Financial Stability Report

November 2017 | Issue No. 42

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.

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

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Executive summary

The Financial Policy Committee (FPC) aims to ensure the UK financial system is resilient to, and prepared for, the wide range of risks it could face — so that the system could support the real economy, even in difficult conditions.

The 2017 stress test shows the UK banking system is resilient to deep simultaneous recessions in the UK and global economies, large falls in asset prices and a separate stress of misconduct costs.

- The economic scenario in the test is more severe than the global financial crisis.
- In the test, banks incur losses of around £50 billion in the first two years of the stress. This scale of loss, relative to their assets, would have wiped out the common equity capital base of the UK banking system ten years ago. The stress test shows these losses can now be absorbed within the buffers of capital banks have on top of their minimum requirements.
- Major UK banks' capital strength has tripled since 2007; their Tier 1 capital ratio was in aggregate 16.7% in September 2017.
- For the first time since the Bank of England launched its stress tests in 2014, no bank needs to strengthen its capital position as a result of the stress test.

The FPC is raising the UK countercyclical capital buffer rate from 0.5% to 1%, with binding effect from 28 November 2018.

- This will establish a system-wide UK countercyclical capital buffer of £11.4 billion.
- Capital buffers for individual banks ('PRA buffers') will be set by the Prudential Regulation Committee (PRC) in light of the stress-test results. These will in part reflect the judgement made by the FPC and PRC in September 2017 that, following recent rapid growth, the loss rate on consumer credit in the first three years of the scenario would be 20%.
- The setting of the countercyclical and PRA buffers, as informed by the stress test, will not require banks to strengthen their capital positions. It will require them to incorporate some of the capital they currently have in excess of their regulatory requirements into their regulatory capital buffers.
- The purpose of these buffers is to be drawn on as necessary to allow banks to support the real economy in a downturn.

The stress-test scenario and the resulting setting of capital buffers reflect the FPC's assessment that, apart from those related to Brexit, domestic risks are at a standard level overall, and that risks from global debt levels, asset valuations and misconduct costs remain material.

There are also potential risks arising from the macroeconomic consequences of some possible Brexit outcomes.

- There are many possible combinations of risks that could result from a sudden exit from the European Union without a trade agreement. The outcome would depend on many factors, including the extent of contingency planning and government policies in the United Kingdom and European Union.

- In the stress scenario, there is a sudden reduction in investor appetite for UK assets and the sterling exchange rate falls to its lowest ever level against the dollar. Bank Rate rises to 4% and unemployment rises by more than in the financial crisis. UK commercial property prices fall by 40%, and UK residential property prices fall by 33% — the largest fall on record.

- The stress-test scenario therefore encompasses a wide range of UK macroeconomic risks that could be associated with Brexit.

- As a result, the FPC judges the UK banking system could continue to support the real economy through a disorderly Brexit.

However, the combination of a disorderly Brexit and a severe global recession and stressed misconduct costs could result in more severe conditions than in the stress test. In such circumstances, capital buffers would be drawn down substantially more than in the stress test and, as a result, banks would be more likely to restrict lending to the real economy.

The FPC will reconsider the adequacy of a 1% UK countercyclical capital buffer rate during the first half of 2018, in light of the evolution of the overall risk environment.

The FPC continues to assess the risks of disruption to UK financial services arising from Brexit so that preparations can be made and action taken to mitigate them.

- Ensuring a UK legal and regulatory framework for financial services is in place is essential to financial stability. The Government plans to achieve this with the EU Withdrawal Bill and related secondary legislation.

- It will be difficult, ahead of March 2019, for financial companies on their own to mitigate fully the risks of disruption to financial services. Timely agreement on an implementation period would reduce risks to financial stability.

- To preserve continuity of existing cross-border insurance and derivatives contracts, UK and EU legislation would be required. Six million UK policyholders, 30 million European Economic Area (EEA) policyholders, and around £26 trillion of outstanding uncleared derivatives contracts could otherwise be affected. HM Treasury is considering all options for mitigating risks to the continuity of outstanding cross-border financial services contracts.

- EEA-incorporated banks that operate in the United Kingdom as branches will need authorisation to operate in the United Kingdom. To maintain financial stability, the conditions for authorisation, particularly for systemic entities, will depend on the degree of co-operation established between regulatory authorities. The Prudential Regulation Authority plans to set out its approach to authorisations before the end of the year.

- 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 United Kingdom. This will require maintaining a level of resilience that is at least as great as that currently planned, which itself exceeds that required by international baseline standards.

The FPC and PRC have completed an exploratory exercise examining major UK banks' long-term strategic responses to an extended low growth, low interest rate environment with increasing competitive pressures from FinTech. Although banks suggest they could, by reducing costs, adapt without major strategic change or taking on more risk, there are clear risks to this.

- Competitive pressures enabled by FinTech may cause greater and faster disruption to banks' business models than banks project.

- The cost of maintaining and acquiring customers in a more competitive environment may reduce the scope for cost reductions or result in greater loss of market share.

- The cost of equity for banks may be higher than the 8% level they expect in this scenario. In a low growth, low interest rate environment, investors may perceive downside economic risks to be greater, raising the equity risk premium.

- Supervisors will now discuss the results of the exercise with banks, including the potential implications of these risks.

The FPC has completed an annual review of risk and regulation beyond the core banking sector. It is not recommending any changes to the regulatory perimeter at this stage.

- Market-based finance — the system of markets, non-bank financial institutions and infrastructure that provide financial services to support the real economy — now accounts for almost 50% of the UK financial system.

- The FPC has asked for an in-depth assessment of the use of leverage in the non-bank financial sector, focusing on leverage created through use of derivatives. The FPC has considered, and will continue to monitor, risks to the provision of market-based finance from the growth of electronic and algorithmic trading.

Overview of risks to UK financial stability and UK countercyclical capital buffer

The FPC judges that, apart from those related to Brexit, domestic risks are at a standard level overall, and that risks from global debt levels, asset valuations and misconduct costs remain material.

The 2017 stress test shows the UK banking system is resilient to deep simultaneous recessions in the UK and global economies, large falls in asset prices and a separate stress of misconduct costs. Informed by the stress-test results, the FPC is raising the UK countercyclical capital buffer rate from 0.5% to 1%, with binding effect from 28 November 2018.

There are also potential risks arising from the macroeconomic consequences of some possible Brexit outcomes. The stress-test scenario encompasses a wide range of UK macroeconomic risks that could be associated with Brexit. As a result, the FPC judges the UK banking system could continue to support the real economy through a disorderly Brexit.

However, the combination of a disorderly Brexit and a severe global recession and stressed misconduct costs could result in more severe conditions than in the stress test. The FPC will reconsider the adequacy of a 1% UK countercyclical capital buffer rate during the first half of 2018, in light of the evolution of the overall risk environment.

The FPC assesses the risks the financial system could face in an economic stress.

The FPC assesses the losses the financial system could face in a severe economic shock. This 'risk assessment' covers:

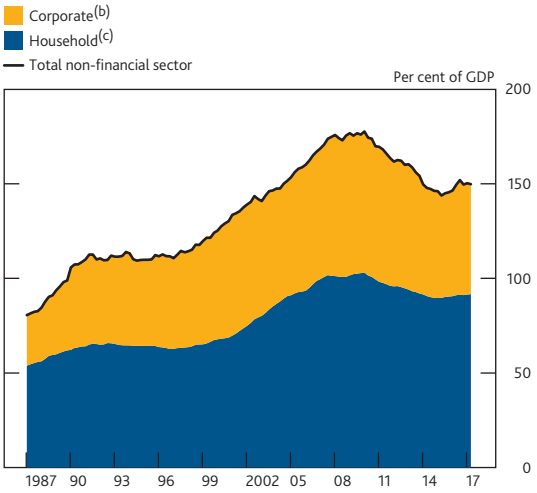
- The sensitivity of the financial system to economic shocks. To assess this, the FPC monitors the size and riskiness of the financial system's balance sheet.

- The size of economic shocks the system could face. For example, the FPC monitors the risk that highly indebted households could amplify economic downturns, or that falls in foreign investor sentiment for UK assets could drive a fall in domestic demand.

The FPC uses this assessment in aiming to ensure that the UK financial system is resilient to, and prepared for, the wide range of risks it could face — so that the system could support the real economy, even in difficult conditions. An important tool to achieve this is the system-wide countercyclical capital buffer (CCyB). This buffer of capital, which applies to the UK exposures of all banks, can be released following a stress,

Chart A.1 The ratio of debt to GDP in the UK real economy has fallen since the crisis, but remains high by historical standards

Components of private non-financial sector debt to GDP[a]

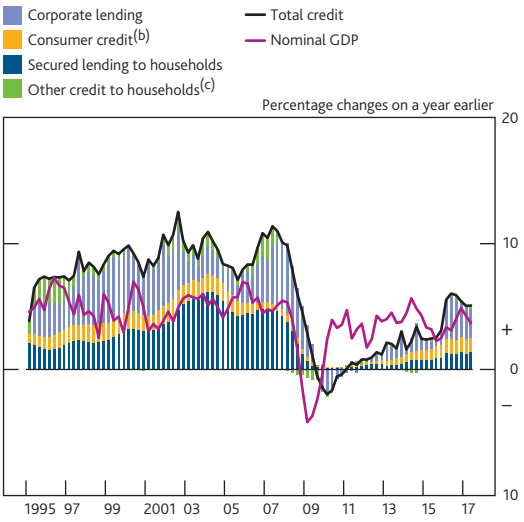


Sources: ONS and Bank calculations.

(a) Data are all currency and are non seasonally adjusted.
(b) Includes private non-financial corporations' (PNFCs') loans and debt securities, excluding direct investment loans and loans secured on dwellings.
(c) Includes all liabilities of households and non-profit institutions serving households (NPISH), except for unfunded pension liabilities and financial derivatives associated with NPISH.

Chart A.2 Total credit growth to the real economy is only a little faster than nominal GDP growth

Nominal GDP and contributions to total private non-financial sector credit growth[a]



Sources: ONS and Bank calculations.

(a) Credit is defined as debt claims on the UK private non-financial sector. This includes all liabilities of households and non-profit institutions serving households (NPISH), except for unfunded pension liabilities and financial derivatives associated with NPISH. Also contains PNFCs' loans and debt securities, excluding direct investment loans and loans secured on dwellings. Data are all currency and are non seasonally adjusted.
(b) Includes student loans. As student loans data are only available annually on a financial-year basis, periods after 2017 Q1 are estimated as total unsecured loans to households and NPISH, less monetary financial institutions' (MFIs') sterling loans to unincorporated businesses and the not-for-profit sector component.
(c) Calculated as the residual of total credit to households and NPISH, less secured and unsecured loans to individuals. The residual comprises of MFI loans to unincorporated businesses (for example sole traders), loans to NPISH, and household bills that are due but not yet paid.

enhancing the ability of the banking system to continue to support the economy.[1]

The FPC varies the UK CCyB rate to reflect the prevailing risk environment: when risks are high, either because banks could face bigger economic shocks or because they are more sensitive to them, a larger buffer is needed to absorb potential losses.

In its published strategy for setting the CCyB, the FPC signalled that it expects to set a UK CCyB rate in the region of 1% in a standard domestic risk environment. In June 2017, the FPC stated that, absent a material change in the outlook, it expected to increase the rate to 1% at its November meeting.

Stress testing supports this process. The annual cyclical scenario in the stress test was calibrated to reflect the FPC's view of the prevailing risk environment. The projected losses in the stress test provide an indication of the size of the capital buffers necessary for banks to withstand a shock.

The FPC's risk assessment currently focuses on: the domestic risk environment; asset valuations; debt levels in the global economy; and risks associated with Brexit. This chapter sets out the FPC's aggregate risk assessment, while individual risks are discussed in more detail in the subsequent chapters of this *Report*.

The FPC judges that, apart from those related to Brexit, domestic risks are at a standard level overall.

The FPC judges that apart from those related to Brexit, domestic risks are at a standard level overall. This judgement takes into account domestic credit conditions, including consumer credit, as well as the United Kingdom's external financing position.

While debt levels are high, overall credit growth is only a little above nominal GDP growth, and debt-servicing costs are low…

Credit conditions are a core element of the overall risk environment. High levels of debt, particularly when built up during periods of rapid credit growth with looser underwriting standards, leave the financial system at risk of incurring a higher level of losses, by:

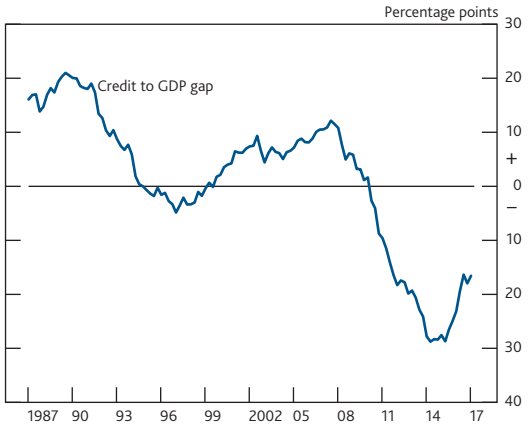
- Making lenders more exposed to losses. Highly indebted borrowers facing difficulties in servicing their debt can default, causing losses for lenders directly. This channel is most relevant to consumer credit.

- Raising the size of economic shocks banks could face. Highly indebted borrowers can cut their spending sharply in a downturn in order to continue to service their debts. This can amplify economic downturns and is most relevant to mortgage debt.

(1) The CCyB rate set by the FPC applies to all UK exposures, irrespective of the country of origin of the lender. Similarly, other countries set the CCyB rates that apply to lending by UK banks overseas. The CCyB applies to all banks, building societies and investment firms (other than those exempted by the FCA) incorporated in the United Kingdom. For more details on the CCyB see 'The Financial Policy Committee's approach to setting the countercyclical capital buffer', available online at www.bankofengland.co.uk/financialstability/Documents/fpc/policystatement050416.pdf.

Chart A.3 The private non-financial credit to GDP gap is negative

Private non-financial sector credit to GDP gap[a]

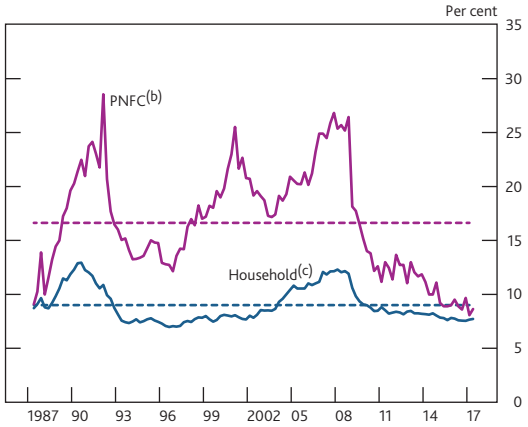


Sources: ONS, Revell, J and Roe, A (1971), 'National balance sheets and national accounting — a progress report', *Economic Trends*, No. 211, UK Finance and Bank calculations.

(a) Credit is defined as debt claims on the UK private non-financial sector. This includes all liabilities of households and non-profit institutions serving households (NPISH), except for unfunded pension liabilities and financial derivatives associated with NPISH. Also contains 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.

Chart A.4 Aggregate debt-servicing costs are low

Aggregate household and corporate debt-servicing ratios[a]



Sources: ONS and Bank calculations.

(a) Dashed lines show 1987–2017 averages.
(b) PNFC interest payments as a percentage of gross operating surplus, excluding the alignment adjustment and the effects of financial intermediation services indirectly measured (FISIM).
(c) Calculated as interest payments, plus mortgage principal repayments as a proportion of nominal post-tax household income. Household income has been adjusted for the effects of FISIM.

The overall stock of outstanding private non-financial sector debt in the real economy has fallen since prior to the crisis, though it remains high by historical standards, at 150% of GDP (**Chart A.1**).[1] Excluding student debt, the aggregate household debt to income ratio is 18 percentage points below its 2008 peak (see **Chart A.9** in the UK household indebtedness chapter). The FPC's judgement about the overall credit environment is also informed by the rate of growth and serviceability of that debt.

Credit growth is, in aggregate, only a little above nominal GDP growth. In the year to 2017 Q2, outstanding borrowing by households and non-financial businesses increased by 5.1%; in that same period, nominal GDP increased by 3.7% (**Chart A.2**). Excluding student loans, household debt has increased only a little faster than household incomes.[2] Corporate debt has fallen relative to corporate profits in recent years.

The United Kingdom's credit to GDP gap, which measures the difference between the ratio of credit to GDP and a simple statistical estimate of its long-term trend, remained significantly negative in 2017 Q2, suggesting that risks from credit growth are very subdued (**Chart A.3**).[3]

The cost of servicing debt for households and businesses is currently low (**Chart A.4**). The aggregate household debt-servicing ratio — defined as interest payments plus regular mortgage principal repayments as a share of household disposable income — is 7.7%, below its average since 1987 of 9%. The share of households with very high debt-servicing ratios is also small, and the FPC has policies in place to guard against the risk of a marked loosening in underwriting standards and any significant rise in the number of highly indebted households (see UK household indebtedness chapter). The ratio of non-financial businesses' interest payments to profits is 8.6%, around half its average since 1987.

…though there is a pocket of risk in consumer credit.

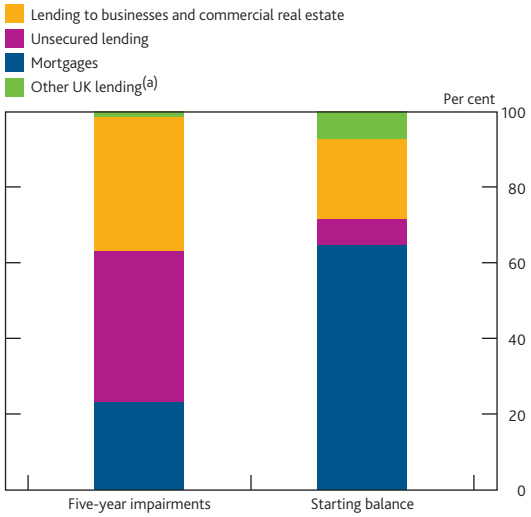
While overall domestic credit conditions do not point to elevated risk, consumer credit has been growing rapidly, creating a pocket of risk. The outstanding stock of consumer credit increased by 9.9% in the year to September 2017 (see **Chart A.15** in the UK household indebtedness chapter).

Rapid growth of consumer credit is not, in itself, a material risk to economic growth through its effect on household spending.

(1) In October 2017 the ONS published revisions to the National Accounts and Balance of Payments, which affected a range of indicators covered in this chapter, including measures of household and PNFC debt, the current account deficit and the stock of external debt. These changes are discussed in the box on 'Revisions to the National Accounts and the Balance of Payments' in the November 2017 *Inflation Report*; www.bankofengland.co.uk/publications/Documents/inflationreport/2017/nov.pdf.
(2) Repayments on UK student loans are income-contingent, unlike most other forms of household debt. Outstanding student loans are estimated to amount to 8% of disposable household income in 2017 Q2, their highest-ever level. The Bank's November 2017 *Inflation Report* set out that student loans are likely to continue to push up household debt in coming years; excluding them, debt is projected to grow broadly in line with income.
(3) This indicator has been strongly correlated with past financial crises. But as the FPC has previously noted, the long-term trend on which it is based currently gives undue weight to the rapid build-up in credit prior to the global financial crisis, which proved to be unsustainable.

Chart A.5 Consumer credit accounts for a high proportion of UK impairments in the stress test

Breakdown of major UK banks' starting balances and impairments for UK lending in the 2017 Annual Cyclical Scenario

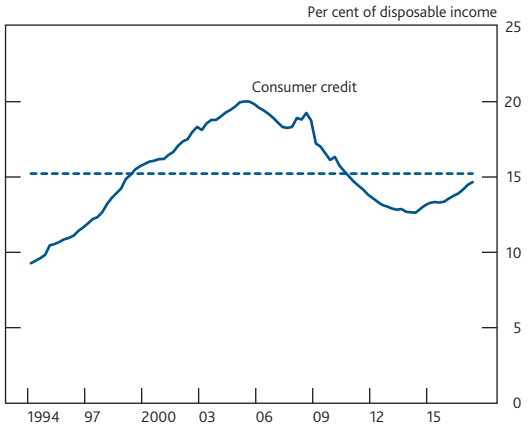


Sources: Participating banks' Stress Testing Data Framework data submissions, Bank analysis and calculations.

