which the FPC will assess over time.

The Bank is continuing to develop a system-wide stress simulation to assess the dynamics of markets under stress.

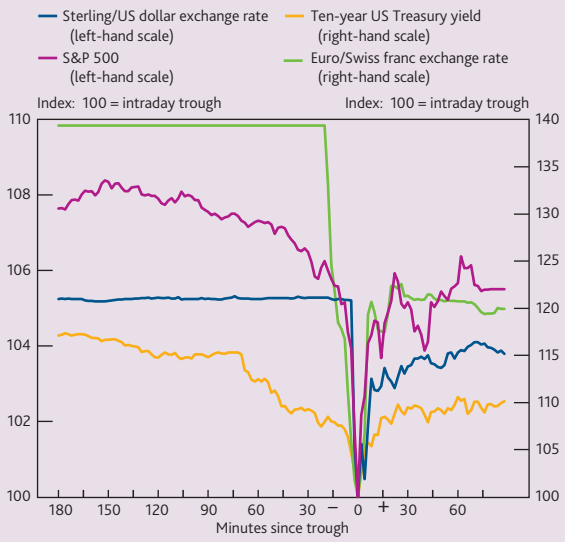
In the context of concerns around market liquidity, the Bank is developing a system-wide stress simulation, to assess the dynamics of markets under stress. It will include an analysis of the behaviour of various sectors — such as open-ended investment funds, insurance companies and dealers (see Financial stability risk and regulation beyond the core banking sector chapter).

The FPC has further concluded that unit-linked insurance products share some economic similarities with open-ended investment funds, with investors able to switch between funds at short notice. Such flexibility could lead to procyclical investment behaviour, particularly during times of stress. The Bank will include unit-linked funds in its system-wide stress simulation.

Box 3
Issues around the sterling flash event

In the early hours of 7 October, sterling depreciated by around 9% against the US dollar in less than 40 seconds, before quickly retracing much of the move.(1) This 'flash event' is the most recent of a series of episodes of heightened short-term volatility (**Chart A**), which have largely centred on markets with widespread use of electronic and high-frequency trading.

Chart A Recent episodes of heightened short-term volatility(a)(b)



Sources: Bloomberg and Bank calculations.

(a) Sterling flash event 7 October 2016 (blue), US equity markets flash-crash 6 May 2010 (magenta), US Treasury market flash-rally 15 October 2014 (orange) and removal of the Swiss franc peg to the euro 15 January 2015 (green).
(b) Data shown in two minutes intervals, and may not fully capture the lowest traded prices during each event.

While such disruptions have generally proved to be short-lived, and without immediate consequences for financial stability, they nevertheless underscore the concern that liquidity in some markets may have become more fragile in recent years.(2)

No material losses were reported by major UK banks as a consequence of the sterling flash event. But if occurrences of heightened volatility were to increase in frequency, or if market dysfunction lasted longer in future episodes, confidence in affected markets could be undermined, potentially impairing financial stability. For example, further flash events in sterling exchange rates could lead to an increase in the trading and hedging costs faced by market participants. This could increase the return required by investors for holding sterling-denominated assets, increasing funding costs faced by the UK government and corporate sector.

The Bank for International Settlements (BIS) Markets Committee is preparing a report on the sterling flash event to which the Bank of England has submitted detailed analysis. A final report will be submitted by the Markets Committee to the Economic Consultative Committee (ECC) of Governors in January.(3)

This box provides a high-level description of the movements in sterling on 7 October 2016, including the possible triggers of the event and the factors that acted to amplify volatility during it. It focuses on movements in the sterling exchange rate against the dollar, though corresponding movements were seen against other currencies.

Description of movements during the event

The movements in sterling can be described in three stages.

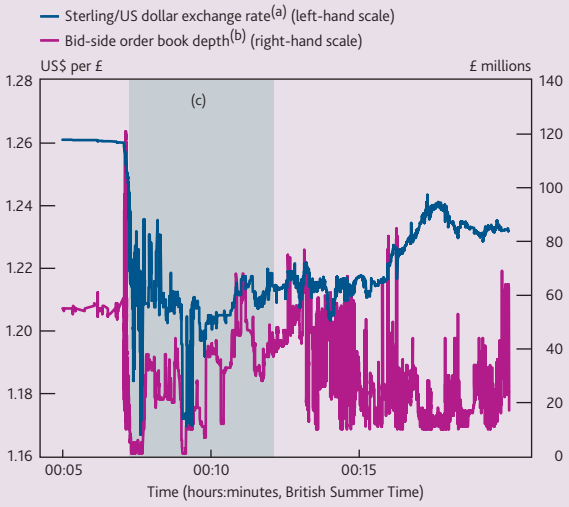
Shortly after midnight on 7 October, trading volumes in the sterling exchange rate increased significantly and, between 12:07:03am and 12:07:11am, sterling depreciated from 1.26 to 1.25 against the dollar.(4)(5) The price movement over this period was orderly, with bid-offer spreads remaining unchanged, and the price impact of individual trades not unusually elevated.

Sterling continued to fall sharply. At 12:07:15am it had fallen below 1.24 against the dollar, with the speed of price movements triggering a trading halt for sterling/US dollar futures on the Chicago Mercantile Exchange (CME) futures platform (**Chart B**). Continued selling pressure depleted the 'resting' orders that were in place to buy sterling on a range of major trading venues. Following this, market functioning became highly impaired for a period of just over ten minutes: order book depth was much lower than usual, individual trades had an unusually large impact on prices, and significant gapping was observed between traded prices. During this period, there was a sharp drop off in participation on key trading venues, which points to a potentially greater role for the idiosyncratic actions of individual market participants in driving the subsequent price falls below 1.20 against the dollar.

By around 12:20am, the market began to recover. Sterling retraced to stand around 2.2% lower against the dollar than its level immediately prior to the event. By this time, market participants had begun to return to major trading venues, and order book depth had improved. Orderly market functioning resumed relatively quickly, though trading volumes and bid-offer spreads remained higher than their usual overnight

(1) Based on traded prices observed on Reuters Matching foreign exchange platform.
(2) See Anderson, N, Webber, L, Noss, J, Beale, D and Crowley-Reidy, L (2015), 'The resilience of financial market liquidity', *Bank of England Financial Stability Paper No. 34;* www.bankofengland.co.uk/financialstability/Pages/fpc/fspapers/fs_paper34.aspx.
(3) The ECC is an 18-member group of Central Bank Governors hosted by the BIS.
(4) All dates and times in this section are given in British Summer Time (GMT+1).
(5) Based on the mid-price on Reuters Matching foreign exchange platform.

Chart B Prices and order book depth on Reuters Matching foreign exchange platform on 7 October



Sources: Thomson Reuters and Bank calculations.

(a) Series shows the mid-point between the best bid and best offer price in the Reuters Matching electronic order book. Data shown for each point in time at which there is an addition or revision to the order book.
(b) Series shows the sum of the ten best available bids to buy sterling in the Reuters Matching electronic order book. Data shown for each point in time at which there is an addition or revision to the order book.
(c) Grey area shows the time during which trading halts or restrictions were intermittently in effect on sterling/US dollar futures contracts traded on the CME.

levels. Spillovers to non-sterling currencies or other asset classes during the event were limited. UK government bond yields rose sharply when the market opened the following morning, but trading was orderly, and there was no apparent impact on risky asset prices.

Though the peak-to-trough fall in sterling was of a similar magnitude to the overnight fall following the EU referendum, the events on 7 October are set apart by the lack of a clear fundamental trigger, the speed with which developments took place, the fact that the price move reversed almost entirely, and the short-lived but severe impairment of market functioning and price discovery. In contrast, as detailed in the July *Report*, foreign exchange markets appeared resilient following the EU referendum, with no apparent impairment of price discovery.

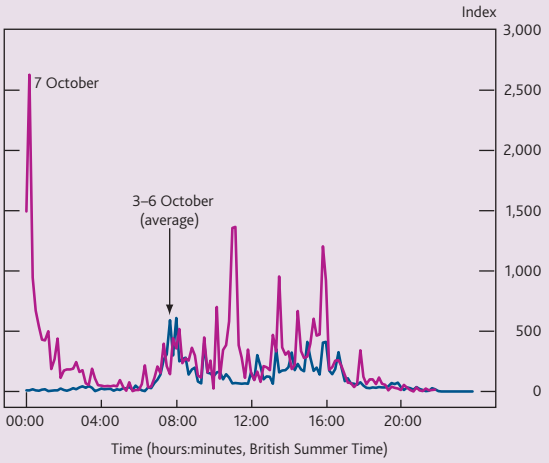
Triggers and amplifiers during the sterling event

Context and trigger

The sterling move began shortly before the publication of a news story containing information that market participants interpreted as supporting a depreciation of sterling. This timing suggests that, while the story may have acted to reinforce the negative pressure on sterling, it was not the initial trigger. A number of other potential triggers have been suggested by market participants. These include: a large trade executed erroneously (a so-called 'fat finger' error), the use of a poorly calibrated execution algorithm, unsophisticated retail trading, or a deliberate attempt to move the price lower. It is hard to definitively rule out these possibilities as not all activity in the foreign exchange market is observable.

Regardless of the trigger, it is likely that the relatively low level of liquidity at the time of day when the incident occurred meant the market was more vulnerable to an imbalance in order flow. Though the foreign exchange market is open for 24 hours a day during the week, the majority of trading in sterling/US dollar takes place between 7am and 5pm UK time, with volumes highest when the London and New York markets are open (**Chart C**). Accordingly, measures of liquidity are typically lower outside these hours. During the event, volumes transacted on Reuters' foreign exchange platform were over 80 times their average level for the same time of day over the preceding week.

Chart C Sterling/US dollar intraday trading volumes(a)(b)



Sources: Thomson Reuters and Bank calculations.

(a) Trading volumes per minute on Reuters Matching foreign exchange platform, averaged over ten-minute intervals.
(b) Index: 100 = average trading volume per minute, across all ten-minute intervals, over 3–6 October.

Functioning of critical trading infrastructure

The sterling event did not appear to be amplified by any weaknesses in critical trading infrastructure. There were no reported issues with major foreign exchange platforms and banks' risk management controls generally functioned as expected.

However, the presence of circuit breakers on some foreign exchange trading venues may have contributed to a sharp withdrawal of liquidity across the market more broadly. In addition to the trading pause on the CME futures market following the initial price movement, a number of further pauses were triggered on the same platform given the continued volatility (**Chart B**). These trading pauses could have discouraged firms from participating in the spot market given some firms may be reliant on the CME for pricing information.

Procyclical and mechanistic responses to price falls

The fall in sterling is likely to have been amplified by mechanistic selling by some market participants in order to hedge options positions by transacting in the spot market, and to fulfil orders placed with them by clients. In some cases, this selling may have occurred without regard to underlying market conditions or likely price impact of trading.

Data gathered from firms supervised by the Prudential Regulation Authority point to a concentration of exotic options positions whose risk profiles were highly sensitive to falls through the 1.22–1.25 level in sterling/US dollar. The increase in selling pressure observed as the spot price passed through these levels may in part be explained by hedging flows related to these positions.

In addition, the subsequent fall in sterling may have been exacerbated by the use of algorithms that were inappropriate for the trading conditions observed around the time of the flash event.

Withdrawal of liquidity providers

As in some previous episodes of heightened volatility, the initial fall in sterling may also have been amplified by the withdrawal of market participants in their role as market makers. A number of banks have confirmed that they withdrew from market-making during the sterling episode, as automated controls designed to protect them from volatile market conditions were triggered. And market contacts suggest that some non-bank market makers may also have withdrawn or widened pricing during the event. This resulted in a sharp decline in depth in the spot market (**Chart B**).

The FPC is continuing its analysis of developments in market liquidity, including in fast, electronic markets, particularly in light of this event. The FPC, drawing on the work of the BIS Markets Committee, will seek to examine the potential implications for financial stability if episodes of heightened market volatility become more frequent, or if market dysfunction is longer-lasting in any future event.