(a) Other UK lending includes exposures to financial institutions, local and central government, public sector entities and smaller wholesale portfolios.

Chart A.6 Consumer credit is not elevated as a share of household incomes

Outstanding consumer credit to income(a)(b)



Sources: Bank of England, ONS and Bank calculations.

(a) Gross consumer credit 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 non-profit institutions serving households (NPISH). The household disposable income series is adjusted for financial intermediation services indirectly measured (FISIM).
(b) Dashed line shows 1994–2017 average.

The flow of new consumer borrowing is equivalent to only 1.4% of consumer spending, and has made almost no contribution to the growth in aggregate consumer spending in the past year.

Consumer credit can instead pose a risk to financial stability by increasing the losses lenders incur in an economic shock. In the 2017 stress test, consumer credit accounts for 40% of overall UK impairments incurred by UK banks over the five years of the scenario, despite accounting for only 7% of their starting balances of UK loans (**Chart A.5**).

As a share of income, consumer credit is not elevated by historical standards (**Chart A.6**), and defaults on consumer credit have fallen in recent years, with write-off rates falling from 5% to 2% between 2011 and 2016. Low arrears rates may reflect underlying improvement in credit quality. However, as set out in the UK household indebtedness chapter, the FPC has judged that lenders overall have been attributing too much of the improvement in consumer credit performance in recent years to underlying improvement in consumer credit quality and too little to the macroeconomic environment. This has driven an expansion of the supply of credit, with, for example, lending rates on personal loans falling and promotional interest-free periods on balance transfer credit cards lengthening.

The United Kingdom may be vulnerable to a reduction in foreign investor appetite for UK assets.

The United Kingdom has a large external balance sheet and current account deficit. As discussed in the UK external financing chapter, recent capital inflows, which have focused on direct investment and long-term securities, appear less vulnerable to reversals than during the run-up to the financial crisis.

However, the United Kingdom is vulnerable to a reduction in foreign investor appetite for UK assets. If that occurred, credit conditions would be expected to tighten, domestic demand would weaken and the sterling exchange rate would depreciate. In this way, the United Kingdom's external financing position increases the scale of economic shocks the financial system could face.

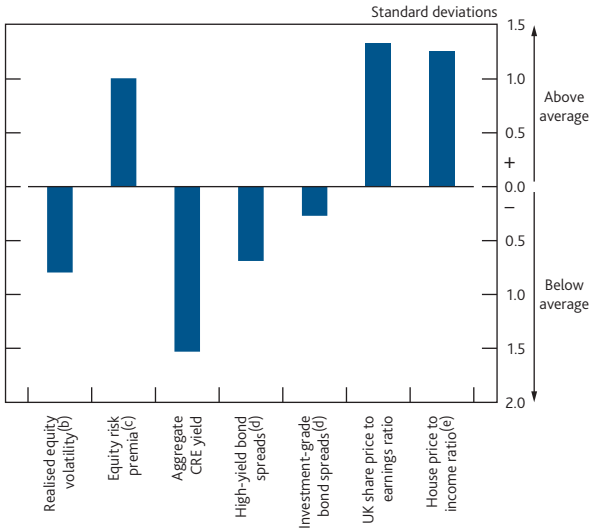
Some asset valuations may be vulnerable to adjustment…

Sharp downward adjustments in asset prices can amplify economic shocks, as the cost of bond and equity issuance increases and the value of collateral used to secure credit is diminished. Such asset price falls can also affect the financial system directly, through both adverse impacts on the collateral securing existing loans and losses on the assets held in trading portfolios. High asset valuations therefore increase the risks faced by the financial system.

As discussed in the Asset valuations chapter, investors in global markets may currently be placing excessive weight on the recent benign environment continuing. Growth has been moderate, inflation subdued, and market volatility low. In that

Chart A.7 There are signs that asset valuations may be vulnerable to a repricing

Indicators of asset valuations compared to historical averages[a]



Sources: Bloomberg Finance L.P., Department for Communities and Local Government, Halifax/Markit, HM Treasury, ICE BofAML, IMF *WEO*, MSCI Inc., Nationwide, ONS, Thomson Reuters Datastream and Bank calculations.

(a) Series start in 1987, except equity risk premia (2000), high-yield bond spreads (1997), investment-grade bond spreads (1998), and house price to income ratio (1990).
(b) Quarterly average of monthly standard deviation of log returns.
(c) Based on an estimated dividend discount model. See Dison, W and Rattan, A (2017), 'An improved model for understanding equity prices', *Bank of England Quarterly Bulletin*, Vol. 57, No. 2, pages 86–97; www.bankofengland.co.uk/publications/Pages/quarterlybulletin/2017/q2/a1.aspx.
(d) Three-month moving averages of daily data.
(e) Sum of gross disposable income of households and non-profit institutions serving households (NPISH), adjusted for financial intermediation services indirectly measured (FISIM). House prices are calculated as the mean of the average UK house price as reported in the Halifax and Nationwide house price indices. Seasonally adjusted. For more detail, see Annex 2 footnotes.

context, investors expect long-term interest rates to remain low and are willing to accept lower compensation for the risks they are taking. Risky asset prices may be vulnerable to a repricing, either through an increase in long-term interest rates or a downward adjustment in growth expectations, or both (**Chart A.7**).

In the United Kingdom, long-term interest rates and equity prices of domestically focused companies do appear to be factoring in pessimistic growth expectations and downside risks. In contrast, the compensation for risk demanded by investors in some sterling corporate bonds appears low, and valuations of some segments of the London commercial property market remain stretched. They appear to factor in the low level of long-term market interest rates but not necessarily the cash flows associated with the economic outlook embodied in such rates (see Asset valuations chapter).

…and risks stemming from debt in the global economy are elevated.

As with the domestic economy, high levels of debt can result in larger downside economic risks in foreign economies. If they materialise, these risks can spill over to the United Kingdom through trade and financial linkages. In particular, the UK banking system is directly exposed to the global economy. Forty-four per cent of large UK banks' total lending is to non-UK borrowers.[1]

Although near-term prospects for the global economy have continued to strengthen, risks from debt vulnerabilities in several major economies remain material. In China, economic growth continues to be supported by rapid credit expansion (see Global debt vulnerabilities chapter).

The risk environment was reflected in the 2017 stress-test scenario.

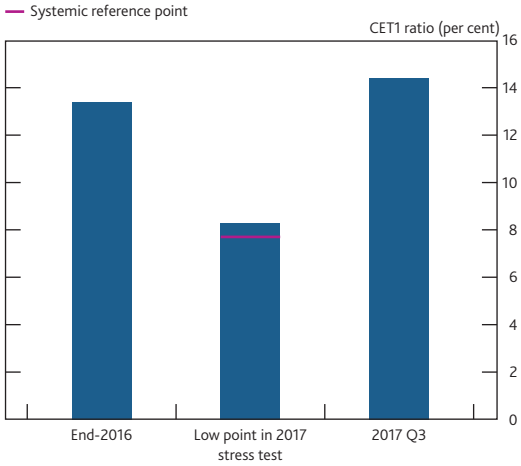
The annual cyclical scenario for the 2017 stress test captured a wide range of domestic and global risks.[2] In particular, the test incorporated:

- A severe consumer credit impairment rate of 20% over the first three years of the stress, as unemployment and interest rates increase sharply. The resulting losses across the banking system of £30 billion (of which £21 billion are incurred by the major banks in the stress test) are £10 billion higher than in the 2016 stress test.
- A sudden increase in the return investors demand for holding sterling assets and a 27% fall in the sterling exchange rate index.
- Sharp increases in interest rates and volatility measures, severe falls in sterling corporate bond and UK commercial real estate prices.

(1) Figure is from the seven banks participating in the 2017 stress test.
(2) See 'Stress testing the UK banking system: key elements of the 2017 stress test'; www.bankofengland.co.uk/financialstability/Documents/stresstesting/2017/keyelements.pdf.

Chart A.8 Major UK banks are resilient to the 2017 stress test

Aggregate common equity Tier 1 capital ratios for UK banks participating in the 2017 Annual Cyclical Scenario(a)



Sources: Participating banks' published accounts and Stress Testing Data Framework data submissions, Bank analysis and Bank calculations.

(a) The risk-weighted capital ratio is defined as CET1 capital expressed as a percentage of risk-weighted assets, where these are in line with CRR and the UK implementation of CRD IV via the PRA rulebook. Aggregate risk-weighted capital ratios are calculated by dividing aggregate CET1 capital by aggregate risk-weighted assets at the aggregate low point of the stress in 2018.

- A severe and synchronised global slowdown, with a 2.4% contraction in global output, larger than that experienced during the global financial crisis. Chinese GDP contracts by 1.2%.

- A separate stress of misconduct costs, which total around £40 billion over the five years of the stress. In aggregate, between 2011 and 2016 participating banks had paid out or provisioned for around £67 billion of misconduct costs. The stress scenario would therefore take total misconduct costs over the period from 2011 to 2021 to over £100 billion.

The stress test shows that the UK banking system is resilient to deep simultaneous recessions in the UK and global economies, large falls in asset prices and a separate stress of misconduct costs (**Chart A.8**).

The FPC is raising the UK countercyclical capital buffer rate to 1%.

The FPC is raising the system-wide UK CCyB rate from 0.5% to 1% with binding effect from 28 November 2018.(1)(2) This will establish a system-wide UK countercyclical capital buffer of £11.4 billion. This decision is:

- Consistent with the FPC's published strategy for setting the CCyB, in which it signalled that it expects to set a UK CCyB rate in the region of 1% in a standard risk environment.

- Consistent with the FPC's guidance in June 2017. At that time the Committee stated that, absent a material change in the outlook, it expected to increase the UK CCyB rate to 1% at its November meeting.

- Informed by the results of the stress test. The impact of the UK economic stress was equivalent to around 3.5% of relevant risk-weighted UK credit assets.(3) This suggests that the 2.5% capital conservation buffer should be supplemented with a 1% UK CCyB rate.

Capital buffers for individual banks ('PRA buffers') will also be set by the Prudential Regulation Committee (PRC) in light of the stress-test results. These will in part reflect the judgement made by the FPC and PRC in September 2017 that, following recent rapid growth, the loss rate on consumer credit in the first three years of the scenario would be 20%.

Once these buffers are set, banks will need to maintain a capital buffer that is, in total, big enough to absorb the effect of the stress-test scenario. The setting of the CCyB and PRA

(1) The increase in the CCyB rate will also lead to a proportional increase in major UK banks' leverage requirements via the countercyclical leverage buffer.
(2) Under EU law, the UK CCyB rate applies automatically (up to a 2.5% limit, and currently subject to a transition timetable) to the UK exposures of firms incorporated in other European Economic Area (EEA) states. The FPC expects it to apply also to internationally active banks in jurisdictions outside the EEA that have implemented the Basel III regulatory standards. Consistent with this, CCyB actions in 2017 by the Czech Republic, Hong Kong, Slovakia and Norway have been reciprocated.
(3) This does not include the part of UK consumer credit losses in the stress relating to the FPC's judgement on credit quality, which will be reflected in individual bank capital requirements rather than the UK CCyB rate.

buffers, as informed by the stress test, will not require banks to strengthen their capital positions. It will require them to incorporate some of the capital they currently hold in excess of their regulatory requirements into their regulatory capital buffers. The purpose of these regulatory capital buffers is to be drawn on as necessary to allow banks to support the real economy in a downturn.

The CCyB decision reflects the FPC's intention to vary the CCyB in gradual steps. The FPC is mindful of banks' capacity to generate capital internally through retained earnings. Increases in capital requirements that banks can meet through retained earnings should have a relatively small effect on the cost of capital to the real economy, whereas sharp increases that could prompt deleveraging by banks could have disproportionately large effects. The FPC recognises that banks may wish to maintain some headroom over their regulatory requirements, but the setting of capital buffers following this stress test is not expected to have a material impact on prevailing credit, or wider economic conditions.

The stress-test scenario encompasses a wide range of UK macroeconomic risks that could be associated with Brexit.

There are also potential risks arising from the macroeconomic consequences of some possible Brexit outcomes. The FPC has considered the risks associated with a range of possible outcomes for the United Kingdom's future relationship with the European Union and possible paths to that relationship. Consistent with its remit, the FPC is focused on scenarios that, even if they may be the least likely to occur, could have most impact on UK financial stability. This includes scenarios in which there is no agreement in place at the point of exit.

There are many possible combinations of risks that could result from a sudden exit from the European Union without a trade agreement. The outcome would depend on many factors, including the extent of contingency planning, and government policies in the United Kingdom and European Union across a very wide range of different issues such as tariffs, immigration, regulations and customs processes.

Given the severity of the 2017 stress-test scenario, the FPC judges that it encompasses a wide range of macroeconomic risks that could be associated with Brexit. As a result, the FPC judges the UK banking system could continue to support the real economy through a disorderly Brexit.

However, the combination of a disorderly Brexit and a severe global recession and stressed misconduct costs could result in more severe conditions than in the stress test. In such circumstances, capital buffers would be drawn down substantially more than in the stress test and, as a result, banks would be more likely to restrict lending to the real economy. The FPC will reconsider the adequacy of a 1% UK CCyB rate during the first half of 2018, in light of the evolution of the overall risk environment.

Risks to the provision of financial services from Brexit

The FPC continues to assess the risks of disruption to UK financial services arising from Brexit so that preparations can be made and action taken to mitigate them.

Ensuring a UK legal and regulatory framework for financial services is in place is essential to financial stability. The Government plans to achieve this with the EU Withdrawal Bill and related secondary legislation.

It will be difficult, ahead of March 2019, for financial companies on their own to mitigate fully the risks of disruption to financial services. Timely agreement on an implementation period would reduce risks to financial stability.

To preserve continuity of existing cross-border insurance and derivatives contracts, UK and EU legislation would be required. Six million UK policyholders, 30 million European Economic Area (EEA) policyholders, and around £26 trillion of outstanding uncleared derivatives contracts could otherwise be affected. HM Treasury is considering all options for mitigating risks to the continuity of outstanding cross-border financial services contracts.

EEA-incorporated banks that operate in the United Kingdom as branches will need authorisation to operate in the United Kingdom. To maintain financial stability, the conditions for authorisation, particularly for systemic entities, will depend on the degree of co-operation established between regulatory authorities. The PRA plans to set out its approach to authorisations before the end of the year.

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 United Kingdom. This will require maintaining a level of resilience that is at least as great as that currently planned, which itself exceeds that required by international baseline standards.

In March 2017, the UK Government notified the European Council of the United Kingdom's intention to withdraw from the European Union. This initiated a two-year period to negotiate and conclude a withdrawal agreement. The Government has confirmed its intention to ensure that the United Kingdom will cease to be a member of the European Union on 29 March 2019. It is seeking to negotiate a new economic partnership with the European Union, with an implementation period lasting around two years from exit day.

There are a range of possible outcomes for the future UK-EU relationship. Consistent with its remit, the FPC is focused on scenarios that, even if the least likely to occur, could have most impact on UK financial stability. This includes scenarios in which there is no agreement in place at exit.

The June 2017 *Report* identified key financial stability risks posed by the United Kingdom's withdrawal from the European Union. This chapter updates on the FPC's assessment of key risks to the provision of financial services.

Without a bespoke agreement, UK financial companies may no longer be able to provide services to customers in the EEA — and *vice versa* — in the same way as they do today, and in some cases not at all.

The UK real economy could be affected if financial services to the United Kingdom are disrupted, and by spillovers from disruption of financial services to the EEA.

Overall, the FPC judges that Brexit poses material risks to the provision of financial services to customers in both the United Kingdom and European Union.

Ensuring a UK legal and regulatory framework for financial services is in place is essential to financial stability. **Risks associated with the process of bringing European legislation into UK law** are discussed in the first section of this chapter.

Risks to the continuity of outstanding cross-border contracts are discussed in the second section. **Risks posed by barriers to cross-border provision of new financial services** are discussed in the third section.

Risks associated with the process of bringing European legislation into UK law

Much of the UK legal and regulatory framework for financial services is derived from EU law. Directly applicable EU law will need to be brought into UK law. Changes will need to be made to the resulting legal framework to make it workable when the United Kingdom is no longer a member of the European Union.

The Government plans to achieve this with the **EU Withdrawal Bill** and related secondary legislation.

The Government's EU Withdrawal Bill will end the supremacy of EU law over any law passed or made after the United Kingdom's withdrawal, and copies EU law as it stands at the point of exit into domestic law. It also creates temporary powers for Ministers to make additional legislation to change laws to make them workable, so that the domestic legal system could continue to function correctly outside the European Union.(1)

The Bill passed its second reading in the House of Commons on 11 September 2017 and is currently in the Committee stage. It is expected to be subject to significant further scrutiny in both the House of Commons and House of Lords and to receive Royal Assent during 2018. Royal Assent must be achieved before it is possible for the necessary subordinate legislation to be laid under the Bill, scrutinised by Parliament, and made.

Certain provisions of EU law will need to be adapted when brought into UK law in order to ensure that they operate effectively, achieve legal certainty and reflect the new relationship between the United Kingdom and the European Union. The extent and nature of the changes required before exit will depend on the terms of any withdrawal agreement, in particular the terms of any implementation period. Changes will be particularly important should there be no withdrawal agreement with the European Union that provides for an implementation period. For example — EU law that will be nationalised in the EU Withdrawal Bill:

- Provides that certain regulatory functions are to be carried out by EU authorities rather than UK authorities. For example, EU authorities supervise credit rating agencies and EU authorities approve certain macroprudential measures.

- Distinguishes between EEA and rest of world exposures in the capital framework.

The Bank and FCA are providing technical advice to HM Treasury to support it in its development of subordinate legislation pursuant to the Bill. The FPC will monitor the progress of the Bill and associated subordinate legislation.

Regulatory authorities will also need to make changes to their own rulebooks to reflect the new legislation. Firms will need to make any changes necessary to comply with the modified legal framework. All of this must be completed before exit; that is, by 29 March 2019.

Risks to the continuity of outstanding cross-border contracts

A withdrawal of permissions to conduct cross-border business following Brexit could impair financial companies' ability to perform or service outstanding financial contracts. Though a wide range of financial contracts could be affected, the largest identified risks are around over-the-counter (OTC) derivative and insurance contracts.

OTC derivative contracts

In the absence of an agreement, financial companies in the United Kingdom and EEA may lose their passporting rights and therefore may no longer be able to service certain **outstanding uncleared OTC derivative contracts** with counterparties in the other jurisdiction.

Amending existing contracts and/or undertaking other 'lifecycle events' could constitute regulated activities in some EEA states and in the United Kingdom. After exit, UK financial companies might not have permission to conduct these activities with counterparties in the EEA (and *vice versa*).

(1) This is set out in the explanatory notes prepared by the Department for Exiting the European Union.

Such lifecycle events include: rolling open positions, exercising options and trade compression. Lifecycle events are common in servicing derivative contracts. Some — such as trade compression — may be required by regulators.

Around a quarter of uncleared OTC derivative contracts entered into by parties in both the United Kingdom and European Union could be affected. The gross notional amount outstanding of these affected contracts is around £26 trillion, of which £12 trillion matures after 2019 Q1.

Financial companies are assessing whether they can service contracts using local exemptions or permissions at exit. The need for and form of local authorisation varies across jurisdictions.

Where companies lack the necessary regulatory permissions, they may need to move (or 'novate') uncleared OTC derivative contracts to legal entities that do have the appropriate permissions. For example, a UK bank would need to novate its contracts with EEA counterparties to a legal entity based in the EEA.

Such 'novations' would require time to prepare and execute and the consent of all parties. Each major dealer will have several thousand counterparties, with whom contracts will require renegotiation, potentially impacting tens of thousands of underlying clients. There are no precedents for these types of multiple large-scale novations within an 18-month period.

Given the scale and the complexity involved, firms may not be able to mitigate the risks fully by exit. Many derivatives are between two financial companies. Both parties may require appropriate permissions to trade across the UK-EEA border.

Effective mitigation of the risk, other than through a bilateral agreement, would require EEA states to legislate to protect the long-term servicing of existing contracts with UK counterparties **and** the UK government to legislate to protect the long-term servicing of contracts with EEA counterparties.

Insurance contracts

There are also risks to the continuity of **existing insurance contracts**. If EEA insurers lose their authorisations, this may restrict their ability to collect premiums and pay out on policies of UK policyholders (and *vice versa*).

A significant number of policyholders could be affected in both the United Kingdom and EEA. Initial estimates suggest around £20 billion of insurance liabilities and six million UK policyholders could be affected because their contract is with an insurer based in the EEA. £40 billion of insurance liabilities and 30 million EEA policyholders could also be affected. Long-term insurance policies such as life insurance and employer liability business are particularly vulnerable. Some of these contracts extend for decades.

To ensure continuity of contracts with their EEA customers, some UK insurance companies are planning to transfer insurance contracts to legal entities located in the EEA that have the required authorisations. Such transfers can be done in bulk using the procedure in Part VII of the Financial Services and Markets Act 2000. This is expected to result in a significant increase in the required volume of such transfers, which is likely to be challenging in the time available. This, together with their complex nature, means that there are significant execution risks to such transfers.

Insurers located in the EEA would need to ensure their activities in respect of existing UK business are performed by entities with the correct permissions in the United Kingdom. The PRA plans to set out its approach to authorisations before the end of the year.

The UK government could legislate to ensure that EEA insurers continue to have the permissions necessary to collect premiums and pay out on claims on existing contracts in the United Kingdom. Given that both UK and EEA customers could be affected, the most effective mitigant of these risks — other than a bilateral agreement — would be co-ordinated action by the UK and EU authorities.

Government approach

HM Treasury has advised it is considering all options for mitigating risks to the continuity of outstanding cross-border financial services contracts, including derivative and insurance contracts.

Risks posed by barriers to cross-border provision of new financial services

Brexit could require changes to the way new financial services are provided. This poses both immediate and medium-term risks to the provision of these services.

Immediate risks to the provision of financial services

The ability of financial companies to carry out both existing and new financial services may also be impaired by barriers to the cross-border flow of **personal data** between the United Kingdom and EEA. These barriers could, for example, impact firms' ability to service EEA clients from their data centres, which are typically located in the United Kingdom, as they do now. This could in turn disrupt service provision to those customers.

To address this, financial companies can, for example, introduce new clauses into contracts that permit data transfer. But this may not be possible in the time available before exit. And such clauses are the subject of a legal challenge. The best solution to these risks would be for the United Kingdom and

European Union to recognise each other's data protection regimes as 'adequate', potentially via a new framework which provides more certainty for firms. This approach is discussed in the Government's 24 August position paper on the exchange and protection of personal data.(1)

In the absence of a deal, barriers to cross-border trade may mean that new cross-border **banking and clearing services** may not be able to be provided across the UK-EEA border in the same way as they are today.

This could be disruptive for financial stability, given the scale of financial service provision between the United Kingdom and EEA. For example, UK-incorporated companies provide around half of wholesale banking services used by EEA customers. LCH (a UK-located central counterparty) clears over 90% of cleared interest rate swaps globally. And the ECB estimates that UK central counterparties (CCPs) clear approximately 90% of euro-denominated interest rate swaps used by euro-area banks.(2) EEA banks and CCPs are important for the provision of some types of clearing services and lending to UK customers.

To continue providing **banking services** to clients in the EEA, some UK firms plan to operate from EEA subsidiaries. In principle, this is robust to no agreement being in place at exit. Part of this will require satisfactory regulatory permissions on both sides and may present operational challenges as a result. Some plans indicate financial and/or operational interdependence between UK-incorporated and EEA-incorporated affiliates. These may require approvals from EEA and UK authorities. This, and the scale of relocation required, means that risks to provision of banking services to clients in the EEA remain.

In the absence of an agreement, EEA-incorporated banks (including investment firms) that operate in the United Kingdom as branches will need authorisation to operate in the United Kingdom. To maintain financial stability, the conditions for authorisation, particularly for systemic entities, will depend on the degree of co-operation established between regulatory authorities. It is important that firms' contingency plans fully account for this. The PRA is engaging these banks to improve the state of their contingency planning and plans to set out its approach to authorisations before the end of the year.

In the absence of an agreement, UK **CCPs** would be able to serve EEA customers after exit only if they are 'recognised' by the European Securities and Markets Authority. Additionally, the European Commission has recently made a legislative proposal containing draft provisions, including a 'location policy', that could be used to prohibit EEA banks from accessing some CCPs outside the EEA, even in 'equivalent' jurisdictions. EEA, and rest of world, CCPs will also need recognition in order to serve UK customers. The UK authorities will clarify their approach to this in due course.

There are material risks of disruption to the provision of clearing services in the EEA if these cross-border services are disrupted. UK CCPs and their users are assessing possible contingencies with the aim of providing continuity of services, including relocation by firms or CCPs of some clearing services to different locations or switching by user firms to different providers. However, overall migration will be complex and difficult to achieve, particularly in relation to existing contracts. If continuity of access is not maintained, a loss of permissions could interfere with EEA clearing members' ability to meet contractual obligations to the CCP. And separating EEA clients from others could make it harder and more costly for them to maintain hedging and matching positions. These challenges mean that substantial risks of disruption of cross-border clearing activity remain. The Bank continues to engage firms and CCPs on their contingency planning.

The ability of **asset managers** to conduct business could be impaired by any potential restrictions on cross-border delegation of collective portfolio management or outsourcing. This is currently a very widespread international practice. Estimates suggest over twenty per cent of assets of funds located in non-UK EEA countries are managed in countries outside the EEA and United Kingdom. An estimated further 10% of assets of funds located in non-UK EEA countries are managed in the United Kingdom. Restrictions on delegation or outsourcing could require disruptive changes to asset managers' business models.

Medium-term risks to the provision of financial services

In addition to the immediate risks identified above, Brexit poses longer-term risks to the provision of financial services.

Fragmentation could increase the cost of financial intermediation. This is particularly relevant for wholesale banking activity which lends itself more naturally to the branch structure and the pooling of risks, given that wholesale capital markets and the banks which serve them are deeply interconnected. The separation of derivatives clearing could increase its costs and so reduce its benefits. The current arrangements create netting efficiencies that could be lost and require less collateral than would be needed if clearing becomes more fragmented. Industry estimates suggest that a single basis point increase in the cost resulting from splitting clearing of interest rate swaps could cost EU firms €22 billion per year across all of their business. Any fragmentation of asset management could mean that economies of scale and

(1) 'The Exchange and Protection of Personal Data, a Future Partnership Paper', 24 August 2017; www.gov.uk/government/uploads/system/uploads/attachment_data/file/639853/The_exchange_and_protection_of_personal_data.pdf.
(2) 'European CCPs after Brexit', speech by Benoît Cœuré, Member of the Executive Board of the ECB, at the Global Financial Markets Association, Frankfurt am Main, 20 June 2017.

scope currently achieved by pooling of funds and their management would be reduced.

These changes could ultimately lead to higher costs for firms and governments raising finance and hedging risks. This could result directly from increased costs of accessing market-based finance, and indirectly through increased costs for lenders.

Another potential consequence of fragmentation is an increase in complexity and opacity.

The need to split operations post-exit across a greater number of entities is likely to increase complexity of firms' operations and supervision. And many banks' and investment firms' business models rely on being able to undertake activities with clients in one jurisdiction but transfer and manage certain risks/activities associated with those clients in another jurisdiction.

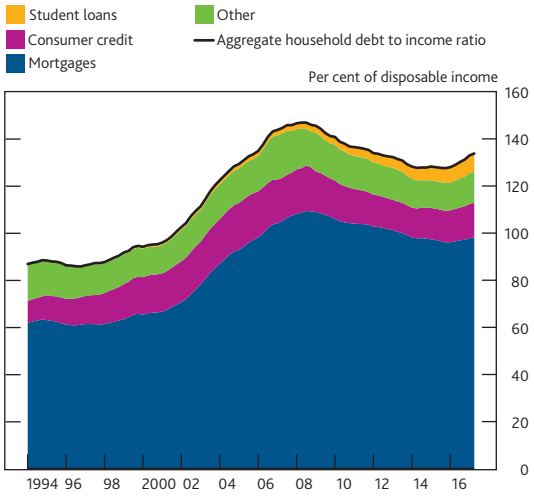
Such transactions increase interdependency between UK and EEA entities, and in the event of a non-cooperative outcome could increase opacity. In authorising EEA firms to operate in the United Kingdom, UK authorities will need to be content that such practices do not pose undue risks to the UK financial system.

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 United Kingdom. This will require maintaining a level of resilience that is at least as great as that currently planned, which itself exceeds that required by international baseline standards.

UK household indebtedness

The level of household indebtedness in the United Kingdom has fallen but remains high relative to incomes. The majority of household debt is mortgage debt, which can pose risks to UK financial stability mainly by amplifying economic downturns, as highly indebted households cut back on spending to continue to service their mortgage obligations. There are signs of continued easing in both price and non-price terms in the mortgage market. But the FPC's mortgage market Recommendations guard against the risk of a marked loosening in underwriting standards and a significant increase in the number of highly indebted households. Consumer credit, in contrast to mortgage debt, could affect UK financial stability mainly through the potential for direct losses to lenders. Growth in consumer credit has slowed a little recently, but remains rapid. Following the completion of the 2017 stress test, UK banks' regulatory capital buffers will be set so that they can absorb a 20% impairment rate on consumer credit, alongside all the other effects of the severe stress scenario.

Chart A.9 Household debt is high relative to income
UK household debt to income ratio(a)



Sources: Bank of England, ONS and Bank calculations.

(a) All data are seasonally adjusted unless otherwise stated. Household sector liabilities as a percentage of four-quarter moving sum of household disposable income. Household disposable income series is adjusted for financial intermediation services indirectly measured (FISIM). Household sector liabilities exclude unfunded pension liabilities and financial derivatives associated with non-profit institutions serving households (NPISH), and are non seasonally adjusted. The stock of outstanding income-contingent student loans has been projected to 2017 Q2 using historical growth rates. Other household sector liabilities includes loans to unincorporated businesses (for example, sole traders), loans to NPISH, and household bills that are due but not yet paid.

UK household debt has fallen but remains high relative to income, which can pose risks to UK financial stability.
The total stock of UK household debt in 2017 Q2 was £1.6 trillion, comprising mortgage debt (£1.3 trillion), consumer credit (£0.2 trillion) and student loans (£0.1 trillion). It is equal to 134% of household incomes (**Chart A.9**), high by historical standards but below its 2008 peak of 147%.(1) Excluding student debt, the aggregate household debt to income ratio is 18 percentage points below its 2008 peak.(2)

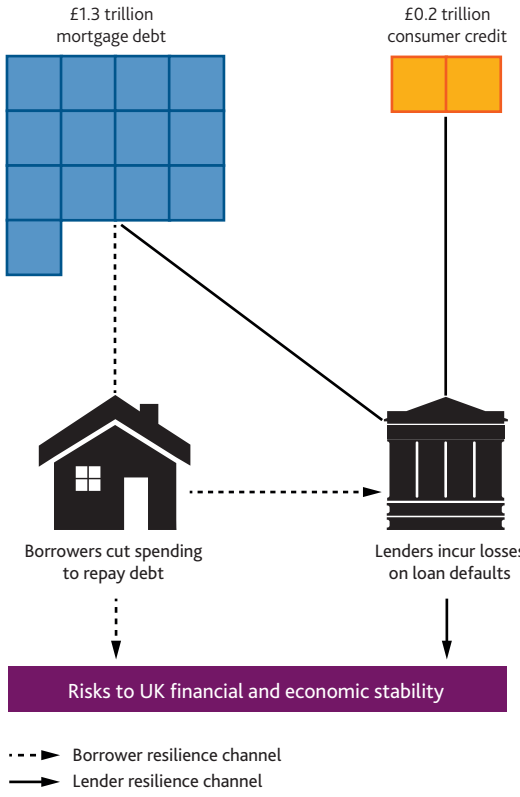
Debt provides benefits to the economy by allowing people to make purchases that they otherwise would not be able to pay for in one go, smoothing their consumption over time.

However, high household indebtedness can pose risks to UK financial and economic stability. The FPC has identified two main channels through which high levels of household debt can pose risks to the UK financial system or wider economy (**Figure A.1**):

- **Borrower resilience**: Highly indebted households are more vulnerable to unexpected falls in their incomes or increases in their loan repayments. In an economic downturn, highly

(1) In October 2017 the ONS published revisions to the National Accounts and Balance of Payments, leading to an upward revision to household income estimates with no change to household debt. These and other changes are discussed in the box 'Revisions to the National Accounts and the Balance of Payments' on pages 12–13 of the November 2017 *Inflation Report*; www.bankofengland.co.uk/publications/Documents/inflationreport/2017/nov.pdf.
(2) Repayments on UK student loans are income-contingent, unlike most other forms of household debt. Outstanding student loans are estimated to amount to 8% of disposable household income in 2017 Q2, their highest-ever level. The Bank's November 2017 *Inflation Report* set out that student loans are likely to continue to push up household debt in coming years; excluding them, debt is projected to grow broadly in line with income.

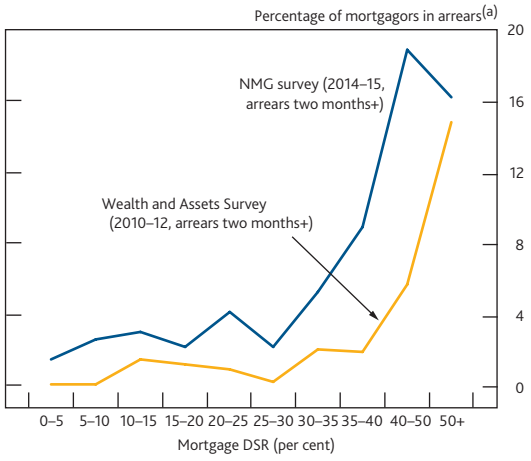
Figure A.1 Household debt poses risks to UK financial stability and the UK economy through two main channels



Sources: Bank of England and ONS.

Chart A.10 Households with high debt-servicing ratios (DSRs) can experience much greater repayment difficulties

Households in two-month arrears by mortgage DSR



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 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.

indebted households may cut back sharply on other spending in order to continue to service their debts, making the downturn worse. In doing so, they pose an indirect risk to financial stability, as this increases the risk of losses to lenders on all forms of lending. The FPC judges that this channel is most material for mortgage debt.

- **Lender resilience**: The resilience of lenders could be tested if highly indebted households default on their debts in response to adverse shocks, resulting in losses for the lender. This poses a direct risk to UK financial stability. The FPC judges that this channel is most material for consumer credit, but could also be relevant for mortgage debt in a severe stress.

Both types of resilience will be particularly tested if underwriting standards have been loosened during benign economic conditions.(1)

In order to mitigate these risks, the FPC has taken action through its 2014 owner-occupier mortgage market Recommendations and through the annual cyclical stress tests, as set out below.(2)

The proportion of mortgagors with high debt-service burdens remains low…

The average debt-servicing ratio (DSR) on the stock of mortgages (ie the share of income spent on servicing mortgage debt) remains low, reflecting continued low interest rates. Empirical evidence suggests that the share of households experiencing repayment difficulties can rise sharply as the DSR increases beyond 40% (**Chart A.10**).(3) The proportion of households with high mortgage DSRs is at a historically low level (**Chart A.11**). However, the latest NMG Consulting survey of household finances suggests the proportion of households with high DSRs has increased slightly in the past year (see Box 1).

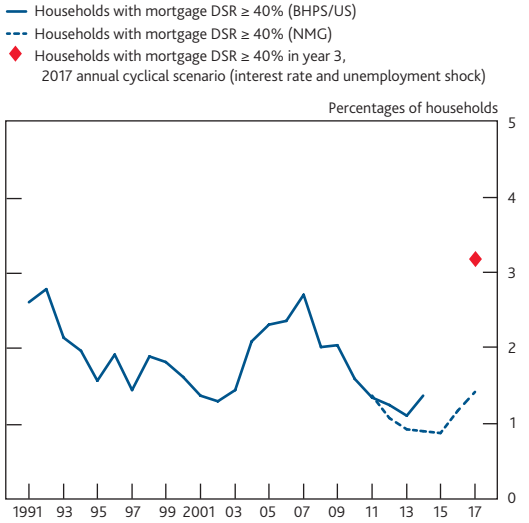
…and there are signs of continued easing in price and non-price terms in the mortgage market…

There is evidence of continued easing in price and non-price terms in the mortgage market. If sustained, this may increase the number of vulnerable households who will be sensitive to shocks. For example, spreads between mortgage rates and risk-free rates have continued to narrow over the past year. The quoted spread on new two-year mortgages at 90% and 75% loan to value (LTV) ratios has fallen by over 25 basis points and 50 basis points respectively this year. And

(1) In an upturn, when risks are perceived to be low, lenders' underwriting standards can loosen quickly, as they seek to maintain or build market share. This increases the supply of credit further.
(2) The 2014 affordability test Recommendation was withdrawn and replaced by an updated Recommendation in 2017.
(3) The November 2017 *Inflation Report* set out the sensitivity of households to changes in interest rates, and found that a 25 basis point increase in Bank Rate increases monthly payments on the average mortgage by around £15; www.bankofengland.co.uk/publications/Documents/inflationreport/2017/nov.pdf.

Chart A.11 An interest rate or unemployment shock could challenge households' ability to service their mortgage debts

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

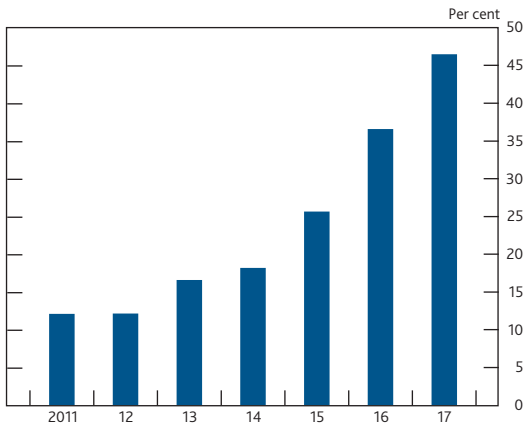


Sources: Bank of England, British Household Panel Survey/Understanding Society (BHPS/US), NMG Consulting survey and Bank calculations.

(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 (2011–17).
(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.

Chart A.12 The proportion of new mortgages with no fees has increased

Proportion of new mortgages with no fees[a]



Sources: Moneyfacts and Bank calculations.

(a) The proportion of £0 fee products in each year is calculated relative to the total number of new mortgages offered during the year. The proportion in 2017 is calculated based on data from January to October 2017.

the proportion of mortgage products without fees has continued to increase, lowering the effective cost of borrowing (**Chart A.12**).

There is also evidence of continued easing in non-price terms. For example, there has been a long-run trend towards longer mortgage terms since the crisis (**Chart A.13**). Long loan terms allow borrowers to extend their debt over a longer period of time, which may improve affordability. However, borrowers who extend terms to take on more debt will also be more sensitive to interest rate shocks in the long term, and their debt burden will be more persistent.

…but the FPC's mortgage market Recommendations guard against a material deterioration in borrower resilience…

The FPC's 2014 owner-occupier mortgage market Recommendations guard against the risk of a marked loosening in underwriting standards and a significant increase in the number of highly indebted households.