Financial stability risk and regulation beyond the core banking sector

The Bank of England Act 1998, as amended by the Financial Services Act 2012, gives the FPC responsibility to identify, assess, monitor and take action in relation to financial stability risks across the UK financial system, including risks arising from beyond the core banking sector.(1)

To meet this responsibility, the FPC conducts an annual assessment of financial stability risk and regulation beyond the core banking sector. This process also helps ensure that the UK authorities adhere to the Financial Stability Board's (FSB's) policy framework for shadow banking entities, which asks authorities to define and keep up to date the regulatory perimeter.(2)

This chapter provides an update on the progress the FPC has made following its 2015 annual assessment and presents an overview of its 2016 assessment. In summary:

- The FPC is not recommending any changes to the regulatory perimeter at this stage.
- Further to its in-depth assessment of the activities of open-ended investment funds in 2015:
  - The FPC supports the proposals being developed by the FSB to address structural vulnerabilities related to asset management activities.
  - The FPC supports the FCA's intention to publish a discussion paper on the potential challenges associated with open-ended funds investing in illiquid assets, including commercial real estate (CRE).
  - The FPC supports the Bank's ongoing work to develop a system-wide stress simulation, which will include an analysis of the behaviour of various sectors such as open-ended investment funds, insurance companies and dealers.
- The FPC has completed an in-depth assessment of risks to financial stability associated with the investment activities of insurers (see Risks to financial stability from insurers' investment behaviour chapter).
- The FPC is continuing its analysis of developments in market liquidity, including in fast, electronic markets, particularly in light of the flash event in the sterling exchange rate on 7 October 2016 (see Box 3).
- Further to the FPC noting marked changes in repo market conditions in the July 2016 *Report*, the Bank is contributing to an international review of repo market functioning by the Committee on the Global Financial System (CGFS).
- The FPC has asked the Bank to complete an in-depth assessment of the financial stability risks associated with derivative transactions. This will examine progress towards implementation of the post-crisis reforms in derivatives markets and consider the implications for the resilience of the financial system.
- The FPC, alongside the MPC, will continue to monitor closely developments in defined-benefit pension fund deficits in the current low interest rate environment (see November 2016 *Inflation Report*). It will also monitor closely a number of fast-growing areas, including exchange-traded funds, peer-to-peer lending, and other innovations in financial technology.

Activity-based risk-assessment framework

Risks arising from beyond the core banking sector reside in financial markets and the activities of non-bank financial institutions (NBFIs). Globally, NBFIs account for a significant proportion of financial system assets. In the United Kingdom, despite a particularly large banking system due to its international nature, NBFIs account for almost half of the UK financial system's total assets (see Market-based finance chapter). By comparison, NBFIs account for 60% and just under a half of the US and euro-area financial systems, respectively.(3)

The FPC assesses risks from financial markets and the activities of NBFIs by focusing on three key transmission channels: (i) the provision of critical services; (ii) risks to systemically important counterparties; and (iii) disruption to systemically important financial markets. Each transmission channel is considered to present greater risks when combined with

(1) The Act gives the FPC the power to make Recommendations to HM Treasury on regulated activities, as well as more general powers of Recommendation, including to the PRA and FCA; and gives the Bank powers in respect of information gathering.
(2) See www.fsb.org/wp-content/uploads/r_130829c.pdf.
(3) For further details, see the FSB Global Shadow Banking Monitoring Report 2015 and related data set; www.fsb.org/2015/11/global-shadow-banking-monitoring-report-2015/. The US share of NBFIs excludes public financial institutions.

sources of fragility, such as leverage and liquidity or maturity mismatch between assets and liabilities.(1)

Progress update since 2015 assessment

Since its last annual assessment in July 2015, the FPC has completed three in-depth reviews:(2)

(i) Open-ended investment funds

Total assets of global open-ended investment funds have nearly doubled since end-2008, from around US$20 trillion to just under US$40 trillion at mid-2016. Fixed-income funds have more than doubled over this period to nearly US$9 trillion. The growth in these funds reflects investor demand for fixed-income assets, including those issued by UK businesses. On a cumulative basis, virtually all net financing raised by UK private non-financial businesses since the crisis has been in the form of bond rather than bank finance.

Open-ended investment funds offer short-term redemptions; and in some cases invest in longer-dated and potentially illiquid assets, giving rise to a liquidity mismatch. Large-scale investor redemptions could result in sales of assets by funds that might test markets' ability to absorb them, potentially amplifying market moves and impairing market liquidity. Should some funds have to suspend redemptions, this might in turn create incentives for investors to redeem from other funds.

These dynamics were recently illustrated in the case of open-ended funds investing in the UK CRE market. In the months leading up to the EU referendum, and immediately following it, these funds experienced significant net outflows. In response, a number of funds suspended dealings. There was also some evidence of funds selling properties at significant discounts to pre-referendum values to meet redemptions (see UK commercial real estate chapter).

The FPC supports the FCA's plans to publish a discussion paper on the potential challenges associated with the structure of open-ended funds investing in illiquid assets, including CRE funds.

The Committee's in-depth assessment of open-ended investment funds was published in the December 2015 *Report*, following which:

- The FSB has developed proposals to address structural vulnerabilities related to asset management activities, which the FPC supports; in particular, that: (i) authorities give consideration to system-wide stress testing as a way to capture effects of collective selling by funds and other investors; (ii) funds' investment strategies should be consistent with the terms and conditions governing fund unit redemptions; and (iii) authorities should develop simple and consistent measure(s) of leverage in funds to enhance their understanding of related risks.(3) The FSB will publish the final recommendations by the end of the year, at which point the International Organization of Securities Commissions (IOSCO) will start operationalising some of them.

- In February 2016, the FCA published an update describing good practices for liquidity risk management and oversight, based on what it observed at leading investment management firms.(4) This includes: clear disclosure of liquidity risk to investors; ensuring that a fund's dealing arrangements are appropriate for its investment strategy; a regular assessment of liquidity demands; and fund-level stress testing.

- The Bank is continuing to develop a system-wide stress simulation, which will include an analysis of the behaviour of various sectors — such as open-ended investment funds, insurance companies and dealers — to assess their impact on market functioning. As part of this work, the Bank will consider data requirements of such a simulation exercise and identify any material data gaps.(5)

(ii) Insurance companies

As set out in the Risks to financial stability from insurers' investment behaviour chapter, the FPC has reviewed the extent to which the introduction of Solvency II, in January 2016, might affect the propensity of UK life insurers to invest procyclically. It judges that limiting the sensitivity of the 'risk margin' to changes in risk-free interest rates would have macroprudential benefits. This should be addressed, including through the forthcoming review of Solvency II by the European Commission. Such incentives to invest procyclically should also be avoided in the International Capital Standards for insurers, which are being developed by the International Association of Insurance Supervisors.

In addition, the FPC has assessed whether the risks to market liquidity emanating from unit-linked insurance products are comparable to the risks from open-ended investment funds. The FPC has concluded that there are some economic similarities, with investors typically able to switch between different funds at short notice. Such flexibility could lead to procyclical investment behaviour. The Bank will include assets held by the insurance sector, including unit-linked funds, in its system-wide stress simulation.

(1) The risk assessment framework is described in more detail in Box 9 of the June 2014 *Report*; www.bankofengland.co.uk/publications/Documents/fsr/2014/fsrfull1406.pdf. It is consistent with the FSB's policy framework for shadow banking entities; www.fsb.org/wp-content/uploads/r_130829c.pdf. In particular, the focus is on activities rather than the NBFIs themselves. This abstracts from entities' legal structures and can accommodate new types of institutions as they arise.
(2) See Box 5 in the July 2015 *Report*; www.bankofengland.co.uk/publications/Documents/fsr/2015/fsrfull1507.pdf.
(3) The FSB published a consultation document in June on proposed policy recommendations; www.fsb.org/2016/06/proposed-policy-recommendations-to-address-structural-vulnerabilities-from-asset-management-activities/.
(4) See www.fca.org.uk/publications/documents/liquidity-management-investment-firms-good-practice.
(5) See Box 5 in 'The Bank of England's approach to stress testing the UK banking system'; www.bankofengland.co.uk/financialstability/Documents/stresstesting/2015/approach.pdf.

(iii) Market liquidity

The FPC has conducted an in-depth assessment of liquidity in dealer-intermediated markets. In its July 2016 *Report* the FPC noted that key dealer-intermediated markets, including corporate bond and repo markets, had seen a reduction in liquidity — in part attributable to post-crisis regulation of dealers. The FPC judged that the net economic benefit of post-crisis regulations had been materially positive, but that it was appropriate to adjust regulatory measures, where possible, to minimise their impact on the liquidity of core financial markets, without compromising their positive effect on resilience.

In addition, the Bank is contributing to an international review of repo market functioning by the CGFS.

The FPC is continuing its analysis of developments in market liquidity, including in fast, electronic markets, particularly in light of the flash event in the sterling exchange rate on 7 October 2016 (see Box 3).

2016 annual assessment

The FPC's 2016 annual assessment considered activities beyond the core banking sector that could potentially cause or amplify shocks to the real economy. In doing so, the FPC took particular note of activities that are growing rapidly or where the nature of the activities is changing, for example, in response to changes in regulation or the current low interest rate environment.

The FPC is not recommending any changes to the regulatory perimeter at this stage, but intends to complete an in-depth assessment of financial stability risks associated with derivative transactions, and to monitor closely a number of other areas.

Derivative transactions

The FPC has asked the Bank to complete an in-depth assessment of the financial stability risks associated with derivative transactions.

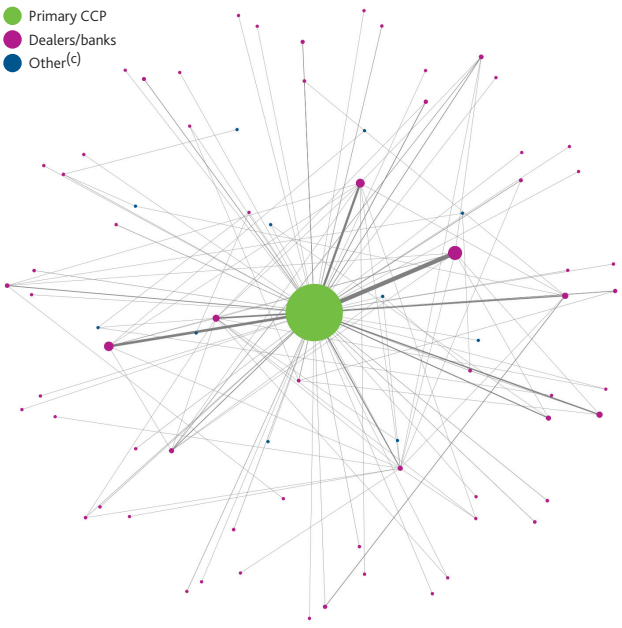
The global derivatives market is large, with over US$600 trillion of contracts outstanding.(1) Derivatives enable firms to hedge financial risk, but they may also be used for speculative purposes and can give rise to extensive intra-financial system exposures, potentially of a complex and opaque nature.

The G20 agreed a set of reforms to derivatives markets in 2009 following the financial crisis.(2) These promoted the trading of standardised over-the-counter (OTC) derivatives contracts on exchanges or electronic trading platforms, where appropriate, and their clearing through central counterparties (CCPs). The G20 also called for greater transparency through the reporting of derivatives contracts to trade repositories, and for higher capital requirements for non-centrally cleared derivatives. Subsequently, it was also agreed that there should be margin requirements for non-centrally cleared derivatives.

As an intended consequence of these reforms, there has been a significant and mandated move to central clearing for standardised OTC derivatives. CCPs place themselves between buyers and sellers of a trade, simplifying the network of exposures between market participants. Central clearing further tends to reduce the aggregate amount of risk in the system through multilateral netting, that is, by market participants holding a single net position at a CCP rather than multiple and otherwise potentially offsetting positions at different counterparties.

As a result of these developments CCPs have become more important as counterparties to financial institutions. For example, based on trade repository data, **Chart A** shows that the network of counterparties in cleared and uncleared sterling forward rate agreements is concentrated around the most significant CCP in the market.(3) In response, tighter regulatory requirements have been introduced internationally to enhance CCP resilience and resolvability. The FSB is also working with a number of international bodies on a CCP

Chart A Network of counterparties in cleared and uncleared sterling forward rate agreements(a)(b)



Sources: DTCC & UnaVista Trade Repository data and Bank calculations.

(a) As of 30 June 2016.
(b) The size of each node is proportional to the outstanding gross notional of a given market participant against all of its counterparties, and the thickness of the connecting lines is proportional to the total amount of gross notional between two nodes.
(c) Includes institutions which are neither the primary CCP nor dealers/banks, such as pension funds, insurers and other funds.

(1) Gross notional value, including both OTC and exchange-traded derivatives.
(2) See G20 Leaders Statement: The Pittsburgh Summit; www.g20.utoronto.ca/2009/2009communique0925.html.
(3) A forward rate agreement is an OTC interest rate derivative in which counterparties agree that a certain interest rate will apply to the borrowing/lending of a certain notional principal amount during a specified future period.

workplan to further enhance CCP resilience, including through the provision by the Committee on Payments and Markets Infrastructures and IOSCO of more granular guidance on CCP stress testing and margins, and to ensure that appropriate recovery and resolution arrangements are in place for CCPs.(1)(2)

Initial margins are an important component of the resilience of CCPs, and are used to mitigate counterparty exposures. But they may also increase the risk of procyclical effects on market conditions if margin requirements increase unduly during periods of stress. This would require counterparties posting margin to have to find additional liquid assets, often at precisely the times when it is most difficult for them to do so.

International regulatory standards for margin calculations by CCPs explicitly recognise the need to limit procyclicality in margin requirements, while ensuring that the soundness and financial security of CCPs is not negatively affected. And regarding non-centrally cleared derivatives, internationally agreed principles of the margining framework also note that the initial margin amount should be calibrated to limit procyclicality.(3)

In its in-depth assessment the FPC will examine progress towards implementation of the post-crisis reforms in derivatives markets and consider the implications for the resilience of the financial system. This work will also contribute to a broader review by the FSB.(4) In addition, the FPC will assess the extent to which trade repository data are sufficient for assessing the distribution of risks across the system from derivative transactions and any improvements that should be considered.

Developments that the FPC will monitor closely

Challenges for non-bank business models in a low interest rate environment

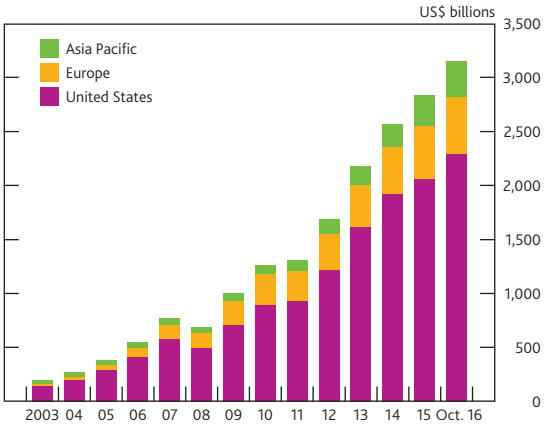
The FPC remains vigilant to the challenges for non-bank business models, such as those of defined-benefit pension funds and insurers, arising from a low interest rate environment. Alongside the MPC, it will continue to monitor closely developments in defined-benefit pension fund deficits (see November 2016 *Inflation Report*).

Risks to financial stability from defined-benefit pension fund deficits are likely to be small. In the United Kingdom, there are around 6,000 Pension Protection Fund-eligible defined-benefit pension schemes, sponsored by less than 1% of UK companies. Although many of these companies are large, less than 10% of total private sector employees are active members of those schemes. While around 80% of the schemes are currently in deficit, the majority of aggregate deficit is concentrated in a small number of schemes. Nevertheless, the FPC will continue to assess the scale of any risks arising from defined-benefit pension schemes.

Exchange-traded funds

Exchange-traded funds' (ETFs') assets under management have grown six-fold over the past decade (**Chart B**). ETFs offer a low-cost method of investing in diversified strategies, the majority of which passively track the performance of particular indices or portfolios. ETFs are often traded on-exchange, which provides a means for intraday price discovery and liquidity. As a result, ETFs are increasingly being used by investors for hedging and cash management, as well as for investment purposes.

Chart B Assets under management of exchange-traded funds by domicile



Source: Deutsche Bank ETF Research.

ETFs rely on a set of Authorised Participants (APs) to create and redeem their shares in exchange for a basket of the underlying securities or cash. This provides arbitrage opportunities for APs, helping ensure that the price of ETF shares is closely aligned with the value of the underlying securities. If the liquidity of the underlying securities deteriorates and APs are not able to execute this arbitrage, ETF shares could trade at a material discount to net asset value (NAV) or with widened bid-offer spreads for a prolonged period. For example, on the morning of 24 August 2015, trading opened late for more than half of S&P 500 equities on the New York Stock Exchange due to high short-term volatility. As a result, APs became less able to take advantage of arbitrage opportunities, leading to large, albeit short-lived, discounts to NAV for some equity ETFs. A prolonged period of impaired price discovery could crystallise so-called 'basis risk' for ETF investors, where there is a difference between the ETF price and the price of the underlying assets.

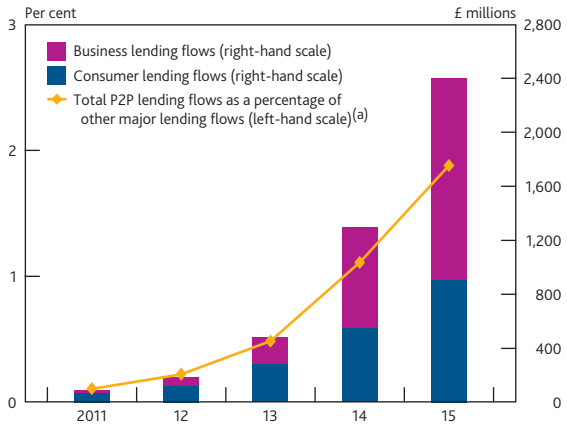
(1) See www.fsb.org/2016/08/progress-report-on-the-ccp-workplan-2/.
(2) On 28 November 2016 the European Commission also proposed new EU legislation on CCP recovery and resolution. See http://ec.europa.eu/finance/financial-markets/ccp-resolution/index_en.htm.
(3) See www.bis.org/bcbs/publ/d317.pdf.
(4) As part of its work on implementation and effects of reforms, FSB's 2017 workplan includes a comprehensive review of the implementation and effects of OTC reforms; www.fsb.org/wp-content/uploads/Financial-Stability-Board-agrees-2017-workplan.pdf.

In the United States, the Financial Stability Oversight Council and the Securities and Exchange Commission are assessing risks from ETFs, including the risk of the arbitrage mechanism not functioning effectively.

Peer-to-peer lending

The UK peer-to-peer (P2P) lending market provides an alternative source of finance for households and businesses.(1) The total stock of P2P lending is only around 1% of the total outstanding stock of consumer credit lending and loans to small and medium-sized enterprises (SMEs).(2) But P2P lending is growing rapidly, with gross new lending almost doubling in size every year between 2011 and 2015. Moreover, while lending on P2P platforms is currently equivalent to only around 2% of other gross flows of new lending to consumers and SMEs (**Chart C**), their share of lending flows to smaller firms is particularly significant, with P2P lending estimated to account for nearly 14% of equivalent gross bank lending flows to small businesses in 2015.(3)

Chart C Gross new annual UK P2P lending



Sources: Bank of England, Nesta, University of California – Berkeley, University of Cambridge and Bank calculations.

(a) 'Other major lending flows' is a sum of consumer and business lending. Consumer lending is consumer credit gross lending from MFIs and other lenders (excluding student loans and credit cards). Business lending is UK MFIs' gross lending (excluding overdrafts) to non-financial SMEs. Business lending data are available from April 2011. The 2011 data point scales up available monthly flows data for that year.

P2P lending is potentially beneficial as an alternative source of finance. However, it could pose financial stability risks since its resilience over the business cycle is untested. If investors do not fully understand or assess the risks they face, such as default and liquidity risk, a downturn and an ensuing increase in the default rate could lower investors' appetite for P2P products. Such a loss of confidence could lead to disruption of credit supply to the real economy, and small firms in particular.

The FPC does not intend to amend the regulatory perimeter for P2P lending at this stage, but notes the FCA's ongoing work to review the regulatory framework for P2P platforms in light of the sector's rapid growth and developments in firms' business models.(4)

Financial technology innovations

Alongside P2P lending, the FPC continues to monitor other innovations in financial technology, as these could also in principle present both benefits and risks for financial stability.

Relatedly, the FPC supports work underway internationally at the FSB to analyse specific financial technology innovations and highlight any regulatory issues that merit policy attention. The Bank will participate actively in this work.

(1) P2P lending is discussed further in a box in the Bank's 2016 Q3 *Credit Conditions Review*; www.bankofengland.co.uk/publications/Documents/creditconditionsreview/2016/ccrq316.pdf.
(2) Consumer credit gross lending from MFIs and other lenders (excluding student loans and credit cards), and UK MFIs' gross lending (excluding overdrafts) to non-financial SMEs.
(3) The 14% figure is calculated using a data set from the British Bankers' Association for gross bank lending flows to small firms. This data set contains a smaller sample of lenders than the data set used in **Chart C**, which is for lending from UK MFIs to all SMEs.
(4) See www.fca.org.uk/publications/calls-input/post-implementation-review-fca-crowdfunding-rules.

Risks to financial stability from insurers' investment behaviour

The Bank of England Act 1998, as amended by the Financial Services Act 2012, gives the FPC responsibility to identify, assess, monitor and take action in relation to financial stability risks across the UK financial system, including risks arising from beyond the core banking sector.

The FPC presented its first annual assessment of risks beyond the core banking sector in the July 2015 *Report* (see Financial stability risk and regulation beyond the core banking sector chapter for the 2016 assessment). As part of that, the FPC noted its intention to conduct a detailed assessment of risks to financial stability arising from the investment activities of UK insurers.

Separately, in September 2016, the United Kingdom's Treasury Committee announced an inquiry into the introduction and operation of Solvency II (the prudential regulatory regime for European insurance companies), in order to supplement its work on the relationship that the United Kingdom might seek with the European Union.(1) This inquiry will, in part, seek to assess the strengths and weaknesses of Solvency II as it currently stands, covering a range of issues, including its impact on competition, and safety and soundness.

The FPC has reviewed the risks to financial stability from insurers' investment activities, focusing on: (i) the extent to which the introduction of Solvency II, in January 2016, might affect the propensity of UK life insurers to invest procyclically; and (ii) whether the risks to market liquidity emanating from unit-linked insurance products are comparable to the risks from open-ended investment funds.

Procyclicality, in the short-term, refers to the tendency to invest in a way that amplifies market movements and contributes to asset price volatility. In the medium-term, procyclicality refers to the tendency to invest in line with asset price and economic cycles, so that investors' willingness to bear risk diminishes in periods of stress and increases in upturns.

This chapter presents the FPC's conclusions, which are:

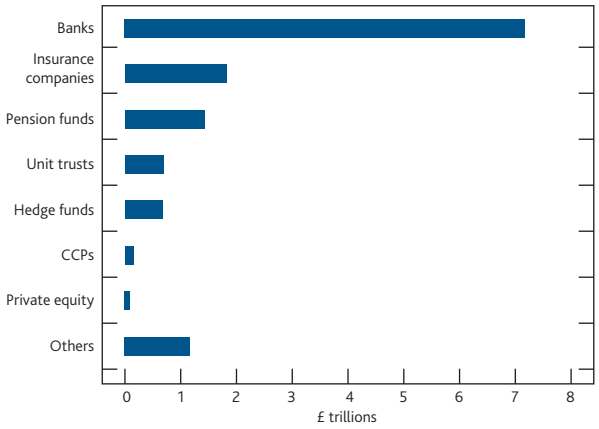
- Solvency II contributes to the resilience of the insurance sector. It also includes some features — such as the so-called 'matching adjustment' — that are beneficial from a macroprudential perspective by reducing potential instability across the financial system.(2)
- Under its current design, the so-called 'risk margin' — a provision that increases the value of a firm's liabilities (and consequently reduces its excess capital over regulatory requirements) to facilitate their transfer to another insurer should the business fail — could, in future, encourage insurance companies to reinforce falls (rises) in risk-free interest rates by switching into (out of) low-risk assets.
- **The FPC judges that limiting the sensitivity of the risk margin to changes in risk-free interest rates would have macroprudential benefits.** This should be addressed, including through the forthcoming review of Solvency II by the European Commission. Such incentives to invest procyclically should also be avoided in the International Capital Standards (ICS) for insurers, which are being developed by the International Association of Insurance Supervisors (IAIS).
- The FPC has further concluded that unit-linked insurance products share some economic similarities with open-ended investment funds. For instance, investors are typically able to switch between different funds at short notice. There is tentative evidence that this flexibility could lead unit-linked policyholders to invest procyclically, particularly during times of stress. That is, when risky assets prices have fallen, policyholders have switched from funds invested in more risky assets to those invested in less risky assets. This reinforces risks associated with open-ended funds and market liquidity (see Market-based finance chapter). The Bank will include assets held by the insurance sector, including unit-linked funds, in its system-wide stress simulation designed to assess the resilience of market liquidity.

UK life insurers are significant investors in financial assets.
Insurance companies are important financial intermediaries: they support the real economy by enabling households and firms to transfer the risks they face, and — alongside other institutional investors — by helping to channel long-term savings into investment via financial sector assets (**Chart A**).

In the United Kingdom, life insurers hold £1.7 trillion of assets. These account for a significant proportion of the total assets outstanding in several UK securities markets (**Table 1**).

(1) See terms of reference: www.parliament.uk/documents/commons-committees/treasury/Terms%20of%20reference/EU-insurance-regulation-ToR-16-17.pdf.
(2) Where insurers hold long-dated assets to match long-dated stable liabilities, such as annuities, the 'matching adjustment' allows them to look through the impact of short-term market movements on assets when valuing their liabilities.

Chart A UK financial sector assets excluding derivatives[a][b][c][d]



Source: Burrows, O, Cumming, F and Low, K (2015), 'Mapping the UK financial system', *Bank of England Quarterly Bulletin*, Vol. 55, No. 2, pages 114–29; www.bankofengland.co.uk/publications/Documents/quarterlybulletin/2015/q201.pdf.

(a) See 'Mapping the UK financial system', Figure 3, *ibid*, for full definitions of each sector.
(b) UK-owned banks are measured on a global consolidated basis. UK-resident branches and subsidiaries of foreign-owned banks are measured on a residency basis, with cross-border assets excluded for foreign-owned branches.
(c) Insurance companies and pension funds are measured on a residency basis. Insurance companies include all PRA-authorised insurers and reinsurance companies. Pension funds covers self-administered pension funds in the United Kingdom.
(d) In general, other non-banks are included if managed in the United Kingdom. The range of sources used to estimate non-banks may not report on consistent bases.