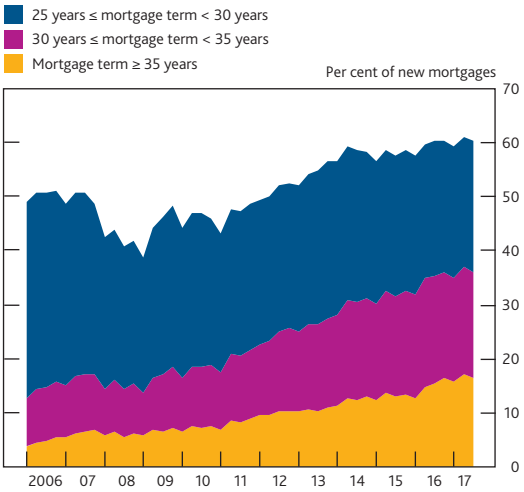
The FPC's loan to income (LTI) flow limit Recommendation limits the number of mortgages extended at LTI ratios of 4.5 or higher to 15% of a lender's new mortgage lending. The 4.5 multiple was calibrated to ensure that, at a stressed mortgage rate of 7% and a typical mortgage term of around 25 years, mortgagors' stressed DSRs would not exceed 35%–40%. In aggregate, the proportion of new mortgages with an LTI above 4.5 has never been close to the 15% limit, and is currently around 10% (**Chart A.14**). But one feature of recent lending has been a 'bunching' of loans just below the FPC's 4.5 LTI limit. The share of new mortgage lending at LTI multiples between 4.0 and 4.5 has increased from 12.0% in 2014 Q3 to 17.7% in 2017 Q3. In part, this is likely to represent some individuals being constrained to smaller loans than they would have otherwise obtained.

The FPC's affordability test recommends that mortgage lenders test whether borrowers could still afford their mortgages if, at any point over the first five years of the loan, their mortgage rate were to be 3 percentage points higher than the reversion rate specified at origination. In June 2017, the FPC clarified the rate to which the 3 percentage point stress should be applied.[1] As expected, some lenders have responded to the FPC's clarification by changing their stressed interest rates or adjusting their reversion rates. In September 2017, the FPC confirmed that its affordability test Recommendation for owner-occupied mortgage lending should not apply to any remortgaging where there is no increase in the amount of borrowing, whether done by the same or a different lender.

(1) See 'The FPC's approach to addressing risks from the UK mortgage market', June 2017 *Financial Stability Report*; www.bankofengland.co.uk/publications/Documents/fsr/2017/fsrjun17.pdf.

Chart A.13 There has been a continued trend towards longer mortgage terms

Share of new mortgages by mortgage terms[a][b]

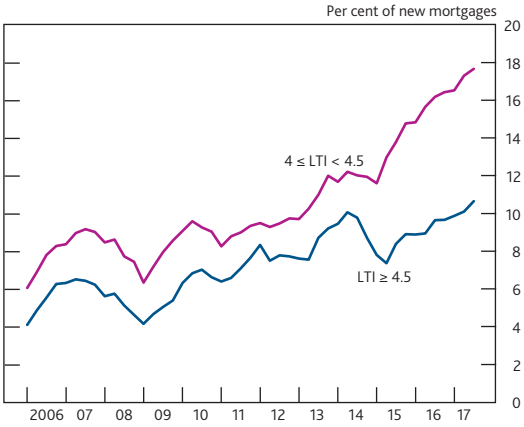


Sources: FCA Product Sales Database and Bank calculations.

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

Chart A.14 There remains headroom for further high LTI lending in aggregate

Flow of new mortgages by LTI[a]



Sources: FCA Product Sales Database and Bank calculations.

(a) The Product Sales Database includes regulated mortgage contracts only. Loan to income ratio (LTI) 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 amount borrowed.

…and lenders' resilience to losses on their mortgage lending has been tested in the 2017 stress test.

Mortgages are the largest loan exposure for UK lenders, accounting for around two thirds of major UK banks' loans to UK borrowers. The Bank's annual stress test assesses banks' resilience to risks from mortgage debt in a severe downturn. The Bank's 2017 annual cyclical scenario includes an interest rate shock, combined with a large increase in unemployment (see Box 3). This shock puts borrowers with mortgages under significant pressure by historical standards, as it substantially increases the share of households with high mortgage DSRs (**Chart A.11**).

Consumer credit continues to grow rapidly…

Although the level of consumer credit relative to household incomes is not high by historical standards (**Chart A.9**), consumer credit has been growing much faster than household incomes in recent years (**Chart A.15**). Annual growth in consumer credit was 9.9% in the year to September 2017, having slowed gradually over recent months.

…and is an important determinant of banks' ability to withstand severe economic downturns.

The stock of consumer credit is small compared to the overall stock of household debt. The FPC judges that rapid growth of consumer credit is not, in itself, a material risk to economic growth through its effect on household spending. However, loss rates in stress on consumer credit are far higher than for mortgages.[1] That is because, in the face of adverse shocks, borrowers are much more likely to default on their consumer credit loans than their mortgages. And because the majority of consumer credit lending is unsecured, lenders cannot rely on the value of collateral to cushion their losses. For example, in the Bank's 2017 stress test, UK consumer credit represented just 7% of UK banks' exposures but it accounted for 40% of banks' total impairments (see **Chart A.5** in the Overview of risks to UK financial stability and UK countercyclical capital buffer chapter).

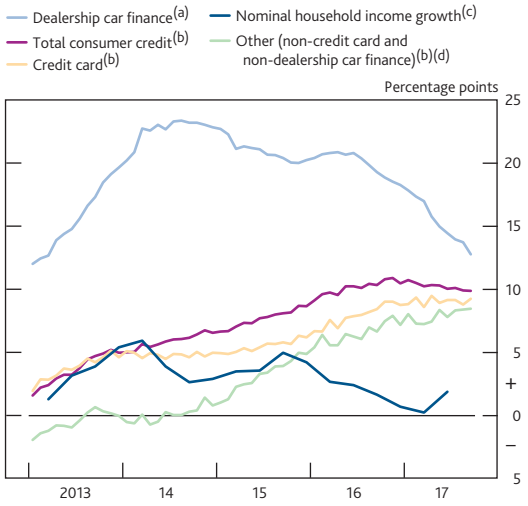
Defaults on consumer credit are currently low, but this reflects factors that should be discounted when assessing how loans would perform in stress…

Defaults on consumer debt have fallen in recent years, with write-off rates falling from 5% to 2% between 2011 and 2016. In part, the reduction in defaults over recent years reflects an improvement in underlying credit quality since the financial crisis. This is consistent with a sharp fall in the level of consumer debt relative to income and a shift in the distribution of consumer lending towards borrowers with lower credit risk, as evidenced by borrower credit scores. But it also reflects factors that should be discounted when assessing how loans would perform under stress — including

(1) Given the 'full-recourse' nature of UK mortgage contracts, borrowers in the United Kingdom typically do all they can to pay their mortgages rather than default, including cutting back sharply on spending and/or defaulting on other forms of debt.

Chart A.15 Consumer credit growth remains high, but has slowed slightly in recent months

Annual growth rates of consumer credit products and household income

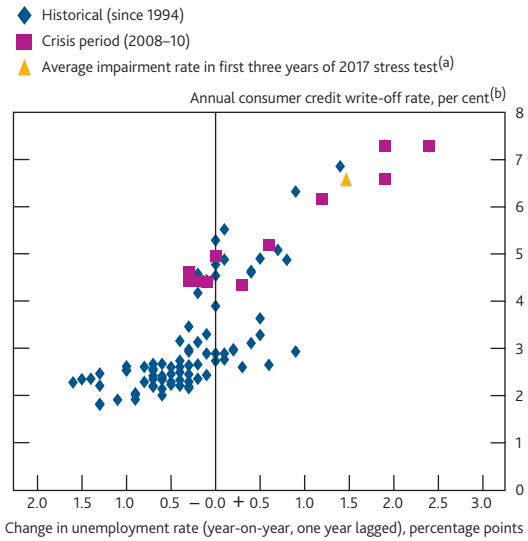


Sources: Bank of England, ONS and Bank calculations.

(a) Identified dealership car finance lending by UK monetary financial institutions (MFIs) and other lenders.
(b) Sterling net lending by UK MFIs and other lenders to UK individuals (excluding student loans). Non seasonally adjusted.
(c) Quarterly nominal disposable household income. Seasonally adjusted.
(d) Other is estimated as total consumer credit lending minus dealership car finance and credit card lending.

Chart A.16 The loss rate of consumer credit in the stress test is consistent with the average historical relationship between unemployment and credit losses

Relationship between consumer credit write-offs and changes in unemployment



Sources: Bank of England, ONS and Bank calculations.

(a) Average impairment rate in the first three years of the 2017 annual stress test against the average annual increase in unemployment between 2015 Q4 and 2018 Q4 in the 2017 annual stress-test scenario.
(b) Four-quarter moving sum of consumer credit write-offs at MFIs, divided by the outstanding stock of consumer credit at MFIs one year earlier.

the macroeconomic environment of sustained employment growth and low interest rates.

…so lenders have been underestimating the losses they could incur in a downturn.

In September 2017, the FPC judged that lenders overall had been attributing too much of the improvement in consumer credit performance in recent years to underlying improvement in credit quality and too little to the macroeconomic environment of sustained employment growth and low interest rates. When assessing the possible performance of consumer credit portfolios in a stress, current macroeconomic performance should be discounted. As a result, lenders have been underestimating the losses they could incur in a downturn.

This judgement is consistent with the 'PRA Statement on consumer credit',(1) which concluded that lenders' assessment and pricing for risk appeared to be overly influenced by the current benign macroeconomic environment and historically low arrears rates. Lenders were reducing interest margins and risk weights associated with consumer loans while, at the same time, beginning to increase lending to higher-risk segments of the market.

The FPC judged that, in the first three years of the 2017 stress-test scenario, the UK banking system would, in aggregate, incur UK consumer credit losses of around £30 billion, or 20% of UK consumer credit loans, representing 150 basis points of the aggregate common equity Tier 1 capital ratio of the UK banking system. This is approximately an extra £10 billion in impairments relative to the 2016 stress test. The loss rate is consistent with the average historical relationship between unemployment and credit losses (**Chart A.16**). It embodies some improvement in consumer credit quality since the financial crisis, but not to the extent implied by banks' own judgements.

Banks participating in the 2017 stress test account for around 70% of the stock of consumer credit extended by the banking system. Their consumer credit impairments are estimated to be around £21 billion. Smaller banks were not part of the annual stress-testing exercise but were included in the FPC's September 2017 judgement about the losses the system would incur. Those with material exposures to consumer credit will be assessed against the 2017 stress scenario, including the system-wide losses on consumer credit that it has been judged would result in that scenario. Results for these banks will not be published but will form part of their next capital assessment.

(1) www.bankofengland.co.uk/pra/Documents/publications/reports/prastatement0717.pdf.

Regulatory capital buffers will now be set so that UK banks can absorb potential losses on consumer lending…

Following the completion of the 2017 stress test, regulatory capital buffers for individual firms will be set so that each bank can absorb its losses on consumer lending, alongside all the other effects of the stress scenario on its balance sheet.

The FPC also expects that banks will begin to factor these market-wide levels of stressed losses on consumer credit into their overall lending and capital plans.

…and the PRA and FCA are addressing consumer credit underwriting standards.

The PRA Statement also asked firms to consider and respond to ten issues. These issues included: the extent to which firms take into account the risk of a weaker economic environment in their underwriting; how quickly boards would recognise when a shift in asset quality is taking place; whether a borrower's total debt is taken into account in the underwriting process; and some issues around 0% interest offer credit cards and motor finance.

The PRA is considering firms' responses to these key issues, and where weaknesses are identified, will consider possible microprudential actions to address them. A number of firms have undertaken, or are planning to undertake, actions to strengthen underwriting following the PRA Statement.

The Financial Conduct Authority (FCA) has consulted on proposals to clarify what is expected of firms in assessing creditworthiness; their aim is to publish final rules and guidance in the first half of 2018.(1) In addition, in their *Future Approach to Consumers* document, published in November, the FCA outlined their expectation that lenders take reasonable steps to ensure customers understand the debt they are accruing and identify those who are already heavily indebted and struggle to make payments.(2)

There is already some evidence of tightening terms in the consumer credit market, motivated in part by firms' concerns about customer indebtedness. Lenders responding to the *Credit Conditions Survey* reported that the availability of unsecured credit fell in both 2017 Q2 and Q3, and they expect a further reduction in Q4. There have also been some signs of tightening in other indicators. In particular, the average period for 0% interest-free balance transfers on credit cards has fallen by around three months since the peak in March 2017, albeit following a period of rapid growth.

The FPC will continue to monitor risks to UK financial stability from UK household indebtedness and regularly reviews the calibration of its macroprudential tools (**Figure A.2**).

Figure A.2 FPC responses to UK financial stability risks from household indebtedness

 Borrower resilience	• **FPC affordability test:** Recommends that mortgage lenders test whether borrowers could still afford their mortgages if, at any point over the first five years of the loan, their mortgage rate were to be 3 percentage points higher than the reversion rate specified at origination. • **FPC loan to income limit:** Limits the number of mortgages extended at LTI ratios of 4.5 or higher to 15% of a lender's new mortgage lending.
 Lender resilience	• **Annual cyclical scenario stress test:** Assesses banks' resilience to risks from household debt.

(1) www.fca.org.uk/publications/consultation-papers/cp17-27-assessing-creditworthiness-consumer-credit.
(2) www.fca.org.uk/publications/corporate-documents/our-future-approach-consumers.

Box 1
Survey measures of household vulnerability

Despite a period of household deleveraging following the financial crisis, aggregate UK household debt remains high relative to income (**Chart A.9**). High household indebtedness can pose risks if, in the face of adverse shocks, highly indebted households default on their debts or cut back sharply on spending in order to keep paying their debts.

Survey data provide useful information on the distribution of debt across households, beyond what can be inferred from aggregate statistics. This box explores evidence on household vulnerability from two recently conducted surveys: the NMG Consulting survey and the FCA's Financial Lives Survey 2017.

Background on the surveys

The NMG survey of household finances is a biannual survey commissioned by the Bank. The survey gathers timely microdata on households' finances and investigates topical policy issues. The 2017 H2 survey was conducted in September and covered around 6,000 households. The results are explored in an annual *Quarterly Bulletin* article.(1)

The FCA published initial results from its first Financial Lives Survey in October 2017.(2) In line with the FCA's remit, the survey covers many elements of consumers' interaction with financial products, including a range of questions on consumer satisfaction, engagement and problems with financial products. The survey was conducted between late 2016 and early 2017 and covered just under 13,000 adults.

Surveys typically sample a small proportion of the population, so the conclusions are subject to uncertainty. It is therefore useful to compare metrics of vulnerability from different surveys to consider whether they provide consistent signals about the underlying financial position of households.

Recent developments in household balance sheets

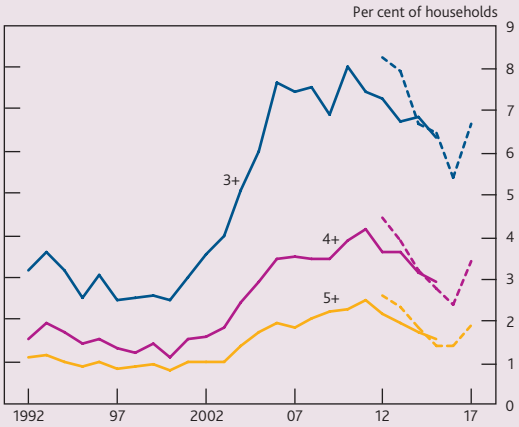
From a financial stability perspective, the FPC considers vulnerability metrics that have historically been associated with spending cuts and default in response to adverse shocks. Mortgage debt is a particular focus, given that it is the largest single liability of UK households.

The two most important household characteristics from this perspective are household debt to income (DTI) ratios and the debt-servicing ratio (DSR), which is the proportion of income spent on loan repayments. For example, during the financial crisis, households with higher levels of mortgage debt relative to income cut spending more sharply in response to adverse shocks. And survey data suggest the proportion of households experiencing repayment difficulty can rise sharply if they have a mortgage DSR of 40% or greater.(3) On these metrics, the balance sheet position of households has improved significantly since the crisis, although the most recent NMG data point to some deterioration.

The proportion of households with high mortgage DTI multiples has increased somewhat recently, although it remains below peaks observed over the past decade (**Chart A**). Around 3.4% of households reported a mortgage DTI ratio of four or above in the latest NMG survey, and around 1.9% reported a mortgage DTI ratio of five or above. The Financial Lives Survey points to a similar proportion of adults with high DTI ratios; 3.6% of adults reported a mortgage DTI ratio of four or above and 2.6% reported a mortgage DTI ratio of five or above.

Chart A The proportion of households reporting high mortgage debt to income multiples has increased recently

Distribution of mortgage debt to income(a)(b)



Sources: Living Costs and Food (LCF) Survey, NMG Consulting survey and Bank calculations.

(a) Ratio of outstanding mortgage debt to pre-tax annual income.
(b) Data in solid lines up to 2015 are based on responses to the LCF Survey. LCF Survey data are on a financial-year basis up until 2015/16, shown in the chart as 2015. Data in dashed lines from 2012 onwards are based on responses to the NMG Consulting survey. NMG data are from the H2 surveys only. NMG data before 2015 have been adjusted for a change in the income definition.

Measures of the proportion of households with high levels of debt relative to income do not take into account the serviceability of that debt. The share of households in the NMG survey with mortgage DSRs at or above 40% has also increased slightly, but remains close to an all-time low (**Chart A.11**). Only around 1.4% of households have a mortgage DSR at or above 40% in the NMG survey and the Financial Lives Survey suggests a somewhat smaller proportion of adults are in this category. An increase in interest rates of

(1) See, for example, 'The financial position of British households: evidence from the 2016 NMG Consulting survey', *Bank of England Quarterly Bulletin*, Vol. 56, No. 4, pages 189–99; www.bankofengland.co.uk/publications/Pages/quarterlybulletin/2016/q4/a3.aspx.
(2) See 'Understanding the financial lives of UK adults. Findings from the FCA's Financial Lives Survey 2017'; www.fca.org.uk/publication/research/financial-lives-survey-2017.pdf.
(3) See 'The FPC's approach to addressing risks from the UK mortgage market', June 2017 *Financial Stability Report*; www.bankofengland.co.uk/publications/Documents/fsr/2017/fsrjun17.pdf.

around 150 basis points for all mortgagors, without an associated increase in incomes, would be required to take this back to its pre-crisis average of just under 2.0%. And the Bank's 2017 stress test ensures the banking system has enough capital to withstand a stress scenario where the proportion of households with DSRs at or above 40% increases to around 3.2%, as incomes fall and interest rates rise at the same time.

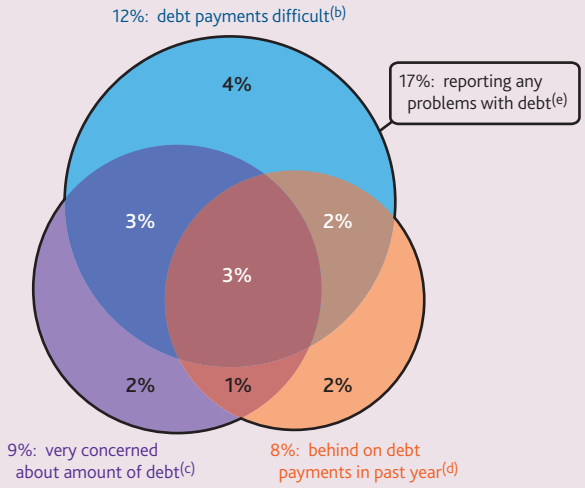
Recent developments in subjective metrics on household vulnerability

Beyond measures of the distribution of debt across households, subjective measures of vulnerability can also be useful indicators of the financial position of households, as they can incorporate households' perceptions of their circumstances.

Using more subjective measures of borrower vulnerability from the NMG survey, up to 17% of households perceive themselves as vulnerable due to problems with debt (**Figure A**). This includes those who reported that they: were 'very concerned' about their debt levels; considered unsecured debt or mortgage payments difficult or a 'heavy burden'; or had been more than two months behind on their debt payments in the past year. Most of these metrics remain well below their post-crisis peaks, although there has been an uptick across these subjective measures over the past year.

Figure A Up to 17% of households in the NMG survey perceive themselves as vulnerable due to problems with debt

Per cent of households indicating problems with debt in the 2017 H2 NMG survey[a]



Sources: NMG Consulting survey and Bank calculations.

(a) Figure is not to scale.
(b) Households reporting that they find unsecured debt repayments to be a heavy burden or that they have difficulty with mortgage payments.
(c) Households reporting that they are very concerned about their current level of debt.
(d) Households reporting that they have been more than two months behind on their debt repayments in the past twelve months.
(e) Households reporting problems in any of the questions explained in footnotes (b)–(d).

The Financial Lives Survey includes similar questions about adults' own perception of their circumstances, which the FCA has translated into potential vulnerability measures. Where the questions cover similar topics, the results are broadly consistent with those of the NMG survey. Around 15% of UK adults found keeping up with domestic bills and credit commitments a 'heavy burden' or in three or more of the past six months had missed making any of these payments, according to the Financial Lives Survey.

However, the precise level of these subjective measures should be interpreted with caution. For example, for several years NMG survey data have suggested a much higher proportion of households are in arrears than has been observed in data using objective definitions of arrears. UK Finance report an aggregate mortgage arrears rate of less than 1%, which is materially below the numbers implied by the NMG survey.

The Financial Lives Survey finds that about 50% of UK adults show characteristics of being 'potentially vulnerable', who might suffer disproportionately if things go wrong. This is a very broad definition that captures a range of factors, over and above those associated with debt. In addition to the 15% of adults reporting problems with debt payments, those defined as potentially vulnerable also include adults with: a health condition that reduces their ability to carry out day-to-day activities a lot; recent experience of a life event (for example bereavement or divorce); low financial capability; or characteristics of low financial resilience aside from problems with debt, such as having limited financial resources to deal with unexpected changes in income or accommodation payments. The definition of 'potentially vulnerable' includes adults without any debt at all.

This metric is useful when considering consumer protection issues, for example by identifying those that consider themselves as having low knowledge of financial matters. But it is too wide from a financial stability perspective, which focuses on the risk that highly indebted households could cut back sharply on spending or default on their debts in response to adverse shocks.

Conclusion

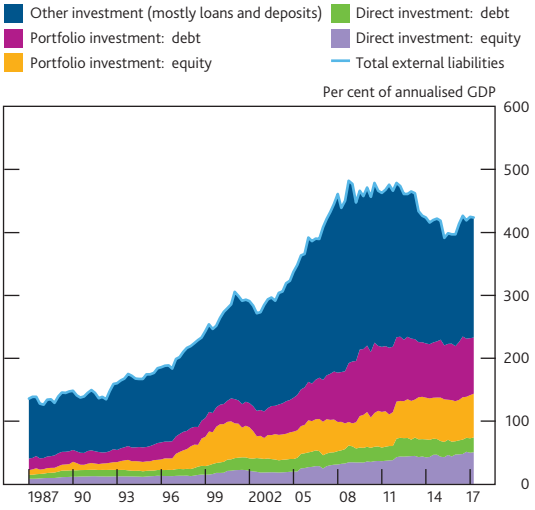
Recent survey data suggest household balance sheets have started to deteriorate somewhat, reversing some of the previous improvement. But these measures remain some way from previous peaks. The Bank's 2017 stress test ensures that the banking system is capitalised to withstand a large increase in the number of vulnerable households in a severe stress. And the FPC's 2014 owner-occupier mortgage market Recommendations guard against a significant increase in the number of highly indebted households (see UK household indebtedness chapter).

UK external financing

The United Kingdom is one of the most financially open major advanced economies in the world, with many UK assets held by foreign investors. It also has a material current account deficit, which is funded by capital inflows from abroad. This means the United Kingdom may be vulnerable to a reduction in foreign investor appetite for UK assets. Such a reduction could lead to disruption in the real economy, through higher funding costs for borrowers, falls in asset prices and a further depreciation of sterling, which could test the resilience of the financial system indirectly. An extreme version of this scenario was included in the 2017 stress test of major UK banks, which featured a material sterling depreciation, a sharp rise in funding costs and a drop in domestic demand. Foreign investors' appetite for most UK assets appears to have been broadly stable over the past year, though there has been evidence of a decline in sentiment towards UK equities.

Chart A.17 The United Kingdom has a large stock of external liabilities

UK gross external liabilities by type[a]



Sources: ONS and Bank calculations.

(a) Derivatives are excluded.

The United Kingdom has a large stock of assets held by overseas investors…

The United Kingdom is one of the most financially open major advanced economies in the world. This openness means that economic conditions in the United Kingdom are affected by the behaviour of overseas investors. Overseas residents have significant holdings of UK assets. For example: UK-listed firms issue debt in international capital markets; and foreign investors account for a material share of investment in UK commercial real estate. These 'external liabilities' amounted to around 420% of annualised GDP in 2017 Q2 (**Chart A.17**). UK residents also have significant investments abroad ('external assets'), amounting to around 415% of GDP.(1) This large stock position reflects substantial capital flows in recent decades. Net acquisition of foreign assets by UK residents was around 7% of GDP in the twelve months to 2017 Q2, while net purchases of UK assets by overseas residents amounted to around 11% of GDP.

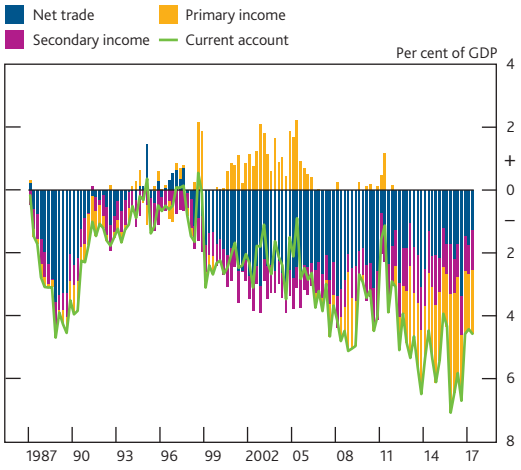
…and a material current account deficit…

These inward flows have been used to finance the United Kingdom's current account deficit, which in recent years has been large by historical and international standards. A current account deficit means that domestic investment is greater than saving, and must be financed by capital from overseas. The UK current account has been persistently in deficit since 1999. This deficit has widened substantially since 2012, reaching 4.6% of GDP in 2017 Q2 (**Chart A.18**). The widening of the deficit since 2012 almost entirely reflects a decline in the primary income balance, caused by weaker earnings from foreign direct investment abroad. The UK trade

(1) Excluding derivatives.

Chart A.18 The UK current account deficit has widened in recent years

Decomposition of the UK current account[(a)]

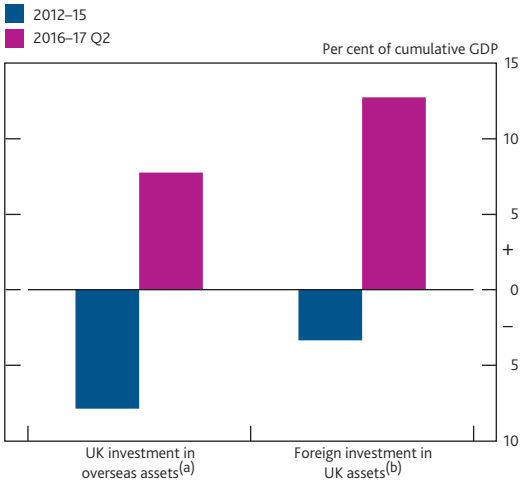


Sources: ONS and Bank calculations.

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

Chart A.19 The pattern of capital flows has reversed since end-2015

Cumulative inward and outward capital flows since 2012



Sources: ONS and Bank calculations.

(a) Net acquisition of foreign assets by UK residents.
(b) Net acquisition of foreign liabilities by UK residents.

deficit has fluctuated around 2% of GDP since 2012, and has improved relative to the pre-crisis period.[(1)]

…potentially posing risks to financial stability.

The refinancing of the United Kingdom's large stock of external liabilities is affected by overseas investors' willingness to continue to hold UK assets. Sharp falls in foreign investor appetite for UK assets could lead to falls in UK asset prices and a tightening in domestic credit conditions. This could be triggered, for example, by perceptions of weaker or more uncertain UK long-term growth prospects.

Such a disruption could also drive further sterling depreciation, potentially triggering a build-up in inflationary pressures, and lead to a downward adjustment in domestic demand. This could worsen the trade-off between growth and inflation. Disruption in the economy could also drive an increase in banks' non-performing loans and mark-to-market losses on assets.

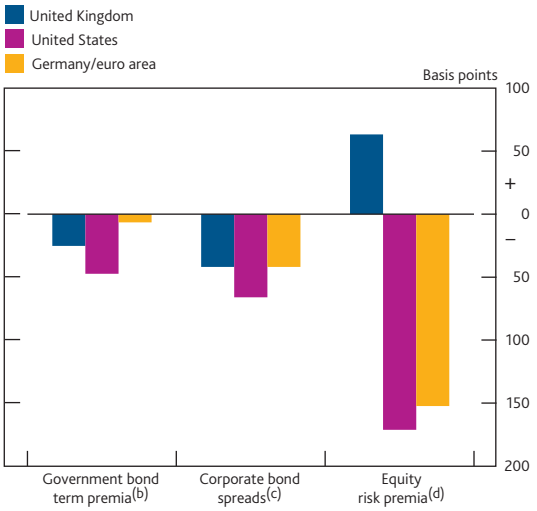
The extent of the risk posed by the current account deficit depends on how it is financed as well as its size. Over the period 2012–15, the funding of the deficit was not reliant on gross inflows from overseas investors: instead it was financed by the sale of UK residents' overseas assets, while foreign capital was flowing out of the United Kingdom. The United Kingdom's stock of external assets and liabilities was therefore shrinking over that period. Since the beginning of 2016, this position has reversed: foreign capital inflows have been substantial, while UK residents have been net buyers of foreign assets (**Chart A.19**). This has driven renewed growth in the United Kingdom's external assets and liabilities. Looking ahead, the ease with which the current account deficit is financed will rest on the credibility of the UK macroeconomic policy framework and its continuing openness to trade and investment.

Recent capital inflows from abroad appear less vulnerable to reversals than flows during the run-up to the crisis. Foreign direct investment from overseas has accounted for nearly two thirds of the £378 billion in gross capital inflows since the beginning of 2016. This is in contrast to the pre-crisis period, when the majority of foreign capital inflows were in the 'other investment' category, which is mainly composed of short-term bank liabilities. In addition, much of the debt issued in the United Kingdom is long-maturity, and therefore less prone to refinancing risk in the event of a shock. For example, the average maturity of outstanding UK government debt instruments is fifteen years, the longest of any G7 country,

(1) In October 2017 the ONS published revisions to the National Accounts and Balance of Payments, leading to an upward revision in the current account deficit and downward revision to the net international investment position. These and other changes are discussed in the box 'Revisions to the National Accounts and the Balance of Payments' on pages 12–13 of the November 2017 *Inflation Report*; www.bankofengland.co.uk/publications/Documents/inflationreport/2017/nov.pdf.

Chart A.20 UK equity risk premia have not fallen in line with euro-area and US equivalents

Changes in risk premia on UK, US and euro-area assets since 4 January 2016[a]



Sources: Bloomberg Finance LP, Federal Reserve Bank of New York: Federal Reserve Board, HM Treasury, ICE BofAML, IMF *World Economic Outlook*, Thomson Reuters Datastream and Bank calculations.

(a) US government bond term premia data to 15 November 2017 and 16 November 2017 for all other series.
(b) UK daily term premium estimate is an average from four model outputs: benchmark and survey models, including 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; Guimarães, R and Vlieghe, G (2016), 'Monetary policy expectations and long term interest rates', unpublished working paper; and Andreasen, M and Meldrum, A (2015), 'Market beliefs about the UK monetary policy lift-off horizon: a no-arbitrage shadow rate term structure model approach', *Bank of England Staff Working Paper No. 541*. Germany/euro-area daily term premia are for Germany and are based on the model described in Malik, S and Meldrum, A (2016), as above. US daily term premia are estimates from the Federal Reserve Bank of New York.
(c) Based on investment grade corporate bonds. The US dollar series refers to US dollar denominated bonds issued in the US domestic market, while the sterling and euro series refer to bonds issued in domestic or eurobond markets in the respective currencies.
(d) As implied by a dividend discount model. Equity risk premia are estimated for the FTSE All-Share, S&P 500 and Euro Stoxx indices.

Chart A.21 The sterling exchange rate has been relatively stable in 2017

Sterling effective exchange rate index

Source: Bank of England.

while the average maturity of outstanding UK corporate bonds is ten years.

Investor sentiment towards most UK asset classes has been broadly stable over the past year…

Demand for most UK asset classes has been broadly stable over the past year. The compensation investors demand for uncertainty about future interest rates (the 'term premium') is below its historical average, as are UK corporate bond spreads. Both of these measures have continued to move in line with those for other advanced economies (**Chart A.20**). Overseas investors' purchases of gilts have held up since mid-2016, and there was little market reaction to Moody's downgrade of the UK Government's credit rating in September.

Following a 12% fall in the period after the EU referendum, the sterling exchange rate has been broadly stable during 2017, and is currently close to its level at the start of the year (**Chart A.21**). Overseas investor transactions in UK commercial real estate, which had fallen sharply in the months leading up to the referendum, have partly recovered. Non-residents' purchases of FTSE 100 shares have also recovered from their trough in 2016 Q2.

…but there is recent evidence of a decline in sentiment towards UK equities.

Within this overall picture, there is recent evidence that investor appetite for UK equities may be declining. The UK equity risk premium, which measures the compensation investors require for investing in risky equities, has not declined in line with equivalent measures for euro-area and US equities (**Chart A.20**). Some market contacts have highlighted uncertainty about the United Kingdom's future trading relationship with the European Union as a particular concern. A net balance of 37% of respondents to the November Bank of America Merrill Lynch Global Fund Manager survey reported that they were underweight UK equities, compared with an average since 1999 of 12%.

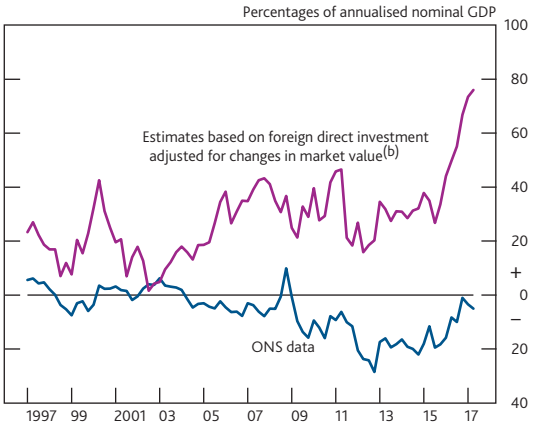
Risks from currency mismatch are mitigated by hedging.

Currency mismatches between the assets and liabilities of UK residents can amplify risks associated with the withdrawal of external capital flows. For example, UK residents who rely on income from sterling-denominated assets to service foreign currency debt could incur losses if sterling depreciates. In aggregate, the United Kingdom is in the opposite position: UK residents hold more foreign currency assets than liabilities. As a result, the depreciation in sterling has increased the value of external assets relative to liabilities, leading to a material improvement the United Kingdom's net foreign asset position (**Chart A.22**). This mitigates the economic risks associated with currency depreciation.

In contrast to this aggregate position, UK-resident non-financial businesses hold more foreign currency liabilities

Chart A.22 The UK net foreign asset position has been improving in recent years

Estimates of the UK net international investment position[a]



Sources: Bloomberg, ONS and Bank calculations.

(a) Data are not seasonally adjusted.
(b) For details on how foreign direct investment estimates are adjusted for changes in market value see footnote (3) on page 23 of the May 2014 *Inflation Report*; www.bankofengland.co.uk/publications/Documents/inflationreport/2014/ir14may.pdf.

than assets, with an estimated £300 billion in foreign currency denominated borrowing (around 80% of annual profits), compared with £200 billion in foreign currency assets. Currency depreciation could affect companies' profitability or solvency where they have currency mismatches on their balance sheets, but these risks are partly mitigated by hedging. Foreign currency borrowing is mainly undertaken by large companies, which tend to hedge their foreign currency risks. The number of firms using financial market hedges rose around the time of the referendum but has since returned to pre-referendum levels, and has been broadly stable. In addition, available data suggest that companies with large foreign currency borrowings also tend to be naturally hedged, earning foreign currency income.

UK banks have material short-term foreign currency liabilities, representing over half of their overall wholesale liabilities, at around £270 billion. These exposures are covered, in aggregate, by banks' foreign currency denominated liquid assets, which are around £340 billion.[1]

The FPC has assessed UK banks' resilience to external financing risks through the 2017 stress test.

Overall, direct risks to financial stability from the United Kingdom's external financing position appear limited. Instead, a withdrawal of capital from the United Kingdom could threaten financial stability indirectly, through its potential impact on the UK economy. Any wider economic disruption triggered by outflows of capital from the United Kingdom could lead to losses for banks on a wide range of UK exposures, testing their resilience.

The FPC is vigilant to the risks posed by the United Kingdom's external financing position, particularly given uncertainty around the United Kingdom's future trading arrangements with the European Union. The annual cyclical scenario for the Bank's 2017 stress test incorporated a sudden increase in the rate of return investors demand for holding sterling assets and falls in residential and commercial property prices. The sterling exchange rate index falls by 27% and Bank Rate rises to 4%, alongside a fall in domestic demand and an increase in unemployment. This scenario results in over £70 billion in impairments on lending to UK households and businesses.

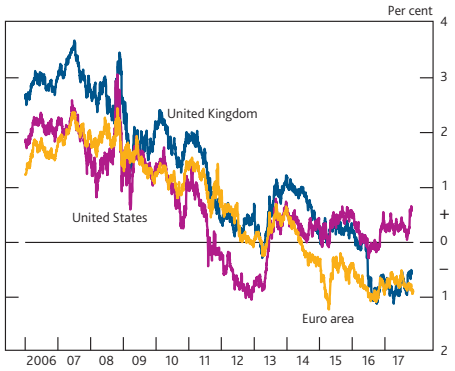
(1) These figures are for the seven largest UK banks.

Asset valuations

Globally, long-term interest rates remain very low, in part reflecting expectations of moderate growth and subdued inflation. This, together with low volatility, has supported risky asset prices; but investors may be placing excessive weight on the recent benign environment persisting. In the United Kingdom, long-term interest rates and equity prices factor in an uncertain and pessimistic growth outlook. However, valuations of some sterling corporate bonds and segments of the UK commercial real estate market seem to take account of low interest rates but not the associated growth outlook. The risk of sharp adjustments in asset prices was captured in the 2017 stress test, which incorporated sharp movements in several market prices and indices, including interest rates, exchange rates, volatility measures, credit spreads and equity indices, and a 40% fall in UK commercial real estate prices.

Chart A.23 Advanced-economy risk-free real interest rates remain close to historical lows

International ten-year real government bond yields(a)

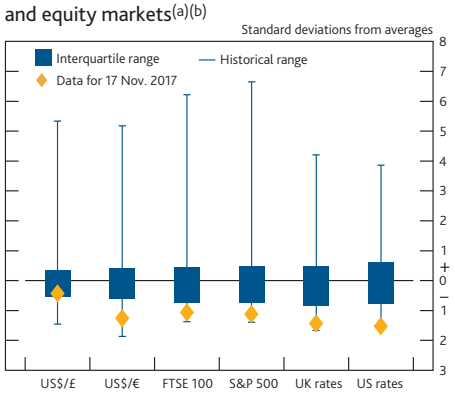


Sources: Bloomberg Finance LP and Bank calculations.