Table 1 Estimated UK life insurers' asset holdings for selected asset classes[a][b][c]

Asset class	UK life insurers' total holdings (£ billion)	Share of outstanding amounts (per cent)
UK government bonds	258	18
UK corporate bonds	262	47
UK equities	338	16

Sources: Bank of America Merrill Lynch, DMO, PRA regulatory data, Thomson Reuters Datastream, and Bank calculations.

(a) Life insurers include life and composite insurers.
(b) Equity holdings include investments in equity funds. Government bond and corporate bond holdings include investments in debt funds.
(c) Data as at end-Q1 2016.

Insurers' investment behaviour is therefore important for financial market functioning. And public policy should avoid creating incentives for insurers to act in ways that amplify changes in asset prices, potentially contributing to 'fire sales', impaired market liquidity or price misalignments.

Procyclical investment behaviour can be characterised in terms of portfolio reallocations that take place in response to economic or market conditions. These reallocations typically involve changes in risk profile, and may be observed either across asset classes (eg switching between equity and fixed income securities) or within a given asset class (eg switching between investment-grade and high-yield corporate bonds).

In 2013, the Bank of England established an industry working group to examine the investment behaviour of insurers and pension funds. It found evidence of procyclical investment behaviour by international and UK insurance companies following the dotcom crash of the early 2000s, but found less evidence of procyclical behaviour during the 2008–09 global financial crisis.[1]

The working group identified a number of drivers of insurers' investment behaviour, which relate to different types of UK insurance business. In the United Kingdom, there are two main types of life insurance product:

- Non-linked products (that represent £0.7 trillion of assets), where insurance firms bear all or part of the market risk on asset holdings, and regulation is a key driver of investment behaviour. Examples include annuities and with-profits products.

- Unit-linked products (that represent £1 trillion of assets), where policyholders typically bear the market risk on asset holdings. Policyholders' investment decisions are a key driver of investment behaviour for unit-linked products.

The potential for insurers that sell each of these types of product to behave procyclically is examined in turn.

Non-linked products and Solvency II

Solvency II, which came into force on 1 January 2016, is the first forward-looking, risk-based prudential regulatory regime for insurers to be applied across Europe. It aims to enhance the level of policyholder protection and improve the resilience of the insurance sector.

Solvency II introduces a number of features which have a bearing on investment behaviour…

Three features introduced under Solvency II have a particular bearing on investment behaviour:

- **The so-called 'risk margin'.** Solvency II introduces a 'risk margin' provision that increases the value of a firm's liabilities to reflect the compensation another firm might require to accept the transfer of those liabilities, were it to fail. The risk margin has a bearing on insurers' solvency positions and therefore could affect investment behaviour, as well as risk management decisions.

- **New countercyclical solvency measures.** Under Solvency II, the so-called 'matching adjustment' cushions certain life insurers' capital resources, subject to conditions and prior approval, by enabling firms to look through the impact of short-term market movements on assets when valuing liabilities.[2]

- **Increased market transparency.** Insurers are required to disclose regularly their solvency positions to regulators and market analysts. This might incentivise firms to build capital buffers above regulatory requirements and increase their resilience to shocks. But it might also incentivise firms to dispose of risky assets in times of stress.

(1) 'Procyclicality and structural trends in investment allocation by insurance companies and pension funds'; www.bankofengland.co.uk/publications/Documents/news/2014/dp310714.pdf.
(2) The matching adjustment replaces the so-called 'liquidity premium' under the former Individual Capital Adequacy Standards (ICAS) regime.

…some of which may be undesirable…

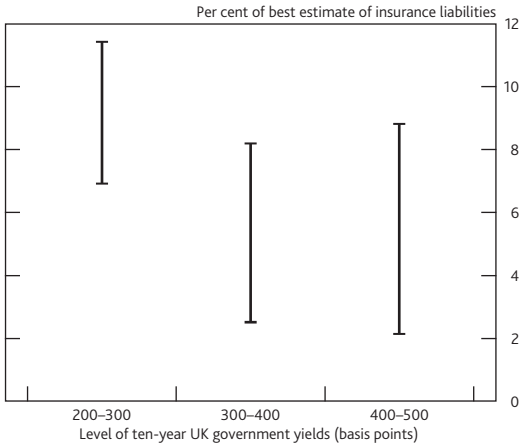
The implementation of the new regime has led to the identification of some specific instances where Solvency II may not be working as intended. These were highlighted by the Bank in its response to the European Commission's Call for Evidence on the EU Regulatory Framework for Financial Services.(1)

One issue identified relates to the risk margin, which, under its current design, is very sensitive to prevailing risk-free interest rates, particularly for firms with long-dated annuity books. The risk margin is currently calculated by multiplying a cost of capital — which is invariant to changes in financial market conditions, including risk-free interest rates — by the net present value of future capital requirements. As risk-free interest rates fall, the net present value of future capital requirements increases.(2) This can cause the value of the risk margin to increase considerably.

The risk margin's sensitivity to risk-free interest rates increases the volatility of insurers' solvency positions (that is, the excess of insurers' capital resources over their capital requirements). From a macroprudential perspective, this could incentivise procyclical investment behaviour by encouraging insurers to de-risk as risk-free interest rates fall. It could also reduce insurers' incentives to hold long-term, risky assets.

Furthermore, empirical evidence suggests that, from a microprudential perspective, the sensitivity of the risk margin to interest rates cannot be justified based on historical evidence on the cost of transferring insurance business, which the risk margin is intended to reflect. In particular, Bank analysis finds that the margin at which insurance liabilities have transferred between firms in the past is not strongly correlated with interest rates (**Chart B**).(3)

Chart B Range of past transfer margins of UK life insurers' liabilities compared to ten-year UK government bond yields



Sources: PRA regulatory data, Thomson Reuters Datastream and Bank calculations.

…as evidenced by a model of insurers' expected future investment behaviour.

Since Solvency II's introduction, there is little evidence that the risk margin has encouraged insurers to invest procyclically, or that it has reduced their willingness to provide stable finance for long-term assets. For example, despite the UK ten-year swap rate falling by 104 basis points over the first half of 2016, large UK insurers experienced only modest deteriorations in their solvency positions.

This is, in part, because insurers are currently able to use so-called 'transitional measures on technical provisions' (TMTPs). These offset the impact of the risk margin on insurance liabilities written before the introduction of Solvency II. While TMTPs are in place, insurers are able to apply to recalculate TMTPs if their risk profiles change materially.(4)

However, the impact of these TMTPs will continue to wane gradually over the next fifteen years. Bank staff have therefore developed an asset allocation model to assess insurers' expected future investment behaviour as TMTPs run-off. Throughout, we focus on annuity writers, who are particularly affected by the introduction of Solvency II.

The model assumes that insurers' asset allocations are based on their objective to maximise shareholders' profits, but — at the same time — to be mindful of a breach of regulatory capital requirements.(5)

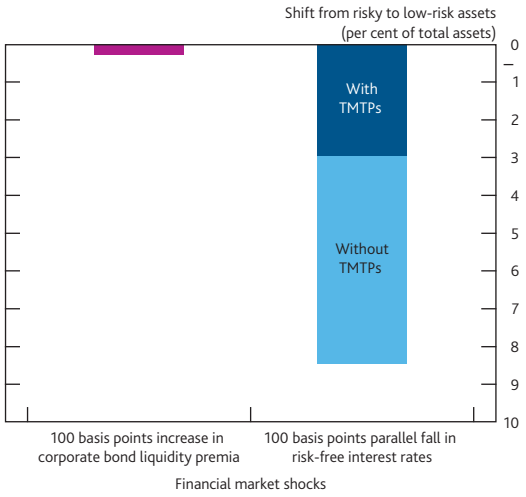
Insurers appear resilient to increases in credit spreads, but may be encouraged to de-risk following risk-free interest rate falls.

When spreads between corporate bond yields and risk-free interest rates widen, the model suggests that life insurers' investment responses are limited under Solvency II. This is because the matching adjustment allows insurers to 'look through' much of any short-term change in spreads, and therefore protects their solvency positions. As a result, following a 100 basis points increase in corporate bond spreads due to a rise in liquidity premia — that is, the compensation investors require to bear the liquidity risk

(1) 'Bank of England Response to European Commission Call for Evidence on EU Regulatory Framework for Financial Services.' www.bankofengland.co.uk/financialstability/Pages/regframework/response.aspx.
(2) For providers of annuities, this effect is accentuated because lower risk-free interest rates increase estimated future capital requirements themselves, particularly because of their exposure to increased longevity.
(3) Transfer premiums typically increase with the amount of the best estimate, which in turn increases with lower risk-free interest rates. But staff found that the level of risk-free interest rates was not associated with an *additional* effect on the premium.
(4) In May 2016, the PRA set out the scope for firms to recalculate their transitional measures in response to the market environment. It invited eligible firms to apply to recalculate their TMTPs to account for changes in market conditions, including sharp falls in market interest rates. The FPC supported the position of the PRA in the July 2016 *Report*.
(5) It also assumes that insurers do not take actions to reduce the variability of the risk margin through hedging or reduce risks through reinsurance of longevity risk. The design of the risk margin allows firms to assume that market risks can be hedged at the point where the liabilities are transferred to another firm in run-off. But insurance risks, such as longevity, are assumed to remain unhedged.

associated with holding bonds — insurers substitute only 0.3% of their portfolios from risky to low-risk assets (**Chart C**).

Chart C Insurers' estimated investment responses to selected financial market shocks[a][b]



Sources: PRA regulatory data and Bank calculations.

(a) 'Low-risk assets' mainly include cash, government bonds and corporate bonds with a credit rating of A or above, but also include a subset of investment funds and other assets; we define 'risky assets' as insurers' residual asset holdings.
(b) 'With TMTPs' reflects where Solvency II has been in place for one year, such that the impact of TMTPs is reduced by 1/16. 'Without TMTPs' reflects where Solvency II has been in place for 16 years, such that the impact of TMTPs is reduced entirely.

The model also considers investment responses to changes in risk-free interest rates. While TMTPs are in place, insurers face only moderate incentives to de-risk following falls in risk-free interest rates. In particular, for a 100 basis points fall in risk-free interest rates, insurers find it optimal to switch about 3% of their asset portfolios from risky to low-risk assets (**Chart C**).

But as TMTPs run-off, similar falls in risk-free interest rates encourage insurers to switch a larger proportion — an additional 5.5% — of their asset portfolios from risky to low-risk assets. In the model, this is driven by the risk margin, which, under its current design, is very sensitive to risk-free interest rates.

The procyclicality arises because interest rate falls increase the value of the risk margin and therefore worsen insurers' solvency positions. This encourages them to reduce the variance of their asset portfolios by disposing of risky assets and investing instead in low-risk assets to reduce the risk of a further deterioration in their solvency positions. Such behaviour could amplify changes in market prices.

The risk margin may also reduce life insurers' incentives to invest in long-term, risky assets.

Certain aspects of Solvency II encourage life insurers to match their liabilities to policyholders against increased holdings of long-term, risky assets. One example of this is the matching adjustment, which reduces the volatility of insurers' solvency positions. The benefit provided by the matching adjustment is greater than that provided by the comparable measure included under the previous regulatory regime in the United Kingdom.

But the model also suggests that the risk margin provides a counteracting disincentive to hold long-term, risky assets, particularly when TMTPs are not available or cannot be recalculated.(1) The additional balance sheet volatility that is introduced by the risk margin incentivises insurers to minimise other sources of risk, including from holdings of long-term, risky assets. This could impact life insurers' ability to invest in a way that matches policyholders' long-term savings interests, and affect companies' ability to raise stable, long-term finance.

The FPC judges that limiting the sensitivity of the risk margin to changes in risk-free interest rates would have macroprudential benefits. This should be addressed, including through the forthcoming review of Solvency II by the European Commission. Such incentives to invest procyclically should also be avoided in the ICS for insurers, which are being developed by the IAIS.

Unit-linked funds and policyholder behaviour

Unit-linked funds are a type of pooled investment offered by insurance companies through their life or pension policies. About £1 trillion of assets are managed through the funds to which these policies are linked. These funds offer customers exposure to a broad range of asset classes, and are significant investors in UK financial markets.(2)

Although unit-linked funds are linked to long-term contracts issued by insurance companies, these funds share some economic similarities with open-ended investment funds. For example: policyholders typically bear the investment risk; funds are typically structured to allow investors to change their asset allocations at short notice (for instance, in the form of switches between funds); and funds invest in both liquid and less liquid assets. In the United Kingdom, unit-linked funds are similar in size to UK-authorised open-ended investment funds, which managed about £870 billion of assets at end-2015.

The FPC completed a review of investment funds in 2015 (see the December 2015 *Report*). It noted that the activities of open-ended investment funds that offer short-term redemptions have the potential to amplify market stress

(1) As with the procyclicality results, the model assumes that insurers' business models do not change materially over time, in particular, that they take no additional actions to reduce, or further hedge against, the value of their risk margins. Insurers could hedge some of the volatility but this raises costs.
(2) Unit-linked funds hold £124 billion of UK government bonds, £78 billion of UK corporate bonds, and £269 billion of UK equities. These estimates are based on the same methodology as for **Table 1**.

through procyclical behaviour by investors. Given the similarities between these and unit-linked funds, it is therefore appropriate to assess whether unit-linked funds are likely to pose similar risks to market functioning.

Risks of procyclical investment by unit-linked funds may be lower than for investment funds…

Unit-linked policyholders might be expected to be less responsive to changes in financial market conditions than investors in investment funds. This is because most unit-linked policies facilitate long-term pension savings, the holders of which may be willing to look through short-term fluctuations in asset prices. And even if policyholders request to switch funds, these switches may not translate one-for-one into asset disposals by unit-linked funds. This is because, just like investment funds, unit-linked insurers can use several 'tools' to manage liquidity risk.

First, unit-linked funds can limit or suspend withdrawals. Second, insurers can purchase the units that policyholders switch out of, and thereby take the risk associated with these units onto their own balance sheets.

In times of market stress, however, insurers may be less likely to increase the riskiness of their own balance sheets where this leads to an increase in regulatory capital requirements. As with investment funds, unit-linked insurers may also have incentives not to limit or suspend policyholder switches, for instance, in order to protect their franchises' reputations.

…but evidence suggests a cohort of policyholders may invest procyclically in response to falls in risky asset prices.

Evidence suggests that the vast majority of unit-linked policyholders tend not to respond to short-term changes in financial markets. But this does not preclude the existence of a cohort of policyholders that actively manage their asset portfolios.

Based on a recent Bank survey of unit-linked providers, there is tentative evidence of increased switching rates by policyholders following substantial falls in risky asset prices. These increases in switching rates typically reflect reallocations from risky to less risky assets, including cash.

The FPC notes the economic similarities between open-ended investment funds and unit-linked funds, including their comparable asset holdings and potential risks from investor behaviour, particularly during times of stress. The Bank will include assets held by the insurance sector, including unit-linked funds, in its system-wide stress simulation designed to assess the resilience of market liquidity.

The FPC's current workplan for 2017

In its response to the Chancellor's remit and recommendations letter in May this year, the FPC said it planned to review, update and publish its medium-term work programme later in 2016.(1) This chapter takes stock of the work that the FPC plans to undertake in 2017.

Risk assessment

The FPC has a statutory responsibility to identify, monitor and take action to remove or reduce systemic risks with a view to protecting and enhancing the resilience of the UK financial system. It will continue to assess the risks listed in this *Report*, and others as they emerge. As part of this, the FPC will continue to assess the financial stability implications of the United Kingdom's withdrawal from the European Union, as that process develops.

Banking sector resilience

Stress testing

The 2017 stress test will, for the first time, include two scenarios: the annual cyclical scenario, intended to assess risks to the banking system emanating from the financial cycle; and the biennial exploratory scenario (BES), designed to complement the annual cyclical scenario by probing the resilience of the system to risks that may not be neatly linked to the financial cycle. This will allow an examination of emerging or latent threats to financial stability including, among other things, slow-burn risks affecting the banking sector, and how these risks develop over a longer forecast horizon than the cyclical scenario.

The Bank intends that the first exploratory scenario will consider the impact of weak global supply growth, persistently low interest rates and a continuation of other structural changes on profitability on individual banks and the sector as a whole. The forecast horizon of the 2017 BES will be seven years in order to capture the full impact of this persistent weakness. The 2016 stress-test results provide further details on the 2017 BES.(2)

The seven banks that participated in the 2016 stress test will participate in both scenarios in 2017.

Framework for bank capital requirements

In December 2015, the FPC set out its assessment of the overall calibration of the risk-weighted capital framework for UK banks. The assessment rested on a number of judgements, in particular progress on international work to address definitional shortcomings in measures of risk-weighted assets, the effectiveness of arrangements for resolving banks and the economic costs of higher capital requirements. The FPC has said previously that a natural point for a full review of these judgements would be in 2019, as the final elements of the Basel III capital framework are phased in. But there will be a first opportunity to assess some of the judgements underlying the capital framework in 2017.

The FPC has also committed to review the UK leverage ratio framework in 2017. The review will consider: progress towards an international standard for a minimum leverage ratio requirement and implications for the calibration of the UK leverage ratio framework; recalibration of the UK leverage ratio standard to adjust, following the FPC's decision in July 2016, for the exclusion of central bank reserves from the exposure measure of the leverage ratio; and the scope of application of the framework, including whether to extend the minimum leverage ratio requirement and countercyclical leverage ratio buffer to all PRA-regulated banks, building societies and investment firms from 2018, and whether the leverage ratio framework should apply to individual entities within groups or subgroups that are also subject to risk-weighted requirements.

Market-based finance resilience

The FPC has committed to carry out an annual assessment of risks and regulation beyond the core banking sector and a regular deep analysis of a range of activities undertaken by the non-bank financial system.

The conclusions of the FPC's latest annual assessment are set out in the Financial stability risk and regulation beyond the core banking sector chapter. Looking ahead, the FPC has asked the Bank to complete an in-depth assessment of the financial stability risks associated with derivative transactions. This will review progress towards implementation of the post-crisis reforms in derivatives markets and consider whether there are any implications for the resilience of the financial system. This work will contribute to a broader review by the Financial Stability Board. In addition, the FPC will assess the extent to which trade repository data are sufficient for assessing the distribution of risks across the system from derivative transactions and any improvements that should be considered.

(1) See www.bankofengland.co.uk/financialstability/Documents/fpc/letters/governorletter260516.pdf.
(2) See www.bankofengland.co.uk/financialstability/Documents/fpc/results301116.pdf.

The FPC also continues to analyse developments in market liquidity and potential risks associated with open-ended investment funds, following on from in-depth assessments in these areas in 2015. The FPC supports the Bank's work to develop a system-wide stress simulation to assess the dynamics of markets under stress. It will include an analysis of the behaviour of various sectors — such as open-ended investment funds, insurance companies and dealers. That exercise will identify any material gaps in the data needed to assess risks.

The FPC's medium-term priorities

In 2013, the FPC established three medium-term priorities in addition to its overarching priority to identify systemic risks and take action to remove or reduce them. These were to:

- establish a medium-term capital framework for banks;
- end 'too big to fail', including through development of the new resolution regime; and
- ensure diverse and resilient sources of market-based finance.

In 2017 the FPC will review progress against these priorities and develop its approach to the next phase of this work.

The FPC has also decided to conduct a review of its overall strategy for setting policy to guard against risks stemming from the mortgage market in 2017 (see The FPC's review of its 2014 mortgage market Recommendations chapter).

Annex 1: Previous macroprudential policy decisions

This annex lists FPC Recommendations from previous periods that have been implemented since the previous *Report*, as well as Recommendations and Directions that are currently outstanding. It also includes those FPC Policy decisions that have been implemented by rule changes and are therefore still in force.

Each Recommendation or Direction has been given an identifier to ensure consistent referencing over time. For example, the identifier 13/Q1/6 refers to the sixth Recommendation made following the 2013 Q1 Committee meeting.

Recommendations implemented since the previous *Report*

16/Q2/2	**Reduction of PRA supervisory buffers reflecting risks that would be captured by a UK countercyclical capital buffer rate**	Implemented

The FPC recommends to the PRA that, where existing PRA supervisory buffers of PRA-regulated firms reflect risks that would be captured by a UK countercyclical capital buffer rate, it reduce those buffers, as far as possible and as soon as practicable, by an amount of capital which is equivalent to the effect of a UK countercyclical capital buffer rate of 0.5%.

The PRA Board agreed to implement the Recommendation and published a Statement and letter to firms explaining how their PRA buffers were to be adjusted. Firms have communicated their updated PRA buffer calculations to the PRA and these have been reviewed by PRA supervisors.

The FPC supports the expectation of the PRA Board that firms do not increase dividends and other distributions as a result of this action.

16/Q3/1	**Exclusion of claims on central banks from the leverage exposure measure**	Implemented

The FPC recommends to the PRA that, when applying its rules on the leverage ratio, it considers allowing firms to exclude from the calculation of the total exposure measure those assets constituting claims on central banks where they are matched by deposits accepted by the firm that are denominated in the same currency and of identical or longer maturity.

The FPC made this Recommendation at its additional July meeting. This was announced on 4 August, on the same day the PRA issued a statement saying it would implement the Recommendation, and invited firms currently subject to the UK leverage framework to apply for a temporary rule modification to that effect.

The explanation of the FPC's decision is set out in the Records of the meetings on 28 June and 1 July, and 25 July.(1)

FPC will consult and decide on the appropriate form of recalibration of the UK leverage ratio standard following the exclusion as part of its 2017 review of the leverage ratio framework.

(1) www.bankofengland.co.uk/financialstability/Pages/fpc/meetings/default.aspx.

Recommendations and Directions currently outstanding

14/Q3/1	**Powers of Direction over housing instruments**	Action under way

The FPC recommends that HM Treasury exercise its statutory power to enable the FPC to direct, if necessary to protect and enhance financial stability, the PRA and FCA to require regulated lenders to place limits on residential mortgage lending, both owner-occupied and buy-to-let, by reference to: (a) loan to value ratios; and (b) debt to income ratios, including interest coverage ratios in respect of buy-to-let lending.

Legislation granting the FPC powers of Direction over loan to value (LTV) and debt to income limits in respect of mortgages on owner-occupied properties came into force in April 2015.

HM Treasury published a response document related to its consultation on granting the FPC powers of Direction over buy-to-let lending and laid the legislation before Parliament on 16 November 2016. HM Treasury has said publicly that subject to parliament approving the legislation it expects the FPC to have the powers from early 2017.

On 18 November, the FPC published a draft update to its existing Policy Statement(1) on housing instruments (which covered powers of Direction in respect of mortgages on owner-occupied properties), to include a description of how the FPC intends to use its proposed powers of Direction over buy-to-let lending.

15/Q2/3	**CBEST vulnerability testing**	Action under way

The FPC recommends that the Bank, the PRA and the FCA work with firms at the core of the UK financial system to ensure that they complete CBEST tests and adopt individual cyber resilience action plans. The Bank, the PRA and the FCA should also establish arrangements for CBEST tests to become one component of regular cyber resilience assessment within the UK financial system.

Thirty of the 35 core firms have now completed CBEST cyber vulnerability tests (up from 23 at the time of the July 2016 *Report*). Those firms which have completed CBEST tests have implemented individual cyber resilience action plans to address vulnerabilities identified. Work by the UK authorities (the Bank, the FCA and HM Treasury) to develop proposals for embedding CBEST testing into the supervisory toolkit and firms' own regular risk management processes is also under way.

At its November meeting, the FPC completed a statutory review of the Recommendation and agreed that it should be maintained.

Alongside its Recommendation on CBEST testing, in June 2015, the FPC endorsed a broader work programme by the authorities to enhance financial system cyber resilience to: review the list of core firms to ensure that it captures those most critical to financial stability in the event of a major cyber attack; define and develop a clear set of capabilities that will enhance the financial system's resilience and improve its ability to respond to and recover from a major cyber attack; and develop co-operation with international authorities. This work programme is under way. In November, the FPC received a progress update on the work programme. It will receive a further update in 2017 H1.

16/Q2/1	**Distribution of capital to meet 'fair shares' of systemic buffers**	Action under way

The FPC recommends to the PRA that it should seek to ensure that, where systemic buffers apply at different levels of consolidation, there is sufficient capital within the consolidated group, and distributed appropriately across it, to address both global systemic risks and domestic systemic risks.

This Recommendation was made at the FPC's May 2016 meeting to agree the final systemic risk buffer (SRB) framework. The explanation for the Recommendation was set out in the Record of that meeting.(2) The PRA has consulted on its planned approach to implement this Recommendation(3) and now intends to issue a policy statement containing the final policy. The FPC will review progress against the Recommendation after this date.

(1) www.bankofengland.co.uk/financialstability/Pages/fpc/policystatements.aspx.
(2) www.bankofengland.co.uk/financialstability/Pages/fpc/meetings/default.aspx.
(3) www.bankofengland.co.uk/pra/Pages/publications/cp/2016/cp2516.aspx.

Other FPC policy decisions which remain in place

The table below sets out previous FPC decisions, which remain in force, on the setting of its policy tools. The calibration of these tools is kept under review.

Countercyclical capital buffer (CCyB)

The FPC reduced the UK CCyB rate from 0.5% to 0% of banks' UK exposures with immediate effect at its July meeting. At the time it stated that absent any material change in the outlook, and given the need to give banks the clarity necessary to facilitate their capital planning, it expected to maintain a 0% UK CCyB rate until at least June 2017. At its meeting on 23 November, the FPC agreed to maintain the UK CCyB rate at 0% and reaffirmed this expectation. This rate is reviewed on a quarterly basis.

The United Kingdom has also previously reciprocated a number of foreign CCyB decisions — for more details see the Bank of England website.(1) Under PRA rules, foreign CCyB rates applying from 2016 onwards will be automatically reciprocated up to 2.5%.