(a) Zero-coupon bond yields derived using inflation swap rates. US and euro-area real rates are defined relative to CPI and HICP inflation respectively. UK real rates are defined relative to RPI inflation and are adjusted for the RPI-CPI wedge. While that wedge is likely to vary over time, a constant 1.3 percentage point adjustment is made as an estimate of the long-run wedge. See pages 34–35 of the February 2014 *Inflation Report* for more details.

Chart A.24 At short horizons, implied volatility is historically low across a range of financial markets

Dispersion in implied volatilities in foreign exchange, interest rate and equity markets(a)(b)



Sources: Barclays Live, BBA, Bloomberg Finance LP, Chicago Mercantile Exchange, NYSE ICE and Bank calculations.

(a) Three-month implied volatilities for exchange rates, equities and ten-year interest rates.

(b) Data for S&P 500, FTSE 100 and US rates start from January 2000; data for US$/£ and US$/€ exchange rate start from August 2001; and data for UK rates start from November 2002.

Long-term risk-free interest rates remain very low, in part reflecting an expectation that inflation will remain subdued…

Long-term real interest rates remain close to historically low levels (**Chart A.23**). In part this reflects the influence of structural factors, such as shifts in demographics.(1) It also reflects perceptions that inflation will remain subdued even with sustained, if moderate, global economic growth.

…and measures of uncertainty are low…

Estimates of term premia — that is, the compensation investors demand for uncertainty around the expected future path of interest rates — appear compressed compared to pre-crisis levels.

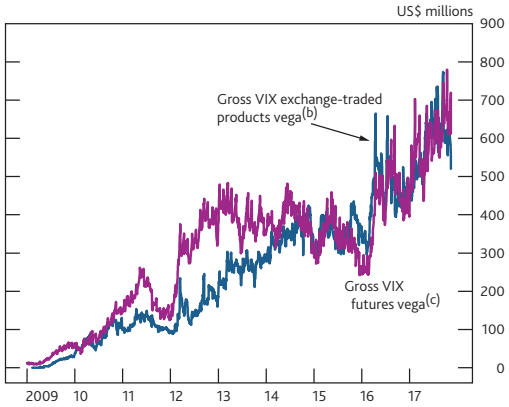
Market-based measures of perceived risks in the near term derived from option prices — so-called implied volatilities — have also been low by historical standards across a number of markets (**Chart A.24**). Levels of volatility for the bond market are particularly low. For example, the MOVE index, a measure of implied US bond market volatility, is at an all-time low. Measures of implied bond market volatility at longer horizons are also lower than the levels seen in 2003–06. In November, the VIX measure of implied US equity market volatility, derived from option prices on the S&P 500 stock index, also fell to historical lows.

According to market contacts, there has also been an increase in recent years in the use by investors (including non-banks) of strategies that sell insurance against a rise in volatility, for which they get paid a premium. In aggregate, investors' exposures to exchange-traded products and futures contracts

(1) For further discussion, see the box on pages 8–9 of the November 2016 *Inflation Report*; www.bankofengland.co.uk/publications/Pages/inflationreport/2016/nov.aspx.

Chart A.25 Investors' exposures to products linked to the implied volatility of the US equity market have increased in the past few years

Estimated gross exposure of VIX exchange-traded products and VIX futures to a 1 percentage point change in implied volatility[a]

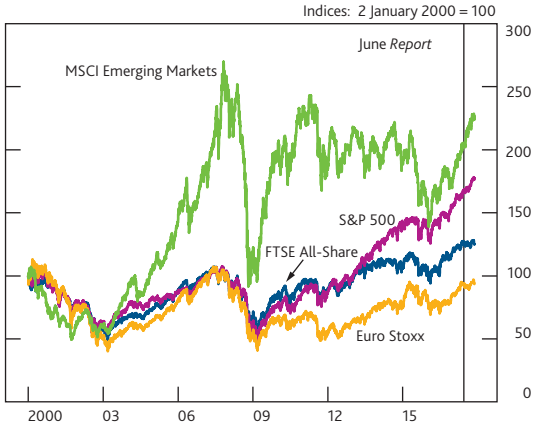


Sources: Bloomberg Finance LP and Bank calculations

(a) Vega measures the sensitivity of a product's mark-to-market valuation with respect to a 1 percentage point change in implied volatility of the underlying asset.
(b) Calculated from seven short term VIX exchange-traded products.
(c) Calculated from nine VIX futures.

Chart A.26 Some international equity prices have risen further

International equity prices[a]

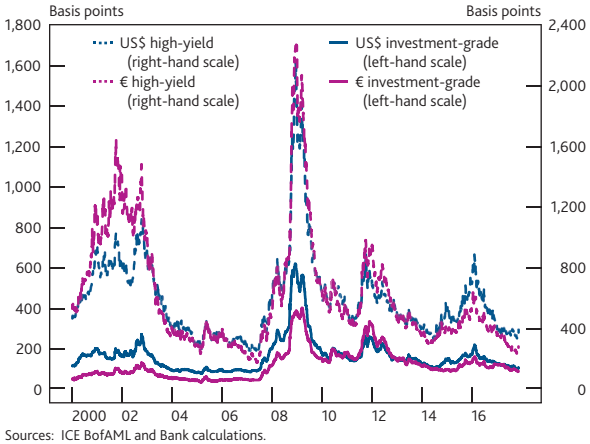


Sources: MSCI, Thomson Reuters Datastream and Bank calculations.

(a) In local currency terms, except for MSCI Emerging Markets, which is in US dollar terms. The MSCI Inc. disclaimer of liability, which applies to the data provided, is available at www.bankofengland.co.uk/publications/Pages/inflationreport/2017/nov.aspx.

Chart A.27 Corporate bond spreads remain compressed

Euro and US dollar corporate bond spreads[a]



Sources: ICE BofAML and Bank calculations.

(a) Option-adjusted spreads. The US dollar series refers to US dollar-denominated bonds issued in the US domestic market, while the euro series refers to bonds issued in eurobond markets in euro.

based on the level of the VIX have increased (**Chart A.25**). The prevalence of these strategies may have contributed to recent low market volatility, and could also potentially amplify the increase in market volatility during periods of stress.

More generally, there is a risk that investors are placing excessive weight on recent benign economic and market conditions. If so, this could lead to an underestimation of risks, underpinning investors' risk appetite and potentially building up risks and fragilities in the financial system.

…which has supported further increases in global risky asset prices, including equities…

Asset valuations in some markets appear to factor in the low level of interest rates but offer little compensation for downside risks. They appear predicated on a continuation of the recent experience of moderate growth, subdued inflation, and low volatility.

Some international equity prices have risen further since the June *Report* (**Chart A.26**) and US equity indices have continued to reach new highs. Equity risk premia — the additional return that investors require for holding equities instead of less risky government debt — for euro-area and US equities are close to their lowest levels in ten years.

…and corporate bonds, whose spreads are compressed despite a loosening of terms and conditions.

In corporate bond markets, spreads are at levels comparable with those seen before the financial crisis, with high-yield more compressed, compared to historical levels, than investment-grade spreads (**Chart A.27**).

This compression in spreads has been accompanied by increased corporate financial leverage, especially in the United States (see Global debt vulnerabilities chapter). Non-price terms for corporate borrowing have also eased, as investors search for yield in a low interest rate and low volatility environment, and are willing to accept lower compensation for the risks taken. One example is weaker financial covenants in high-yield markets. According to market contacts, this trend has been particularly stark in leveraged loan markets, in which covenant-lite debt — where investors have fewer powers to restrict borrowers' ability to take risk — is increasingly becoming the norm (see Box 2).

These assets are therefore vulnerable to a repricing, either through an increase in long-term interest rates or adjustment of growth expectations, or both.

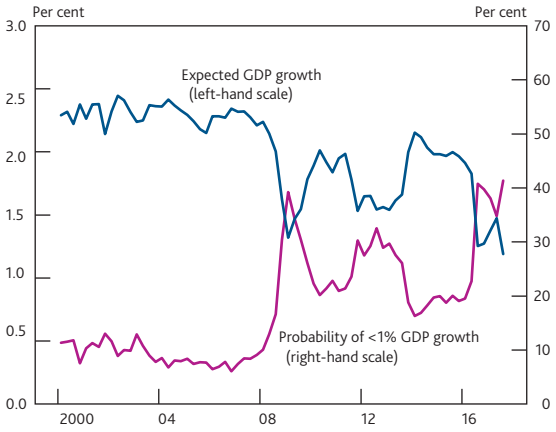
All else equal, lower long-term interest rates would tend to support the present value of cash flows from risky assets, and hence their valuations. Should investors' perceptions of the trade-off between growth and inflation deteriorate, expectations of future interest rates could rise and a range of asset prices would be vulnerable to repricing. In addition, a

reappraisal of risks, for example via an adjustment to growth expectations, could lead to an increase in the compensation required by investors to hold these risky assets instead of less risky government bonds.

The impact of a given rise in interest rates on asset prices could be larger than it would have been in the past, in part because firms have been issuing longer-term bonds over recent years. While this locks in financing for a longer period of time, it can mean that bondholders are exposed to larger movements in prices in the event of a sharp rise in interest rates. In addition, at low interest rates, the responsiveness of corporate bond prices to a given shock will tend to be higher. Together, these factors mean the total amount of interest rate risk borne by the global corporate bond markets has also increased in the past decade. A 100 basis point increase in interest rates would lead to an estimated loss of around 7% of the value of global corporate bonds, compared to a loss of around 4% in 2001. These developments could increase the risks around investors exhibiting procyclical behaviour, therefore magnifying price falls.

Chart A.28 The perceived risk of weakness in near-term output growth remains high in the United Kingdom

External forecasters' perceptions of prospects for UK GDP growth(a)



Sources: Bank of England and Bank calculations.

(a) Calculated from the distributions of external forecasters' predictions for UK GDP growth two years ahead, sampled by the Bank and as reported in the *Inflation Report* each quarter.

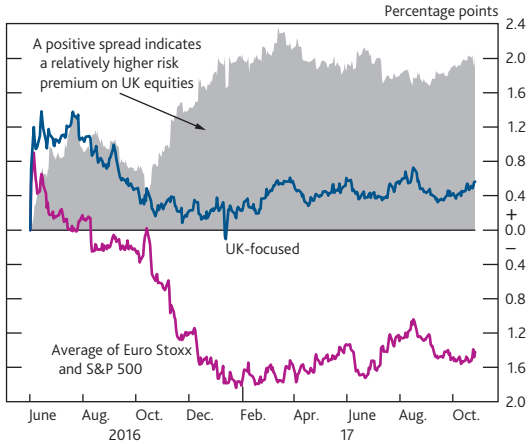
In the United Kingdom, some financial asset prices appear to be influenced by uncertainty about the economic outlook, with investors factoring in more pessimistic growth expectations and downside risks…

In the United Kingdom, the risk of weak output growth in the near term is perceived to be high (**Chart A.28**). This may be part of the reason that risk-free rates in the United Kingdom have fallen more relative to those in other major economies since mid-2016 (**Chart A.23**).

Consistent with this, estimates of equity risk premia for an index of UK-focused companies — those for which at least 70% of revenue is earned in the United Kingdom — have been broadly flat since the EU referendum, in contrast to the falls in equity risk premia for the S&P 500 index and Euro Stoxx index (**Chart A.29**). This could suggest that investors may be factoring in a higher probability of an adverse outcome for the UK economy, and therefore require higher compensation for holding assets that are closely exposed to the UK economy.

Chart A.29 Equity risk premia for UK equities have been broadly flat since the EU referendum, in contrast to the falls in US and euro-area equity risk premia

Cumulative changes in equity risk premia for UK-focused equities and for an average of the equity risk premia for the S&P 500 and Euro Stoxx indices since the EU referendum(a)(b)(c)



Sources: Bloomberg Finance LP, IMF *WEO*, Thomson Reuters Datastream and Bank calculations.

(a) UK-focused companies are those for which at least 70% of revenue is earned in the United Kingdom.
(b) Equity risk premia are implied by a multi-stage dividend discount model.
(c) Cumulative changes are calculated from 23 June 2016 to 17 November 2017.

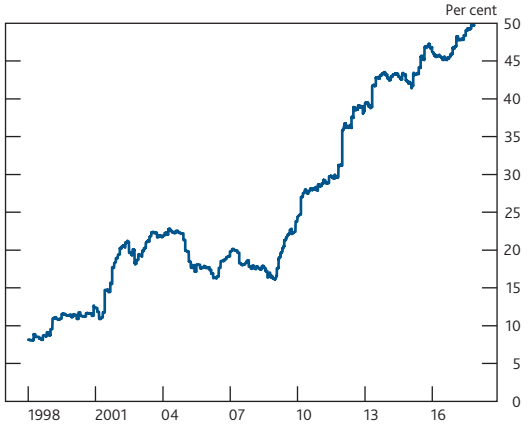
…but sterling corporate bond spreads are, in general, compressed, despite a fall in credit quality…

In line with the global corporate bond market, sterling corporate bond spreads have fallen over the past couple of years and appear compressed by historical standards. In part this may reflect the international nature of many firms issuing sterling corporate bonds, as well as the impact of the Bank's Corporate Bond Purchase Scheme.(1)

(1) Belsham, T, Maher, R and Rattan, A (2017), 'Corporate Bond Purchase Scheme: design, operation and impact', *Bank of England Quarterly Bulletin*, Vol. 57, No. 3, pages 170–81; www.bankofengland.co.uk/publications/Documents/quarterlybulletin/2017/q3/a2.pdf.

Chart A.30 The share of lower-rated companies in the sterling investment-grade corporate bond index has increased

The proportion of BBB-rated debt in the sterling investment-grade corporate bond index[a]

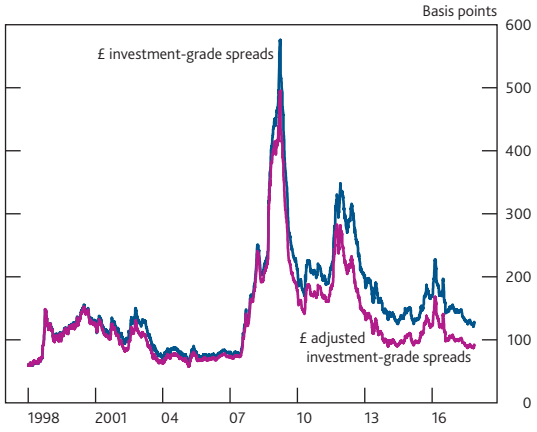


Sources: ICE BofAML and Bank calculations.

(a) The chart shows the proportion, as measured by market value, of the ICE BofAML sterling investment-grade index that is rated BBB. This index can be used as a representative measure of the sterling investment-grade corporate bond market. However, the index may not capture all sterling investment-grade corporate bonds and alternative indices may contain different proportions of BBB-rated bonds.

Chart A.31 Credit quality adjusted sterling investment-grade corporate bond spreads are at similar levels to those seen before the financial crisis

Sterling investment-grade corporate bond spreads and credit quality adjusted sterling investment-grade corporate bond spreads[a]



Sources: ICE BofAML and Bank calculations.

(a) The adjusted sterling investment-grade series accounts for changes in the composition of the index over time by holding constant the weightings of the different credit ratings within the index as at 2 January 1998.

Meanwhile, the share of lower-rated companies in the sterling investment-grade corporate bond market has also increased significantly in the past decade. For example, the share of BBB-rated debt in the sterling investment-grade corporate bond index increased from 8% in 1998 to 49% in 2017 (**Chart A.30**). After adjusting for this deterioration in average credit quality, sterling investment-grade corporate bond spreads look even more compressed and are at similar levels to those seen before the financial crisis (**Chart A.31**).

The spreads of high-yield sterling bonds, which are more likely to be issued by domestically focused firms, are also low by historical standards. However, these spreads have narrowed by less than their dollar and euro equivalents since early 2016.

…and valuations in segments of the UK commercial property market look stretched, particularly in London.

Valuations in some segments of the UK commercial real estate (CRE) sector continue to appear stretched. A range of sustainable valuations can be generated using a valuation model based on a number of assumptions, including CRE rental yields. Based on this approach, current prices lie at the top end of the range of estimated sustainable valuation levels (the blue range in **Chart A.32**), which is consistent with persistently low rental yields. Were rental yields to return to their historical averages, this would suggest that current prices are above estimated sustainable valuation levels (the lower bound of the blue range in **Chart A.32**). This could be triggered by either an increase in long-term interest rates or an adjustment of risk premia and medium-term rental growth expectations, or both.

Some segments of the CRE market appear more stretched than the aggregate picture. For example, current London West End office prices are well above the range of estimated sustainable valuation levels (the yellow range in **Chart A.32**).

The London CRE market is also particularly vulnerable to possible price falls given the large pipeline of supply and an elevated risk of falling demand were firms to relocate from the United Kingdom due to Brexit. It is also highly dependent on overseas investment. Overseas investors accounted for around 80% of total investment in the London CRE market in 2017, compared to around 55% in 2007. The foreign investor base is also increasingly concentrated, with Asian investors accounting for almost two thirds of foreign purchases in London in 2017.

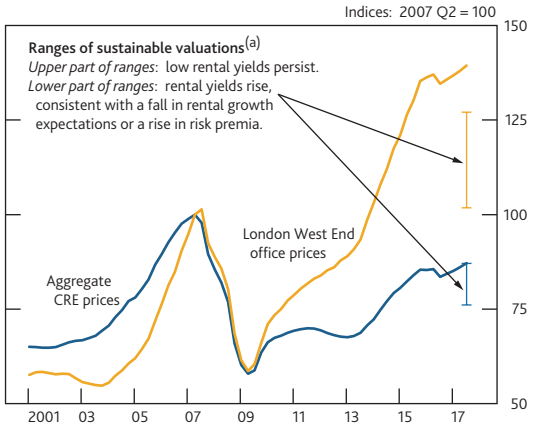
Consensus forecasts from the Investment Property Forum, published in Autumn 2017, point to average price falls of around 5% for London West End offices by the end of 2019.

An adjustment in asset prices could be amplified by the behaviour of some investors, which could affect the supply of credit to the real economy.

Any adjustment in asset prices could be amplified given fragile liquidity in some markets, particularly if some investors behave

Chart A.32 UK commercial real estate prices look stretched based on ranges of sustainable valuations

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

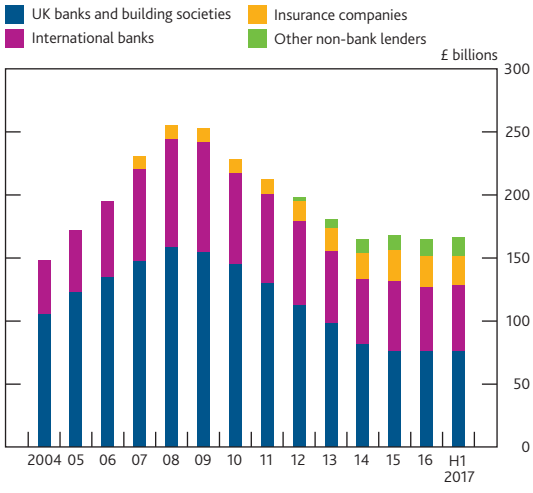


Sources: Bloomberg Finance LP, Investment Property Forum, MSCI Inc. and Bank calculations.

(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 5-year gilt yield plus a risk premium, and the sale proceeds are discounted using a 20-year, 5-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 15-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.33 UK banks' stock of CRE lending has more than halved since the crisis

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 as follows: a category for insurance companies was created in 2007, and another one for non-bank lenders in 2012. The category of insurance companies includes only UK insurers from 2007 to 2011, and all insurers from 2012 onwards. Data exclude commercial mortgage-backed securities.

procyclically — that is, if they sell risky assets in large quantities purely in response to a deterioration in the performance of their portfolios (see Market-based finance chapter).

In extremis, the supply of credit to the real economy, and transfer of risk to those who are best placed to manage it, could be impaired. CRE, for example, 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. Research by Bank staff suggests that every 10% fall in UK CRE prices is associated with a 1% decline in UK economy-wide investment.(1)

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.