Prevailing FPC Recommendation on mortgage affordability tests

When assessing affordability in respect of a potential borrower, UK mortgage lenders are required to have regard to any prevailing FPC Recommendation on appropriate interest rate stress tests. This requirement is set out in FCA rule MCOB 11.6.18(2).(2) In June 2014, the FPC made the following Recommendation (14/Q2/1):

When assessing affordability, mortgage lenders should apply an interest rate stress test that assesses whether borrowers could still afford their mortgages if, at any point over the first five years of the loan, Bank Rate were to be 3 percentage points higher than the prevailing rate at origination. This Recommendation is intended to be read together with the FCA requirements around considering the effect of future interest rate rises as set out in MCOB 11.6.18(2).

At its November meeting, the FPC completed a statutory review of the Recommendation. It decided to maintain the Recommendation and not to amend its calibration. The explanation for this is set out in The FPC's review of its 2014 mortgage market Recommendations chapter.

Recommendation on loan to income ratios

In June 2014, the FPC made the following Recommendation (14/Q2/2):

The Prudential Regulation Authority (PRA) and the Financial Conduct Authority (FCA) should ensure that mortgage lenders do not extend more than 15% of their total number of new residential mortgages at loan to income ratios at or greater than 4.5. This Recommendation applies to all lenders which extend residential mortgage lending in excess of £100 million per annum. The Recommendation should be implemented as soon as practicable.

The PRA and the FCA have published their respective approaches to implementing this Recommendation: the PRA has issued a Policy Statement, including rules,(3) and the FCA has issued general guidance.(4)

The FPC reviewed this Recommendation in November and decided not to amend the calibration. The explanation for this is set out in The FPC's review of its 2014 mortgage market Recommendations chapter.

(1) www.bankofengland.co.uk/financialstability/Pages/fpc/ccbrates.aspx.
(2) http://fshandbook.info/FS/html/FCA/MCOB/11/6.
(3) www.bankofengland.co.uk/pra/Documents/publications/ps/2014/ps914.pdf.
(4) www.fca.org.uk/news/fg14-08.

Annex 2: Core indicators

Table A.1 Core indicator set for the countercyclical capital buffer[a]

Indicator	Average, 1987–2006[b]	Average 2006[c]	Minimum since 1987[b]	Maximum since 1987[b]	Previous value (oya)	Latest value (as of 18 November 2016)
Non-bank balance sheet stretch[d]						
1 Credit to GDP[e]						
Ratio	117.1%	152.1%	86.9%	172.2%	139.3%	145.1% (2016 Q2)
Gap	6.4%	6.2%	-25.5%	20.8%	-25.5%	-16.8% (2016 Q2)
2 Private non-financial sector credit growth[f]	10.1%	9.8%	-3.1%	22.8%	2.9%	4.4% (2016 Q2)
3 Net foreign asset position to GDP[g]	-2.3%	-10.3%	-22.4%	18.5%	-12.5%	-3.0% (2016 Q2)
4 Gross external debt to GDP[h]	183.0%	309.9%	114.2%	398.0%	297.9%	319.0% (2016 Q2)
of which bank debt to GDP	*120.9%*	*195.0%*	*78.6%*	*267.6%*	*160.7%*	*178.7% (2016 Q2)*
5 Current account balance to GDP[i]	-1.7%	-2.2%	-7.0%	0.8%	-4.7%	-5.9% (2016 Q2)
Conditions and terms in markets						
6 Long-term real interest rate[j]	3.10%	1.27%	-1.92%	5.29%	-0.50%	-1.22% (18 Nov. 2016)
7 VIX[k]	19.1	12.8	10.5	65.5	15.9	15.8 (18 Nov. 2016)
8 Global corporate bond spreads[l]	84 bps	84 bps	74 bps	482 bps	165 bps	127 bps (18 Nov. 2016)
9 Spreads on new UK lending						
Household[m]	480 bps	352 bps	285 bps	840 bps	643 bps	667 bps (Sep. 2016)
Corporate[n]	104 bps	97 bps	82 bps	392 bps	222 bps	232 bps (May 2016)
Bank balance sheet stretch[o]						
10 Capital ratio						
Basel II core Tier 1[p]	6.6%	6.3%	6.1%	12.3%	n.a.	n.a.
Basel III common equity Tier 1[q]	n.a.	n.a.	n.a.	n.a.	12.0%	13.5% (2016 Q3)
11 Leverage ratio[r]						
Simple	4.7%	4.1%	2.9%	6.6%	6.2%	6.2% (2016 H1)
Basel III (2014 proposal)	n.a.	n.a.	n.a.	n.a.	4.6%	4.7% (2016 H1)
12 Average risk weights[s]	53.6%	46.4%	34.0%	65.4%	37.4%	34.0% (2016 H1)
13 Return on assets before tax[t]	1.0%	1.1%	-0.2%	1.5%	0.3%	0.3% (2016 H1)
14 Loan to deposit ratio[u]	114.5%	132.4%	95.9%	133.3%	97.3%	96.2% (2016 H1)
15 Short-term wholesale funding ratio[v]	n.a.	24.3%	10.5%	26.5%	13.5%	10.5% (end-2015)
of which excluding repo funding	*n.a.*	*15.6%*	*4.5%*	*15.7%*	*6.2%*	*4.5% (end-2015)*
16 Overseas exposures indicator: countries to which UK banks have 'large' and 'rapidly growing' total exposures[w][x]		In 2006 Q4: AU, BR, CA, CH, CN, DE, ES, FR, IE, IN, JP, KR, KY, LU, NL, US, ZA			In 2015 Q2: KY	In 2016 Q2: DE, JP, KY, NL
17 CDS premia[y]	12 bps	8 bps	6 bps	298 bps	72 bps	103 bps (Nov. 2016)
18 Bank equity measures						
Price to book ratio[z]	2.13	1.94	0.49	2.86	0.88	0.71 (Nov. 2016)
Market-based leverage ratio[aa]	9.7%	7.8%	1.9%	15.7%	5.5%	4.6% (Nov. 2016)

Table A.2 Core indicator set for sectoral capital requirements[a]

Indicator	Average, 1987–2006[b]	Average 2006[c]	Minimum since 1987[b]	Maximum since 1987[b]	Previous value (oya)	Latest value (as of 18 November 2016)
Bank balance sheet stretch[o]						
1 Capital ratio						
Basel II core Tier 1[p]	6.6%	6.3%	6.1%	12.3%	n.a.	n.a.
Basel III common equity Tier 1[q]	n.a.	n.a.	n.a.	n.a.	12.0%	13.5% (2016 Q3)
2 Leverage ratio[r]						
Simple	4.7%	4.1%	2.9%	6.6%	6.2%	6.2% (2016 H1)
Basel III (2014 proposal)	n.a.	n.a.	n.a.	n.a.	4.6%	4.7% (2016 H1)
3 Average mortgage risk weights[ab]	n.a.	n.a.	13.7%	22.4%	15.1%	13.7% (2016 H1)
UK average mortgage risk weights[ac]	n.a.	n.a.	11.0%	15.8%	11.6%	11.0% (2016 H1)
4 Balance sheet interconnectedness[ad]						
Intra-financial lending growth[ae]	12.0%	13.0%	-18.8%	45.5%	-14.8%	10.2% (2016 H1)
Intra-financial borrowing growth[af]	14.1%	13.7%	-21.5%	29.5%	-10.0%	-8.5% (2016 H1)
Derivatives growth (notional)[ag]	37.7%	34.2%	-25.9%	52.0%	-25.9%	17.8% (2016 H1)
5 Overseas exposures indicator: countries to which UK banks have 'large' and 'rapidly growing' non-bank private sector exposures[ah][x]		In 2006 Q4: AU, CA, DE, ES, FR, IE, IT, JP, KR, KY, NL, US, ZA			In 2015 Q2: —	In 2016 Q2: KY
Non-bank balance sheet stretch[d]						
6 Credit growth						
Household[ai]	10.3%	11.2%	-0.6%	19.6%	2.7%	4.0% (2016 Q2)
Commercial real estate[aj]	15.3%	18.5%	-9.7%	59.8%	-3.5%	1.6% (2016 Q3)
7 Household debt to income ratio[ak]	100.1%	141.8%	78.2%	150.5%	131.4%	133.1% (2016 Q2)
8 PNFC debt to profit ratio[al]	237.0%	297.0%	157.0%	407.4%	264.0%	294.3% (2016 Q2)
9 NBFI debt to GDP ratio (excluding insurance companies and pension funds)[am]	56.4%	122.0%	14.0%	176.8%	133.5%	131.4% (2016 Q2)
Conditions and terms in markets						
10 Real estate valuations						
Residential price to rent ratio[an]	100.0	151.1	66.9	160.6	135.7	141.3 (2016 Q3)
Commercial prime market yields[ao]	5.4%	4.0%	3.8%	7.3%	4.0%	4.1% (2016 Q3)
Commercial secondary market yields[ao]	8.9%	5.8%	5.4%	10.9%	7.0%	6.1% (2016 Q3)
11 Real estate lending terms						
Residential mortgage LTV ratio (mean above the median)[ap]	90.6%	90.6%	81.6%	90.8%	86.6%	87.5% (2016 Q3)
Residential mortgage LTI ratio (mean above the median)[ap]	3.8	3.8	3.6	4.1	4.0	4.1 (2016 Q3)
Commercial real estate mortgage LTV (average maximum)[aq]	77.6%	78.3%	57.7%	79.6%	64.5%	57.7% (2016 H1)
12 Spreads on new UK lending						
Residential mortgage[ar]	81 bps	50 bps	34 bps	361 bps	155 bps	179 bps (Sep. 2016)
Commercial real estate[as]	137 bps	135 bps	119 bps	422 bps	255 bps	248 bps (2016 Q2)

(a) A spreadsheet of the series shown in this table is available at www.bankofengland.co.uk/financialstability/Pages/fpc/coreindicators.aspx.
(b) If the series starts after 1987, the average between the start date and 2006 and the maximum/minimum since the start date are used.
(c) 2006 was the last year before the start of the global financial crisis.
(d) The current vintage of ONS data is not available prior to 1997. Data prior to this and beginning in 1987 have been assumed to remain unchanged since *The Blue Book 2013*.
(e) Credit is defined as debt claims on the UK private non-financial sector. This includes all liabilities of the household and not-for-profit sector except for the unfunded pension liabilities and financial derivatives of the not-for-profit sector, and private non-financial corporations' (PNFCs') loans and debt securities excluding direct investment loans and loans secured on dwellings. The credit to GDP gap is calculated as the percentage point difference between the credit to GDP ratio and its long-term trend, where the trend is based on a one-sided Hodrick-Prescott filter with a smoothing parameter of 400,000. See Countercyclical Capital Buffer Guide at www.bankofengland.co.uk/financialstability/Pages/fpc/coreindicators.aspx for further explanation of how this series is calculated. Sources: BBA, ONS Revell, J and Roe, A (1971); 'National balance sheets and national accounting — a progress report', *Economic Trends*, No. 211 and Bank calculations.
(f) Twelve-month growth rate of nominal credit (defined as the four-quarter cumulative net flow of credit as a proportion of the stock of credit twelve months ago). Credit is defined as above. Sources: ONS and Bank calculations.
(g) As per cent of annual GDP (four-quarter moving sum). Sources: ONS and Bank calculations.
(h) Ratios computed using a four-quarter moving sum of GDP. Monetary financial institutions (MFIs) cover banks and building societies resident in the United Kingdom. Sources: ONS and Bank calculations.
(i) As per cent of quarterly GDP. Sources: ONS and Bank calculations.
(j) Five-year real interest rates five years forward, derived from the Bank's index-linked government liabilities curve. Sources: Bloomberg and Bank calculations.
(k) One-month moving average. The VIX is a measure of market expectations of 30-day volatility as conveyed by S&P 500 stock index options prices. Sources: Bloomberg and Bank calculations.
(l) Global corporate bond spreads' refers to a one-month moving average of the global aggregate market non-financial corporate bond spread. This tracks the performance of investment-grade corporate debt publicly issued in the global and regional markets from both developed and emerging market issuers. Index constituents are weighted based on market value. Spreads are option-adjusted (ie they show the number of basis points the matched-maturity government spot curve needs to be shifted in order to match a bond's present value of discounted cash flows). Prior to 2016, published versions of this indicator showed the BofA Merrill Lynch Global Industrial Index. Sources: Barclays and Bank calculations.
(m) The household lending spread is a weighted average of mortgage and unsecured lending spreads, with weights based on relative volumes of new lending. The mortgage spread is a weighted average of quoted mortgage rates over risk-free rates, using 90% LTV two-year fixed-rate mortgages and 75% LTV tracker, two and five-year fixed-rate mortgages. Spreads are taken relative to gilt yields of matching maturity for fixed-rate products until August 2009, after which spreads are taken relative to OIS of matching maturity. Spreads are taken relative to Bank Rate for the tracker product. The unsecured component is a weighted average of spreads on credit cards, overdrafts and personal loans. Spreads on unsecured lending are taken relative to Bank Rate. FCA Product Sales Data includes regulated mortgage contracts only but is used to weight all mortgage products. Series starts in 1997. Sources: Bank of England, CML, FCA Product Sales Data and Bank calculations.
(n) The UK corporate lending spread is a weighted average of: SME lending rates over Bank Rate; CRE average senior loan margins over Bank Rate; and, as a proxy for the rate at which banks lend to large, non-CRE corporates, UK investment-grade company bond spreads over maturity-matched government bond yields (adjusted for any embedded option features such as convertibility into equity). Weights are based on relative volumes of new lending. Series starts in October 2002. Sources: Bank of America Merrill Lynch Global Research, Bank of England, Bloomberg, British Bankers' Association, De Montfort University, Department for Business, Energy and Industrial Strategy and Bank calculations.
(o) Unless otherwise stated, indicators are based on the major UK bank peer group defined as: Abbey National (until 2003); Alliance & Leicester (until 2007); Bank of Ireland (from 2005); Bank of Scotland (until 2000); Barclays; Bradford & Bingley (from 2001 until 2007); Britannia (from 2005 until 2008); Co-operative Banking Group (from 2005); Halifax (until 2000); HBOS (from 2001 until 2008); HSBC (from 1992); Lloyds TSB/Lloyds Banking Group; Midland (until 1991); National Australia Bank (from 2005); National Westminster (until 1999); Nationwide; Northern Rock (until 2011); Royal Bank of Scotland; Santander (from 2004); TSB (until 1994); Virgin Money (from 2012) and Woolwich (from 1990 until 1997). Accounting changes, eg the introduction of IFRS in 2005 result in discontinuities in some series. Restated figures are used where available.
(p) Major UK banks' aggregate core Tier 1 capital as a percentage of their aggregate risk-weighted assets. The core Tier 1 capital ratio series starts in 2000 and uses the major UK banks peer group as at 2014 and their constituent predecessors. Data exclude Northern Rock/Virgin Money from 2008. From 2008, core Tier 1 ratios are as published by banks, excluding hybrid capital instruments and making deductions from capital based on PRA definitions. Prior to 2008, that measure was not typically disclosed and Bank calculations approximating it as previously published in the *Financial Stability Report* are used. The series are annual until end-2012, half-yearly until end-2013 and quarterly afterwards. Sources: PRA regulatory returns, published accounts and Bank calculations.
(q) The Basel II series was discontinued with CRD IV implementation on 1 January 2014. The 'Basel III common equity Tier 1 capital ratio' is calculated as aggregate peer group common equity Tier 1 levels over aggregate risk-weighted assets, according to the CRD IV definition as implemented in the United Kingdom. The Basel III peer group includes Barclays, Co-operative Banking Group, HSBC, Lloyds Banking Group, Nationwide, RBS and Santander UK. Sources: PRA regulatory returns and Bank calculations.
(r) A simple leverage ratio calculated as aggregate peer group equity (shareholders' claims) over aggregate peer group assets over aggregate Basel 2010 leverage ratio exposure. The Basel III (2014) series corresponds to aggregate peer group CRD IV end-point Tier 1 capital over aggregate Basel 2014 exposure measure. Note that the simple series excludes Northern Rock/Virgin Money from 2008. The Basel III series consists of Barclays, Co-operative Banking Group, HSBC, Lloyds Banking Group, Nationwide, RBS and Santander UK. The series are annual until end-2012 and half-yearly afterwards. Sources: PRA regulatory returns, published accounts and Bank calculations.
(s) Aggregate end-year peer group risk-weighted assets divided by aggregate end-year peer group published balance sheet assets. Data for 2014 H1 onwards are on a CRD IV basis. Series begins in 1992 and is annual until end-2012 and half-yearly afterwards. Sources: Published accounts and Bank calculations.
(t) Calculated as major UK banks' annual profit before tax as a proportion of total assets, averaged over the current and previous year. When banks in the sample have merged, aggregate profits for the year are approximated by those of the acquiring group. Series is annual until 2015 when it becomes semi-annual. Sample includes National Australia Bank between 2005 and 2015 H1. Sources: Published accounts and Bank calculations.
(u) Major UK banks' loans and advances to customers as a percentage of customer deposits, where customer refers to all non-bank borrowers and depositors. Repurchase agreements are excluded from loans and deposits where disclosed. One weakness of the current measure is that it is not possible to distinguish between retail deposits from households and deposits placed by non-bank financial corporations on a consolidated basis. Additional data collections would be required to improve the data in this area. The series begins in 2000 and is annual until end-2012 and half-yearly afterwards. Sample includes National Australia Bank between 2005 and 2015 H1. Sources: Published accounts and Bank calculations.
(v) Share of total funding (including capital) accounted for by wholesale funding with residual maturity of under three months. Wholesale funding comprises deposits by banks, debt securities, subordinated liabilities and repo. Funding is proxied by total liabilities excluding derivatives and liabilities to customers under investment contracts. Where underlying data are not published estimates have been used. Repo includes repurchase agreements and securities lending. The series starts in 2005. Sample includes National Australia Bank between 2005 and 2015 H1. Sources: Published accounts and Bank calculations.
(w) This indicator highlights the countries where UK-owned monetary financial institutions' (MFIs') overall exposures are greater than 10% of UK-owned MFIs' tangible equity on an ultimate risk basis and have grown by more than 1.5 times nominal GDP growth in that country. Foreign exposures as defined in BIS consolidated banking statistics. Uses latest data available, with the exception of tangible equity figures for 2006–07, which are estimated using published accounts. Sources: Bank of England, ECB, IMF *World Economic Outlook* (*WEO*), Thomson Reuters Datastream, published accounts and Bank calculations.
(x) Abbreviations used are: Australia (AU), Brazil (BR), Canada (CA), Switzerland (CH), People's Republic of China (CN), Germany (DE), Spain (ES), France (FR), Ireland (IE), Italy (IT), Hong Kong (HK), India (IN), Japan (JP), Republic of Korea (KR), Cayman Islands (KY), Luxembourg (LU), Malaysia (MY), Netherlands (NL), Singapore (SG), Taiwan (TW), United Arab Emirates (AE), United States (US) and South Africa (ZA).
(y) Average of major UK banks' five-year senior CDS premia, weighted by total assets until 2014 and by half-year total assets in 2015. Series starts in 2003. Includes Nationwide from July 2003, and National Australia Bank between 2005 and 2015 H1. Sources: Markit Group Limited, published accounts and Bank calculations.
(z) Relates the share price with the book, or accounting, value of shareholders' equity per share. Averages of the ratios in the peer group, weighted by end-year total assets. The sample comprises the major UK banks and National Australia Bank between 2005 and 2015 H2, excluding Britannia, Co-operative Banking Group, and Nationwide. Northern Rock/Virgin Money is excluded from 2008. Series starts in 2000. Sources: Thomson Reuters Datastream, published accounts and Bank calculations.
(aa) Total peer group market capitalisation divided by total peer group assets (note a discontinuity due to introduction of IFRS accounting standards in 2005, which tends to reduce leverage ratios thereafter). The sample comprises the major UK banks, excluding Britannia, Co-operative Banking Group and Nationwide. National Australia Bank is included between 2005 and 2015 H2. Northern Rock/Virgin Money is excluded from 2008. Series starts in 2000. Sources: Thomson Reuters Datastream, published accounts and Bank calculations.
(ab) Sample consists of Barclays Group, Co-operative Banking Group, HSBC Holdings Group, Lloyds Banking Group, Nationwide Building Society Group, RBS Group, Santander UK Group and excludes Nationwide for 2008 H2 only. Average risk weights for residential mortgages (exposures on the Retail IRB method only) are calculated as total risk-weighted assets divided by total exposure value for all banks in the sample. Calculated on a consolidated basis, except for Nationwide for 2014 H2/2015 H1 where only solo data were available. Series starts in 2009 and is updated half-yearly. Sources: PRA regulatory returns and Bank calculations.
(ac) Sample consists of Bank of Scotland, Barclays Bank, HSBC Bank, Lloyds Bank, National Westminster Bank, Nationwide, Santander UK, Co-operative Bank, Royal Bank of Scotland, Ulster Bank and excludes Nationwide for 2008 H2 only. Average risk weights for residential mortgages (exposures on the Retail IRB method only) are calculated as total risk-weighted assets divided by total exposure value for all banks in the sample. Calculated on an unconsolidated basis, Royal Bank of Scotland data includes National Westminster, Ulster Bank and RBS. Historical data updated as of June 2016 to improve data series consistency. Series starts in 2009 and is updated half-yearly. Sources: PRA regulatory returns and Bank calculations.
(ad) The disclosures the series are based on are not currently sufficient to ensure that all intra-financial activity is included in these series, nor is it possible to be certain that no real-economy activity is included. Additional data collections would be required to improve the data in this area. The intra-financial lending and borrowing growth series are adjusted for the acquisitions of Midland by HSBC in 1992, and of ABN AMRO by RBS in 2007 to avoid reporting large growth rates resulting from step changes in the size and interconnectedness of the major UK bank peer group. Series exclude National Australia Bank.
(ae) Lending to other banks and other financial corporations. Growth rates are year on year. Latest value shows growth rate for year to 2016 H1. Data point excludes National Australia Bank. Sources: Published accounts and Bank calculations.
(af) Wholesale borrowing, composed of deposits from banks and non-subordinated securities in issue. Growth rates are year on year. Latest value shows growth rate for year to 2016 H1. Data point excludes National Australia Bank. One weakness of the current measure is that it is not possible to distinguish between retail deposits and deposits placed by non-bank financial institutions on a consolidated basis. Sources: Published accounts and Bank calculations.
(ag) Based on notional value of derivatives (some of which may support real economy activity). The sample includes Barclays, HSBC and RBS who account for a significant share of UK banks' holdings of derivatives, though the sample could be adjusted in the future should market shares change. Series starts in 2002. Growth rates are year on year. Latest value shows growth rate for year to 2016 H1. Sources: Published accounts and Bank calculations.
(ah) This indicator highlights the countries where UK-owned MFIs' non-bank private sector exposures are greater than 10% of UK-owned MFIs' tangible equity on an ultimate risk basis and have grown by more than 1.5 times nominal GDP growth in that country. Foreign exposures as defined in BIS consolidated banking statistics. Overseas sectoral exposures cannot currently be broken down further at the non-bank private sector level. The intention is to divide them into households and corporates as new data become available. Uses latest data available, with the exception of tangible equity figures for 2006–07, which are estimated using published accounts. Sources: Bank of England, ECB, IMF *World Economic Outlook (WEO)*, Thomson Reuters Datastream, published accounts and Bank calculations.
(ai) The twelve-month growth rate of nominal credit. Defined as the four-quarter cumulative net flow of credit divided by the stock of credit twelve months ago. Credit is defined as all liabilities of the household and not-for-profit sector except for the unfunded pension liabilities and financial derivatives of the not-for-profit sector. Sources: ONS and Bank calculations.
(aj) Four-quarter growth rate of UK-resident MFIs' loans to the real estate sector. The real estate sector is defined as: buying, selling and renting of own or leased real estate; real estate and related activities on a fee or contract basis; and development of buildings. Non seasonally adjusted. Quarterly data. Data cover lending in both sterling and foreign currency from 1998 Q4. Prior to this period, data cover sterling only. Source: Bank of England.
(ak) Gross debt as a percentage of a four-quarter moving sum of disposable income. Includes all liabilities of the household sector except for the unfunded pension liabilities and financial derivatives of the non-profit sector. The household disposable income series is adjusted for financial intermediation services indirectly measured (FISIM). Sources: ONS and Bank calculations.
(al) Gross debt as a percentage of a four-quarter moving sum of gross operating surplus. Gross debt is measured as loans and debt securities excluding derivatives, direct investment loans and loans secured on dwellings. The corporate gross operating surplus series is adjusted for FISIM. Sources: ONS and Bank calculations.
(am) Gross debt as a percentage of four-quarter moving sum of nominal GDP. The NBFI sector includes all financial corporations apart from monetary financial institutions (ie deposit taking institutions). This indicator additionally excludes insurance companies and pension funds. Sources: ONS and Bank calculations.
(an) Ratio between an average of the seasonally adjusted Halifax and Nationwide house price indices and RPI housing rent. The series is rebased so that the average between 1987 and 2006 is 100. Sources: Halifax/Markit, Nationwide, ONS and Bank calculations.
(ao) The prime (secondary) yield is the ratio between the weighted averages, across the lowest (highest) yielding quartile of commercial properties, of MSCI Inc.'s measures of rental income and capital values. Sources: MSCI Inc. and Bank calculations.
(ap) Mean LTV (respectively LTI) ratio on new advances above the median LTV (LTI) ratio, based on loans to first-time buyers, council/registered social tenants exercising their right to buy and homemovers, and excluding lifetime mortgages and advances with LTV above 130% (LTI above 10x). FCA Product Sales Data includes regulated mortgage contracts only. Series starts in 2005. Sources: FCA Product Sales Data and Bank calculations.
(aq) Average of the maximum offered loan to value ratios across major CRE lenders. Series starts in 2002. Sources: De Montfort University and Bank calculations.
(ar) The residential mortgage lending spread is a weighted average of quoted mortgage rates over risk-free rates, using 90% LTV two-year fixed-rate mortgages and 75% LTV tracker, two and five-year fixed-rate mortgages. Spreads are taken relative to gilt yields of matching maturity for fixed-rate products until August 2009, after which spreads are taken relative to OIS of matching maturity. Spreads are taken relative to Bank Rate for the tracker product. Weights based on relative volumes of new lending. Series starts in 1997. FCA Product Sales Data includes regulated mortgage contracts only. Sources: Bank of England, Bloomberg, CML, FCA Product Sales Data and Bank calculations.
(as) The CRE lending spread is the average of senior loan margins across major CRE lenders relative to Bank Rate. Series starts in 2002. Sources: Bank of England, Bloomberg, De Montfort University and Bank calculations.