UK banks have more than halved their stock of CRE lending since the 2008 crisis. The total stock of UK banks' CRE lending fell from around £160 billion at end-2008 to around £77 billion at end-2017 H1 (**Chart A.33**). For large UK banks involved in the 2017 stress test,(2) their exposures to the CRE sector averaged around 50% of common equity Tier 1 capital at end-2016.

The risk of sharp adjustments in asset prices was captured in the 2017 stress-test scenario.

The Bank's 2017 stress test incorporated sharp movements in global and domestic market prices and indices, including interest rates, term premia, corporate bond spreads, exchange rates, volatility measures, credit spreads and equity indices, with many of these shocks resembling the market movements observed during the financial crisis. For example, the VIX index averages 38 compared to a quarterly average of around 40 during the financial crisis, and high-yield US corporate bond spreads increase from around 465 basis points in 2016 Q4 to around 1,615 basis points in 2017 Q4. It also included a 40% fall in UK CRE prices. No bank needs to strengthen its capital position as a result of the stress test (see Box 3).

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

(1) Bahaj, S, Foulis, A and Pinter, G (2016), 'The residential collateral channel', *Centre for Macroeconomics Discussion Paper, CFM-DP2016-07*.
(2) 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.

Box 2
Risks from leveraged loans

Publicly available data suggest that global issuance of leveraged loans has picked up in 2017. These are loans to companies that typically display some of the following characteristics:[1]

- high levels of indebtedness;
- a non-investment grade credit rating;
- ownership by a private equity sponsor.

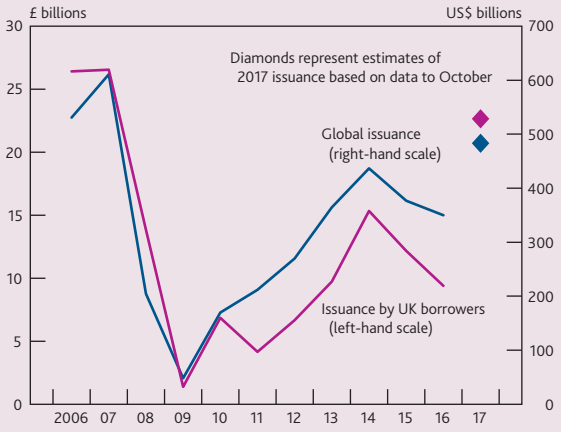
As a result, leveraged loans tend to have higher default rates than other corporate loans. These loans can affect UK financial stability via a number of channels, including: (i) risks to the resilience of UK corporate borrowers; (ii) risks to the resilience of UK banks; and (iii) risks to the wider financial system. This box examines these risks and describes actions that the FPC and international authorities have taken to mitigate them.

Recent trends in global leveraged loan issuance

As of end-October, 'new money' issuance, defined as issuance of leveraged loans other than for refinancing purposes, was on track to exceed US$480 billion in 2017, its highest level since the financial crisis, although this remains around 20% below its 2007 peak (**Chart A**).[2]

Chart A Leveraged loan issuance has picked up

Global new money issuance of leveraged loans[a][b]



Sources: LCD, an offering of S&P Global Market Intelligence, Thomson Reuters Datastream and Bank calculations.

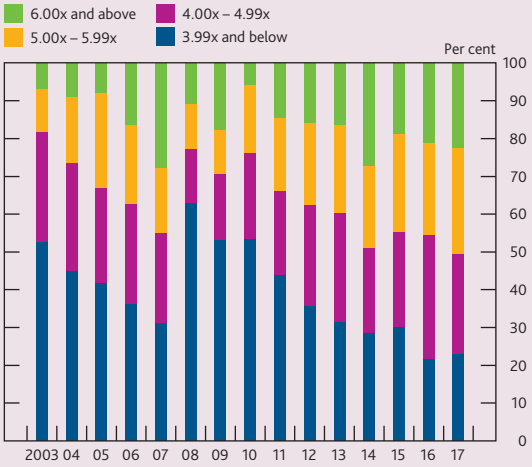
(a) Based on public syndication transactions, and excluding private bilateral deals.
(b) New money issuance refers to gross issuance other than for refinancing purposes. It does not account for other repayments of outstanding loans, and so it differs from net issuance.

The pickup in issuance of leveraged loans has been accompanied by a fall in spreads of loan interest rates over relevant reference rates, consistent with an increase in investor appetite for risky assets (see Asset valuations chapter). For example, since end-2015, typical spreads over Euribor for B-rated loans issued in the European market fell by 1.5 percentage points, to 4.3%.[3]

Underwriting standards have also loosened. For example, among leveraged loans to large companies, the proportion issued to more highly indebted borrowers (those with debt to earnings ratios at or above six) picked up to around 22% in 2017, below the 28% share at its 2007 peak (**Chart B**). And the share of so-called covenant-lite issuance — where investors have fewer powers to restrict borrowers' ability to take risk — has tripled since 2007, to nearly 60%.

Chart B Loans to highly indebted firms have increased

Global leveraged loan issuance to large corporates by debt to earnings ratio[a][b]



Sources: LCD, an offering of S&P Global Market Intelligence and Bank calculations.

(a) Based on data for public syndication transactions, and excluding private bilateral deals.
(b) Large companies defined as those with earnings above US$50 million. Earnings measured before interest, taxes, depreciation and amortisation.

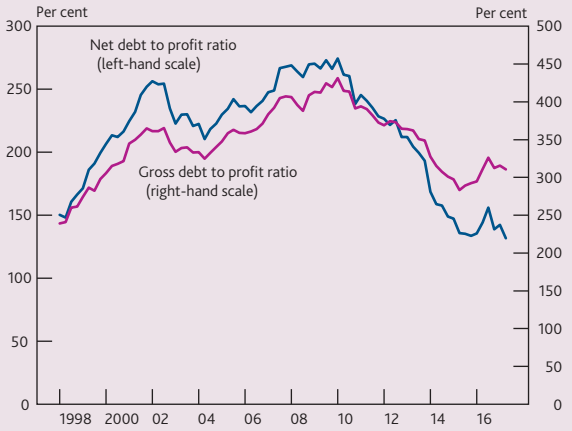
Risks to the resilience of UK corporate borrowers

Leveraged loans only account for less than 10% of UK private non-financial corporations' (PNFCs') borrowing from UK banks. And, in aggregate, UK PNFCs have materially reduced their indebtedness since 2009. The ratio of their outstanding debt to profits has fallen by over 100 percentage points, to 310%, despite the recent pickup in issuance of leveraged loans (**Chart A**). UK companies have also continued to increase their deposits, so the fall in the ratio of their debt net of deposits to profits is even more pronounced (**Chart C**). The cost of servicing corporate debt is also low, supported by the low level of interest rates. As a result, according to 2016/17 financial accounts data, the proportion of companies whose profits do not cover their interest payments is smaller than in recent years and slightly below its level in 2006.[4] Overall, the FPC judges that the risks to UK financial stability from the indebtedness of UK corporates are not elevated.

(1) Precise definitions of leveraged loans vary between data sources.
(2) Throughout this box, statistics on global issuance are based on data provided by LCD, an offering of S&P Global Market Intelligence.
(3) Based on data for 'Term Loans B', which are loans made by institutional investors.
(4) See 'The sensitivity of households and companies to changes in interest rates' in the November 2017 *Inflation Report*; www.bankofengland.co.uk/publications/Documents/inflationreport/2017/nov.pdf.

Chart C UK companies' indebtedness has fallen in recent years

Private non-financial corporations' debt to profit ratios(a)



Sources: ONS and Bank calculations.

(a) Debt as a percentage of a four-quarter moving sum of gross operating surplus, adjusted for the effects of financial intermediation services indirectly measured. Gross debt is measured as loans and debt securities excluding derivatives, direct investment loans and loans secured on dwellings. Net debt is gross debt less deposits.

Risks to the resilience of UK banks

In aggregate, major UK banks held £89 billion of leveraged loans at end-2016, including loans to borrowers overseas.(1) This represented 10% of banks' corporate exposures, and was equivalent to around a third of their common equity Tier 1 (CET1) capital.

Banks' exposures to leveraged loans could grow rapidly during periods of macroeconomic or financial market stress. This is because they may be unable to distribute some of the loans in their underwriting pipeline which they originally intended to pass to investors. This happened during the global financial crisis. These loans would increase the credit risk and market risk faced by banks, because falling asset values would need to be immediately recognised on banks' balance sheets. In 2016, major UK banks distributed around £19 billion of the £42 billion of leveraged loans originated that year to UK and overseas borrowers. If the distributed loans had been retained on banks' balance sheets, banks' holdings of leveraged loans would have risen by around 20%, to 45% of their CET1 capital.

The FPC and PRC continue to monitor closely the underwriting standards of UK banks originating leveraged loans. The resilience of major UK banks to risks arising from their leveraged lending activities is tested as part of the Bank's annual cyclical stress tests. The PRA can also increase a firm's capital requirements under Pillar 2 in respect of risks arising from its leveraged lending activities in cases where the PRA judges that the risks are not covered or not fully covered by Pillar 1.

For banks participating in the 2017 stress test, aggregate cumulative losses on leveraged loans in their underwriting pipeline were projected to reach £2.5 billion in the annual cyclical scenario, with a loss rate of 19%, representing around 15 basis points of banks' aggregate CET1 capital ratio. And losses on banks' global portfolios of non-property corporate loans (which include leveraged loans) were projected to reach nearly £60 billion in the scenario, with a loss rate of 7%, representing around 325 basis points of banks' aggregate CET1 capital ratio. No bank needs to strengthen its capital position as a result of the stress test.

In other jurisdictions, US supervisors and the European Central Bank (ECB) have issued guidance to institutions engaged in leveraged lending activities, aiming to promote sound and consistent risk management practices. For example, the ECB expects credit institutions to define acceptable leverage levels as part of their risk appetite statements, noting that for most industries, borrower leverage in excess of six times debt to earnings raises concerns. This guidance applies to all significant credit institutions supervised by the ECB.(2) And guidance by US supervisors applies to all US lenders and to other lenders originating loans in the United States.(3) As a result, around two thirds of leveraged lending to UK and other European borrowers is now subject to guidance.(4)

Risks to the wider financial system

Stress in the leveraged loan market could also affect the wider financial system. At end-October 2017, around 66% of the US$1 trillion outstanding leveraged loans were repackaged into collateralised loan obligations (CLOs) or sold to credit funds and then distributed to a range of investors, including hedge funds, pension funds and insurers.(5)

If securitisation structures, such as CLOs, are complex or opaque, investors may be unable to properly assess their risks. This became apparent during the financial crisis, prompting a number of regulatory initiatives. For example, in the European Union, investors are now required to check if the originator, sponsor or original lender has retained an interest in the securitisation of at least 5%, which increases incentives of these actors to scrutinise risks. In addition, in October, the European Parliament approved a new Securitisation Regulation that applies due diligence, risk retention and transparency rules across issuers and institutional investors. These reforms apply from 1 January 2019.(6)

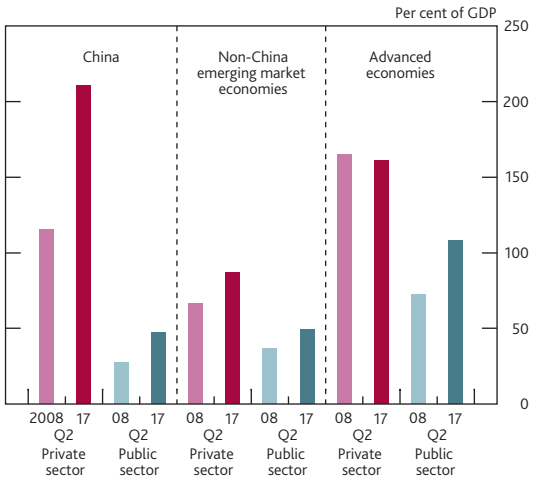
(1) The sample includes: Barclays, HSBC, Lloyds Banking Group, RBS, Santander UK and Standard Chartered. Leveraged loans are defined as corporate loans which satisfy the following criteria: (i) non-investment grade credit rating; (ii) borrower owned by a private equity firm or borrower's ratio of debt to earnings before interest, taxes, depreciation and amortisation (EBITDA) is above four. These exposures exclude loans to small and medium-sized enterprises and commercial real estate loans.
(2) See www.bankingsupervision.europa.eu/ecb/pub/pdf/ssm.leveraged_transactions_guidance_201705.en.pdf.
(3) See www.federalreserve.gov/supervisionreg/srletters/sr1303a1.pdf.
(4) Estimate based on available data for 2017 Q1–Q3. Guidance by the ECB came into force in November 2017.
(5) Investors may also gain exposure to leveraged loans via credit derivatives, eg credit default swaps, allowing them to buy and sell insurance against borrower default.
(6) See https://ec.europa.eu/info/business-economy-euro/banking-and-finance/financial-markets/securities-markets/securitisation_en. These reforms follow recommendations by the Basel Committee on Banking Supervision and the International Organization of Securities Commissions.

Global debt vulnerabilities

Near-term prospects for the global economy have continued to strengthen. But risks from debt vulnerabilities in several major economies persist. These pose risks to UK financial stability through UK banks' exposures to these economies and through spillovers to the UK economy. In particular, risks to financial stability in China remain elevated as economic growth continues to be supported by rapid credit expansion. The FPC incorporated a severe global stress in the 2017 annual cyclical scenario. Global output contracts by 2.4% over the first year of the stress scenario, and growth in China and Hong Kong is particularly adversely affected.

Chart A.34 Private non-financial sector debt to GDP ratios in emerging economies have risen since the 2008 global financial crisis, driven largely by China

Non-financial sector debt[(a)]



Sources: BIS total credit statistics, IMF *World Economic Outlook*, Institute of International Finance (IIF) and Bank calculations.

(a) 2017 Q2 figures use IIF estimates. Includes lending by all sectors at market value as a percentage of GDP, adjusted for breaks. Private non-financial sector debt includes lending to households and non-financial corporations. Public non-financial sector debt includes lending to governments. Regional figures are weighted using GDP valued at market exchange rates.

Near-term prospects for the global economy have continued to strengthen…

The near-term outlook for global output growth has continued to strengthen since the June 2017 *Report*. In October, the International Monetary Fund revised up its forecast for world GDP growth from 3.5% to 3.6% in 2017. Upward revisions to growth were broad-based, including for the euro area, Japan, China, emerging Europe and Russia. The Monetary Policy Committee's expectation is for global GDP growth to remain strong relative to recent history, supported by a recovery in the contribution of investment to advanced-economy growth.

…but global debt vulnerabilities remain material…

Non-financial sector debt — borrowing by governments, non-financial corporates and households — has risen as a share of GDP in several major economies since the 2008 global financial crisis. In particular, private non-financial sector debt to GDP ratios have risen in emerging economies over that period, driven largely by China (**Chart A.34**). The rise in non-financial sector debt since the crisis has taken place in a period of loose financing conditions. Low interest rates, high asset valuations and low volatility (see Asset valuations chapter) are likely to have increased access to credit by corporates.

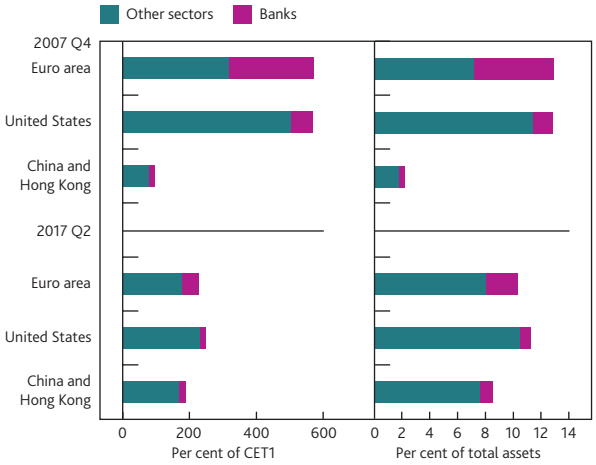
While higher debt has helped facilitate the recovery, it could amplify future risks in indebted countries. Higher debt leaves non-financial sectors more vulnerable to a change in market conditions, including a rise in interest rates or a correction in asset prices. An adverse shock could result in tighter financial conditions and widespread defaults, exacerbating the potential economic downturn.

…and could affect UK financial stability through several channels.

Such shocks may affect UK banks through their direct lending to households and firms in vulnerable economies and potential credit losses in these regions. UK banks may also be affected indirectly by financial contagion, through their exposures

Chart A.35 UK banks have significant exposures to China, Hong Kong, the United States and the euro area

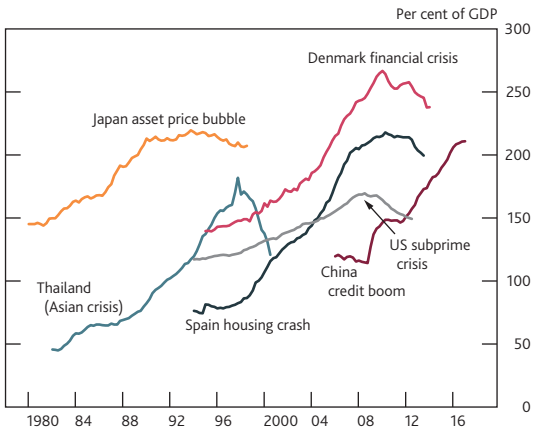
UK-owned banking groups' consolidated exposures to selected countries and regions



Sources: Bank of England, SNL Financial and Bank calculations.

Chart A.36 Countries that underwent sharp credit booms have often experienced a crisis

Private non-financial sector debt[a]



Sources: BIS total credit statistics and Bank calculations.

(a) Includes lending to households and non-financial corporations by all sectors at market value as a percentage of GDP, adjusted for breaks.

to other affected banks. UK banks' exposures to the United States and euro area have fallen since the 2008 global financial crisis both as a share of common equity Tier 1 (CET1) and total assets (**Chart A.35**). In contrast, at around 189% of CET1 and 8.5% of total assets, exposures to China and Hong Kong have increased substantially relative to 2007. Overall, UK banks' exposures to China, Hong Kong, the United States and the euro area remain significant, totalling around 668% of CET1 or 30% of total assets.

Global shocks can also affect UK financial stability through spillovers to the UK economy, testing banks' resilience to UK economic downturns. In addition, they may affect UK financial stability through wider market disruption. UK-resident investment funds and UK-resident insurers and pension funds hold around 48% and 27% of their financial assets respectively in non-UK debt and equity securities. Some investment funds allow investors to redeem positions at short notice. Large-scale investor redemptions could result in sales of assets that could test markets' ability to absorb them, potentially impairing market liquidity (see Market-based finance chapter).

In China, while external pressures have eased, risks from domestic vulnerabilities remain elevated.

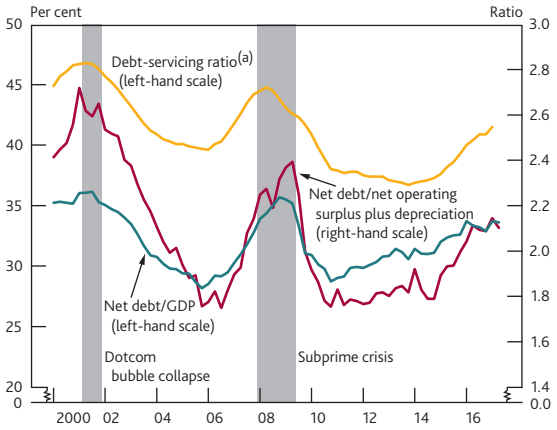
After two years of currency depreciation, the renminbi stabilised in 2017, and has appreciated by 3% against the US dollar since the June 2017 *Report*. China's official foreign exchange reserves have also remained broadly stable, at just above US$3 trillion. This appears to reflect several factors, including an improved economic outlook in China and tighter controls on capital movements by the Chinese authorities.