Table A.3 Core indicator set for LTV and DTI limits[a]

Indicator	Average, 1987–2006[b]	Average 2006[c]	Minimum since 1987[b]	Maximum since 1987[b]	Previous value (oya)	Latest value (as of 18 November 2016)
Lender and household balance sheet stretch						
1 LTI and LTV ratios on new residential mortgages						
Owner-occupier mortgage LTV ratio (mean above the median)[d]	90.6%	90.6%	81.6%	90.8%	86.8%	87.5% (2016 Q3)
Owner-occupier mortgage LTI ratio (mean above the median)[d]	3.8	3.8	3.6	4.1	4.0	4.1 (2016 Q3)
Buy-to-let mortgage LTV ratio (mean)[e]	n.a.	n.a.	70.9%	78.6%	71.6%	71.3% (2016 Q2)
2 Household credit growth[f]	10.3%	11.2%	-0.6%	19.6%	2.7%	4.0% (2016 Q2)
3 Household debt to income ratio[g]	100.1%	141.8%	78.2%	150.5%	131.4%	133.1% (2016 Q2)
of which: mortgages[h]	*70.8%*	*103.8%*	*50.7%*	*113.2%*	*101.0%*	*101.7% (2016 Q2)*
of which: owner-occupier mortgages[i]	*80.6%*	*95.0%*	*67.2%*	*100.0%*	*85.0%*	*84.3% (2016 Q2)*
Conditions and terms in markets						
4 Approvals of loans secured on dwellings[j]	97,915	119,036	26,709	134,915	69,619	62,932 (Sep. 2016)
5 Housing transactions[k]	130,081	139,088	51,700	223,051	105,000	93,130 (Sep. 2016)
Advances to homemovers[l]	48,985	59,342	14,300	93,500	33,100	31,400 (Sep. 2016)
% interest only[m]	53.3%	31.0%	1.8%	81.3%	2.7%	2.2% (Sep. 2016)
Advances to first-time buyers[l]	39,179	33,567	8,500	55,800	28,000	31,500 (Sep. 2016)
% interest only[m]	52.1%	24.0%	0.0%	87.9%	0.4%	0.0% (Sep. 2016)
Advances to buy-to-let purchasers[l]	10,128	14,113	3,600	29,200	11,100	6,400 (Sep. 2016)
% interest only[n]	n.a.	n.a.	50.0%	74.3%	69.6%	70.7% (2016 Q2)
6 House price growth[o]	1.8%	2.2%	-5.6%	7.0%	2.0%	0.7% (Oct. 2016)
7 House price to household disposable income ratio[p]	3.0	4.6	2.2	4.8	4.3	4.5 (2016 Q2)
8 Rental yield[q]	5.8%	5.1%	4.8%	7.6%	5.1%	5.0% (May 2016)
9 Spreads on new residential mortgage lending						
All residential mortgages[r]	81 bps	50 bps	34 bps	361 bps	155 bps	179 bps (Sep. 2016)
Difference between the spread on high and low LTV residential mortgage lending[r]	18 bps	25 bps	1 bps	293 bps	102 bps	90 bps (Oct. 2016)
Buy-to-let mortgages[s]	n.a.	n.a.	61 bps	398 bps	272 bps	259 bps (2016 Q2)

(a) A spreadsheet of the series shown in this table is available at www.bankofengland.co.uk/financialstability/Pages/fpc/coreindicators.aspx.
(b) If the series start after 1987, the average between the start date and 2006 and the maximum/minimum since the start date are used.
(c) 2006 was the last year before the global financial crisis.
(d) Mean LTV (respectively LTI) ratio on new advances above the median LTV (LTI) ratio, based on loans to first-time buyers, council/registered social tenants exercising their right to buy and homemovers, and excluding lifetime mortgages and advances with LTV ratio above 130% (LTI above 10x). FCA Product Sales Data includes regulated mortgage contracts only. Series starts in 2005. Sources: FCA Product Sales Data and Bank calculations.
(e) Estimated mean LTV ratio of new non-regulated lending advances, of which buy-to-let is 88% by value. The figures include further advances and remortgages. The raw data is categorical: the share of mortgages with LTV ratio less than 75%; between 75% and 90%; between 90% and 95%; and greater than 95%. An approximate mean is calculated by giving these categories weights of 70%, 82.5%, 92.5% and 97.25% respectively. Series starts in 2007. Sources: Bank of England and Bank calculations.
(f) The twelve month growth rate of nominal credit. Defined as the four-quarter cumulative net flow of credit divided by the stock of credit twelve months ago. Credit is defined as all liabilities of the household and not-for-profit sector except for the unfunded pension liabilities and financial derivatives of the not-for-profit sector. Sources: ONS and Bank calculations.
(g) Gross debt as a percentage of a four-quarter moving sum of disposable income. Includes all liabilities of the household sector except for the unfunded pension liabilities and financial derivatives of the non-profit sector. The household disposable income series is adjusted for financial intermediation services indirectly measured (FISIM). Sources: ONS and Bank calculations.
(h) Total debt secured on dwellings as a percentage of a four-quarter moving sum of disposable income. The household disposable income series is adjusted for financial intermediation services indirectly measured (FISIM). Sources: ONS and Bank calculations.
(i) Total debt associated with owner occupier mortgages divided by the four-quarter moving sum of disposable income. The household disposable income series is adjusted for FISIM. Owner occupier mortgage debt estimated by multiplying aggregate household debt secured on dwellings by the share of mortgages on lender balances that are not buy-to-let loans. Series starts in 1999. Sources: Council of Mortgage Lenders, ONS and Bank calculations.
(j) Data are for monthly number of house purchase approvals covering sterling lending by UK MFIs and other lenders to UK individuals. Approvals secured on dwellings are measured net of cancellations. Seasonally adjusted. Series starts in 1993. Source: Bank of England.
(k) The number of houses sold/bought in the current month is sourced from HMRC's Land Transaction Return. From 2008 the Return excluded properties priced at less than £40,000 (2006 and 2007 data have also been revised by HMRC to correct for this). Data prior to 2005 comes from the Survey of Property Transactions; the UK total figure is computed by assuming that transactions in the rest of the United Kingdom grew in line with England, Wales and Northern Ireland. Seasonally adjusted. Sources: Council of Mortgage Lenders, HMRC and Bank calculations.
(l) The number of new mortgages advanced for house purchase in the current month. Buy-to-let series starts in 2001. There are structural breaks in the series in April 2005 where the Council of Mortgage Lenders switches source. Data prior to 2002 are at a quarterly frequency. Sources: Council of Mortgage Lenders and Bank calculations.
(m) The share of new owner-occupied mortgages advanced for house purchase that are interest only. Interest-only mortgages exclude mixed capital and interest mortgages. There are structural breaks in the series in April 2005 where the Council of Mortgage Lenders switches source. Data prior to 2002 are at a quarterly frequency. Sources: Council of Mortgage Lenders and Bank calculations.
(n) The share of non-regulated mortgages that are interest only. The data include all mortgages, not just those for house purchase. Interest-only mortgages exclude mixed capital and interest mortgages. Sources: Bank of England and Bank calculations.
(o) House prices are calculated as the mean of the average UK house price as reported in the Halifax and Nationwide house price indices. Growth rate calculated as the percentage change three months on three months earlier. Series starts in 1991. Seasonally adjusted. Sources: Halifax/Markit, Nationwide and Bank calculations.
(p) The ratio is calculated using a four-quarter moving average of gross disposable income of the UK household and non-profit sector per household as the denominator. Aggregate household disposable income is adjusted for FISIM and changes in pension entitlements. Historical UK household population estimated using annual GB data assuming linear growth in the Northern Ireland household population between available data points. Series starts in 1990. Sources: Department for Communities and Local Government, Halifax/Markit, Nationwide, ONS and Bank calculations.
(q) Using Association of Residential Letting Agents (ARLA) data up until 2014. From 2015 onwards, the series uses LSL Property Services plc data normalised to the ARLA data over 2008 to 2014, when both series are available. Series starts in 2001. Sources: Association of Residential Letting Agents (ARLA), LSL Property Services plc and Bank calculations.
(r) The overall spread on residential mortgage lending is a weighted average of quoted mortgage rates over safe rates, using 90% LTV two-year fixed-rate mortgages and 75% LTV tracker, two and five-year fixed-rate mortgages. Spreads are taken relative to gilt years of matching maturity until August 2009, after which spreads are taken relative to OIS of the same maturity. Spreads are taken relative to Bank Rate for the tracker product. Weights are based on relative volumes of new lending. The difference in spread between high and low LTV lending is the rate on 90% LTV two-year fixed-rate mortgages less the 75% LTV two-year fixed-rate. Series starts in 1997. Sources: Bank of England, Bloomberg, Council of Mortgage Lenders, FCA Product Sales Data and Bank calculations.
(s) The spread on new buy-to-let mortgages is the weighted average effective spread charged on new floating and fixed-rate non-regulated mortgages over safe rates. Spreads are taken relative to Bank Rate for the floating-rate products. The safe rate for fixed-rate mortgages is calculated by weighting two-year, three-year and five-year risk-free interest rates by the number of buy-to-let fixed-rate mortgage products offered at these maturities. The risk-free rates are gilts of the appropriate maturity until August 2008, after which the OIS is used. Series starts in 2007. Sources: Bank of England, Moneyfacts and Bank calculations.

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Glossary and other information

Glossary of selected data and instruments

CDS – credit default swap.
CPI – consumer prices index.
ERI – exchange rate index.
GDP – gross domestic product.
OIS – overnight index swap.
RPI – retail prices index.

Abbreviations

AP – Authorised Participant.
AT1 – additional Tier 1.
BHPS – British Household Panel Survey.
BIS – Bank for International Settlements.
CBEST – UK Government's National Cyber Security Programme.
CBPS – Corporate Bond Purchase Scheme.
CCyB – countercyclical capital buffer.
CCP – central counterparty.
CET1 – common equity Tier 1.
CGFS – Committee on the Global Financial System.
CME – Chicago Mercantile Exchange.
CML – Council of Mortgage Lenders.
CRD IV – Capital Requirements Directive.
CRE – commercial real estate.
DMO – Debt Management Office.
DSR – debt-servicing ratio.
DTI – debt to income.
DTTC – Depository trust and Clearing Corporation.
ECB – European Central Bank.
ECC – Economic Consultative Committee.
EEA – European Economic Area.
EME – emerging market economy.
ESRB – European Systemic Risk Board.
ETF – exchange-traded fund.
EU – European Union.
FCA – Financial Conduct Authority.
FDI – foreign direct investment.
FISIM – financial intermediation services indirectly measured.
FMI – financial market infrastructure.
FPC – Financial Policy Committee.
FSA – Financial Services Authority.
FSB – Financial Stability Board.
FTSE – Financial Times Stock Exchange.
G-SIB – global systemically important bank.
HMRC – Her Majesty's Revenue and Customs.
IAIS –International Association of Insurance Supervisors.
ICAS – Individual Capital Adequacy Standards.
ICMA – International Capital Market Association.
ICS –International Capital Standards.
IFRS – International Financial Reporting Standard.
IIF – Institute of International Finance.
IMF – International Monetary Fund.
IOSCO – International Organization of Securities Commissions.
LBG – Lloyds Banking Group.
LTI – loan to income.
LTV – loan to value.
MCOB – Mortgages and Home Finance: Conduct of Business sourcebook.
MFI – monetary financial institution.
MMF – money market fund.
MSCI – Morgan Stanley Capital International Inc.
NAV – net asset value.
NBFI – non-bank financial institution.
NCSC – National Cyber Security Centre.
NIM – net interest margin.
NSFR – Net Stable Funding Ratio.
ONS – Office for National Statistics.
OTC – over the counter.
PNFC – private non-financial corporation.
PPI – payment protection insurance.
PRA – Prudential Regulation Authority.
PSD – Product Sales Database.
RBS – Royal Bank of Scotland.
RICS – Royal Institution of Chartered Surveyors.
RoE – return on equity.
SME – small and medium-sized enterprise.
SRB – systemic risk buffer.
S&P – Standard & Poor's.
TMTPs – transitional measures on technical provisions.
WEO – IMF *World Economic Outlook*.

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