The easing of external pressures has reduced the need for substantial increases in domestic interest rates to counter capital outflows, which could have otherwise led to a sharp tightening of domestic financial conditions. But the improved near-term economic outlook, which has helped ease external pressures, has relied on strong credit growth to pursue the authorities' target of doubling output by 2020, potentially increasing future risks. China's private non-financial sector debt to GDP ratio already stands at 211%, having risen around 60 percentage points in the past five years. China's credit expansion is more rapid than that in the United States in the run-up to the 2008 crisis or in Japan before the 1990 stock market crash. Similarly sharp credit booms preceded financial crises in Thailand, Spain and Denmark (**Chart A.36**).

Such risks could be amplified by the Chinese financial sector, which has become increasingly complex since the 2008 global financial crisis. Over the period, small and mid-sized banks have doubled in asset size as a share of GDP and have become more reliant on wholesale funding, and shadow banking activities have expanded. This could increase the risk of contagion within the Chinese financial system in the event of a shock.

Chart A.37 US corporate leverage and the debt-servicing ratio have been rising since 2014

US corporate net debt ratios and debt-servicing ratio

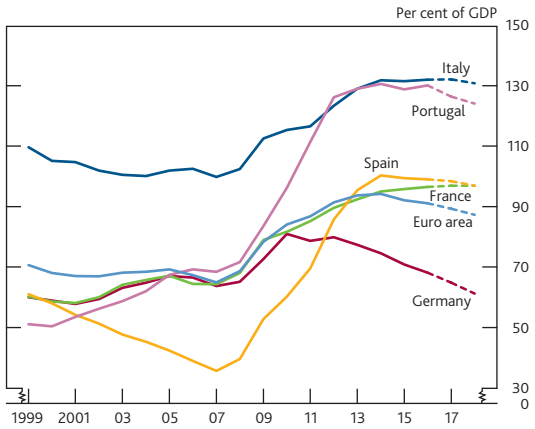


Sources: BIS debt service ratios statistics, Federal Reserve Board Flow of Funds, US Bureau of Economic Analysis and Bank calculations.

(a) Debt-servicing ratio as calculated by BIS, defined as the ratio of interest payments plus amortisations to income.

Chart A.38 Public sector debt remains elevated in several euro-area economies

General government debt(a)



Source: European Commission (AMECO).

(a) Dashed lines are European Commission projections.

US corporate sector leverage has been increasing gradually, alongside a rise in the cost of servicing this debt.

There are some signs of debt vulnerabilities rising in the US corporate sector. At 2.1, corporate leverage (defined as the ratio of net debt to net operating surplus plus depreciation) has increased from 1.8 in 2014 Q3 (**Chart A.37**). In particular, corporate real estate (CRE) loans as a share of GDP increased further in 2017 Q2, approaching pre-crisis levels. Higher corporate debt has also led to a rise in the cost of servicing this debt since 2014 (**Chart A.37**) — although the debt-servicing ratio is still below its pre-crisis average. Overall, UK banks' exposures to the United States account for around 250% of CET1, including claims of around 17% of CET1 on US banks.

In the euro area, public sector debt ratios and non-performing loans remain high in some countries.

Public sector debt remains elevated in several euro-area economies (**Chart A.38**). For example, in 2016, it was above 130% of GDP in both Italy and Portugal. In the private sector, banks' non-performing loan (NPL) ratios fell further in 2017 Q2 in most euro-area countries. However, risks vary across banking sectors, with Italian and Portuguese banks continuing to experience high legacy NPL ratios. While direct UK bank exposures to Italian and Portuguese banks are modest (around 3% of CET1), UK banks could be affected through their exposures to other euro-area banks, which amount to around 47% of CET1. Total UK banks' exposures to the euro area account for around 229% of CET1.

The FPC incorporated a severe global stress in the 2017 annual cyclical scenario.

The 2017 stress-test scenario is more severe than the global financial crisis. Global output contracts by 2.4% over the first year of the stress scenario as economies around the world experience synchronised slowdowns, and growth in China and Hong Kong is particularly adversely affected. The scenario also incorporates wider financial market stress.

The tough global stress leads to significant impairments for UK banks. Over 50% of total projected impairments in the stress relate to non-UK exposures. Of those overseas impairments, more than half relate to lending to the corporate sector (including CRE). For the United States, where GDP falls by 3.5% during the first year of the stress, the corporate impairment rate (excluding CRE) is projected to be 7.8% over the five-year stress, significantly higher than in the 2016 stress test (4.8%). US companies involved in the oil and gas extraction industry are among those most severely affected. For Hong Kong and China, the cumulative corporate impairment rate (excluding CRE) is projected to be 7.8% over the five-year stress. No bank needs to strengthen its capital position as a result of the stress test.

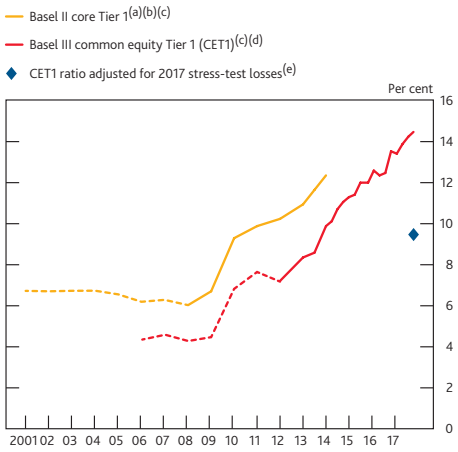
Banking sector resilience

The aggregate Tier 1 capital ratio of the major UK banks was 16.7% of risk-weighted assets in September 2017, and their common equity Tier 1 capital ratio was 14.5%, more than three times the level ten years ago. The aggregate leverage ratio has roughly doubled in that period. The 2017 stress test shows the UK banking system is resilient to deep simultaneous recessions in the UK and global economies, large falls in asset prices and a separate stress of misconduct costs.

UK banks' resilience is reflected in their low funding costs. However, market valuations of equity remain low for some banks, reflecting ongoing headwinds to profitability, including from misconduct costs and persistently low investment banking returns. The FPC and PRC have completed an exploratory exercise examining major UK banks' long-term strategic responses to a low rate, low growth macroeconomic environment.

Chart B.1 UK banks have significantly strengthened their capital resources since the global financial crisis

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, Lloyds Banking Group, National Australia Bank, Nationwide, RBS and Northern Rock (until 2007).
(b) From 2008, the chart shows core Tier 1 ratios as published by banks, excluding hybrid capital instruments and preference shares, and making deductions from capital based on FSA definitions. Prior to 2008 that measure was not typically disclosed; the chart shows Bank estimates.
(c) Weighted by risk-weighted assets.
(d) From 2012, the 'Basel III common equity Tier 1 capital ratio' is calculated as common equity Tier 1 capital over risk-weighted assets, according to the CRD IV definition as implemented in the United Kingdom. Prior to 2012, the chart shows Bank estimates. The peer group includes Barclays, Co-operative Banking Group, HSBC, Lloyds Banking Group, Nationwide, RBS and Santander UK.
(e) CET1 ratio less the aggregate percentage point fall projected under the Bank of England's 2017 annual cyclical stress scenario for the six largest UK banks.

The UK banking system is well-capitalised…

UK banks have significantly strengthened their capital resources since the global financial crisis (**Chart B.1**). In aggregate, the major UK banks had a total Tier 1 capital ratio of 16.7% of risk-weighted assets (RWAs) in September 2017. Their common equity Tier 1 (CET1) capital ratio, estimated on a consistent basis, has more than tripled since 2007 to 14.5%.

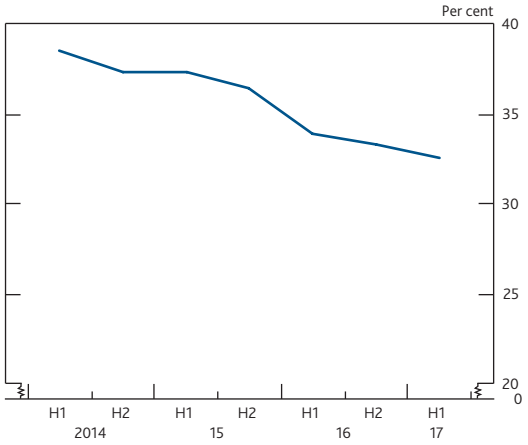
The improvement in UK banks' risk-weighted capital ratios reflects both an increase in capital resources and a reduction in RWAs. The major UK banks have £222 billion of CET1 capital, which is estimated to have increased by around £115 billion since 2007. And, in the past few years, a reduction in the size and riskiness (**Chart B.2**) of banks' balance sheets has led to a fall in RWAs, driving much of the increase in banks' CET1 ratios in that period. This largely reflects: (i) banks paring back investment banking activities and disposing of non-core businesses, such as overseas subsidiaries; and (ii) a shift towards safer and more liquid assets, such as cash and government bonds, partly driven by changing liquidity requirements.

The leverage ratio is invariant to changes in the riskiness of assets. The leverage ratio of the major UK banks, estimated on a consistent basis, has roughly doubled since 2007. In 2017 Q3, their Tier 1 capital as a proportion of total exposures, excluding central bank reserves, was 5.6% (**Chart B.3**).(1)

(1) This is the major UK banks' aggregate UK leverage ratio at the end of September; the average over the quarter was 5.5%.

Chart B.2 UK banks' risk weights have fallen

Major UK banks' average risk weights[a][b]

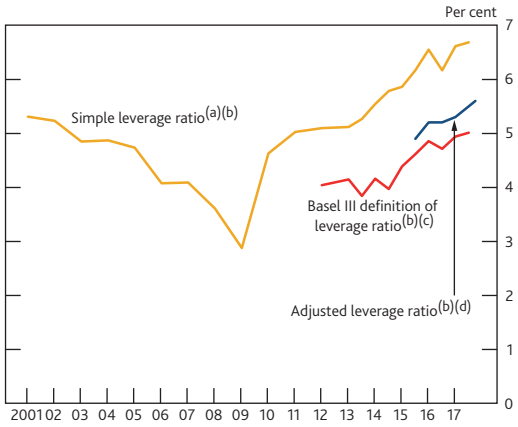


Sources: Published accounts and Bank calculations.

(a) Sample includes Banco Santander, Bank of Ireland, Barclays, Co-operative Banking Group, HSBC, Lloyds Banking Group, National Australia Bank, Nationwide, RBS and Virgin Money.
(b) Aggregate end-year peer group risk-weighted assets divided by aggregate end-year peer group published balance sheet assets. Data are on a CRD IV basis. Latest published figures have been used; in the case of Nationwide, these relate to 2016 H2.

Chart B.3 UK banks' leverage ratios have strengthened

Major UK banks' leverage ratios



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

(a) Simple leverage ratio is 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 described in footnote (o) in Annex 2 also applies here.
(b) Weighted by total exposures.
(c) Basel III leverage ratio corresponds to aggregate Tier 1 capital over the 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. The exposure measure is based on the Basel 2014 definition for 2014 and the CRR definition from 2015 onwards. The peer group described in footnote (d) to **Chart B.1** also applies here.
(d) Leverage ratio with central bank reserves excluded from the exposure measure, consistent with the FPC Recommendation from July 2016. Based on end of the period figures. The peer group used in footnote (d) to **Chart B.1** also applies here.

…and resilient to deep simultaneous recessions in the UK and global economies and large falls in asset prices.

The 2017 stress test incorporates deep simultaneous recessions in the UK and global economies, large falls in asset prices and a separate stress of misconduct costs. The economic scenario in the test is more severe than the global financial crisis and leads to losses for banks of around £50 billion in the first two years of the stress. The 2017 stress test shows the UK banking system is resilient to the risks associated with the scenario (see Box 3).

UK banks' liquidity also remains strong.

UK banks' liquidity and funding positions are also much improved since the financial crisis. At the end of 2016, liquid assets, such as cash, balances with central banks and certain government bonds, accounted for 14.6% of large UK banks' total assets; this proportion has doubled from its low level in 2007 (**Chart B.4**). Major UK banks and smaller UK domestic banks hold sufficient high-quality liquid assets to meet the Liquidity Coverage Ratio requirement and supervisory add-ons for any risks not captured or not fully captured by this requirement. In addition, banks' reliance on short-term funding has fallen sharply: excluding repo financing, it now accounts for 4.5% of large UK banks' total funding, compared to 15.9% in 2007.(1) All major UK banks report they have sufficient stable funding to meet the proposed Net Stable Funding Ratio (NSFR) requirement.(2)

The FPC is considering the impact of changes to international standards on the calibration of the UK capital framework.

On 1 January 2018, most banks in the United Kingdom will need to adhere to a new accounting standard called International Financial Reporting Standard 9 (IFRS 9). The FPC's judgement of the necessary level of loss-absorbing capacity for the banking system is invariant to accounting standards. The Committee will take steps to ensure that the interaction of IFRS 9 accounting with its annual stress test does not result in a *de facto* increase in capital requirements (see Box 4).

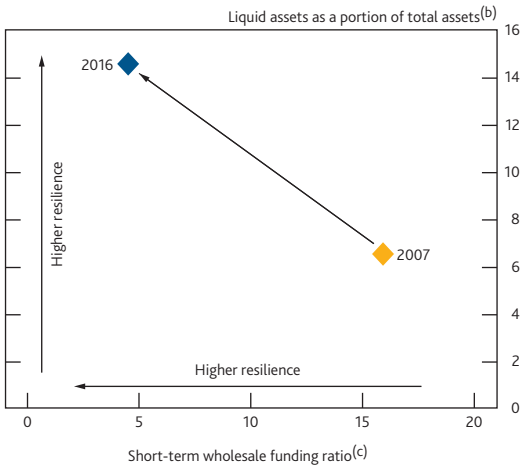
The United Kingdom's comprehensive bank resolution regime and ongoing work to make banks fully resolvable contribute to bank resilience…

Both in the United Kingdom and globally, public authorities are working towards making banks resolvable to ensure that risks to financial stability from bank failure are adequately mitigated, essential services can continue regardless of where they are located and the taxpayer does not bear costs of failure. In October 2017, the Bank updated *The Bank of*

(1) This refers to the five banks listed in footnote (a) to **Chart B.4**. The ratio for a wider group of banks listed in Annex 2 was 4.9% in 2016.
(2) The European Commission has proposed implementing the NSFR as part of the Capital Requirements Regulation II legislative package which is currently being discussed by EU legislative bodies. In the Commission's proposal, the NSFR would become a requirement two years after the entry into force of the regulation.

Chart B.4 UK banks' liquidity and funding positions have improved since 2007

Liquid assets and short-term funding of large UK banks[a]

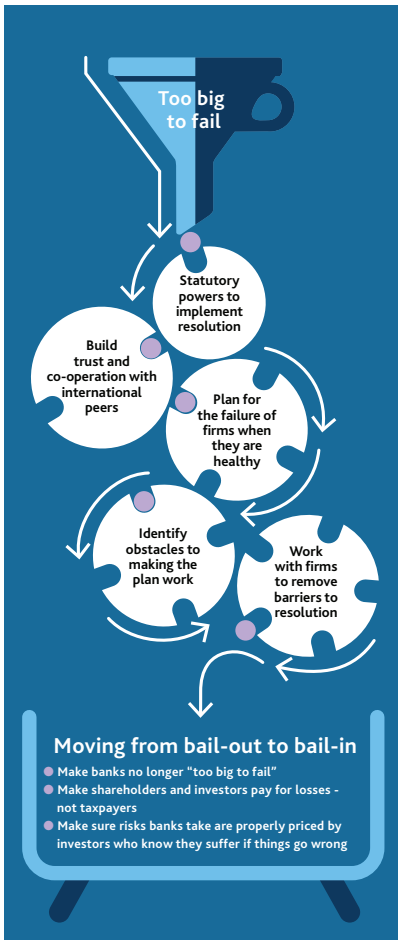


Sources: PRA regulatory returns, published accounts and Bank calculations.

(a) Sample includes Barclays, HSBC, Lloyds Banking Group (including HBOS in 2007), Nationwide and RBS.
(b) The estimate of liquid assets in 2007 is based on: cash and balances with central banks, and highly liquid securities. Liquid assets in 2016 comprise Liquidity Coverage Ratio Level 1 high-quality liquid assets excluding covered bonds.
(c) Share of total funding (including capital) accounted for by wholesale funding with residual maturity of under three months other than repo funding (repurchase agreements and securities lending). Wholesale funding comprises deposits by banks, debt securities and subordinated liabilities. 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.

Figure B.1 When a bank fails, the Bank of England steps in to manage the process

The Bank of England's resolution framework



England's approach to resolution, which provides more details on the resolution regime in the United Kingdom (**Figure B.1**).[1]

One of the key components of the resolution framework is that UK banks should have enough resources on their balance sheet to facilitate orderly resolution. For larger banks, this 'minimum requirement for own funds and eligible liabilities' (MREL) helps to ensure that when banks fail, the resolution authority can use a bank's own financial resources to absorb losses and recapitalise the business through bail-in, so that it can continue to provide critical functions without the need to rely upon public funds. The Bank calibrates MREL as the sum of a loss absorption amount, equal to a bank's minimum capital requirements, and a recapitalisation amount. Based on the indicative estimates published by the Bank in May 2017,[2] in aggregate, the largest UK banks will be required to have loss-absorbing resources, including buffers, of about 28% of RWAs when requirements are implemented in full in 2022.[3] As of end-June 2017, these banks already had MREL-eligible resources of nearly a quarter of their RWAs.

As set out in *The framework of capital requirements for UK banks*,[4] the FPC judged that effective resolution arrangements will materially reduce both the probability and costs of financial crises. These arrangements were assessed by the Bank to reduce the appropriate equity requirement for the banking system by about 5% of RWAs.

In order to ensure that resolution tools can be used effectively, loss-absorbing capacity needs to be appropriately distributed within banking groups (referred to as 'internal MREL'). In October 2017, the Bank published a consultation paper on internal MREL. It expects to finalise its policy in 2018, so that globally systemic banks can implement it by January 2019 when the Financial Stability Board's total loss-absorbing capacity standards come into effect. As part of this proposal, a material subsidiary of a banking group will be required to maintain internal MREL in the range of 75%–90% of the requirement that would apply to it if it were a UK resolution entity (typically a UK parent company) instead.[5]

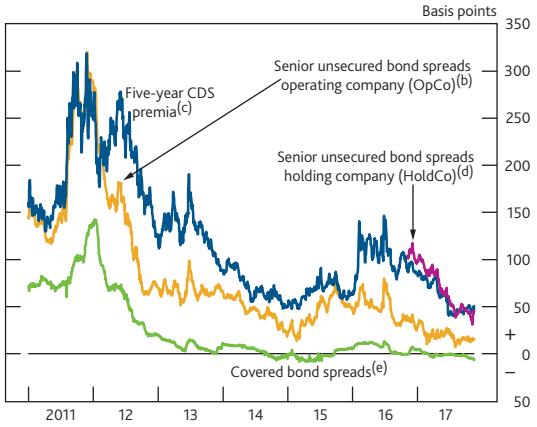
…and firms remain on track to implement their ring-fencing plans by 2019.

'Ring-fencing' of major UK banks, whereby core retail banking activities are separated from investment and international banking activities, will deliver significant financial stability benefits. It will enhance the resolvability of large banking groups and protect the provision of their core services. All relevant

(1) See www.bankofengland.co.uk/publications/Pages/news/2017/resolution-approach.aspx.
(2) See www.bankofengland.co.uk/financialstability/Pages/role/risk_reduction/srr/mrel.aspx.
(3) This includes Basel III capital buffers, and assumes a 1% countercyclical capital buffer (see http://data.parliament.uk/writtenevidence/committeeevidence.svc/evidencedocument/treasury-committee/capital-and-resolution/written/69208.html).
(4) See www.bankofengland.co.uk/publications/Documents/fsr/2015/fsrsupp.pdf.
(5) 'UK resolution entity' is a firm for which the use of stabilisation powers (other than third-country instrument powers) as defined in the Banking Act 2009 is envisaged under the preferred resolution strategy.

Chart B.5 Bank funding costs remain low

UK banks' indicative long-term funding spreads[a]

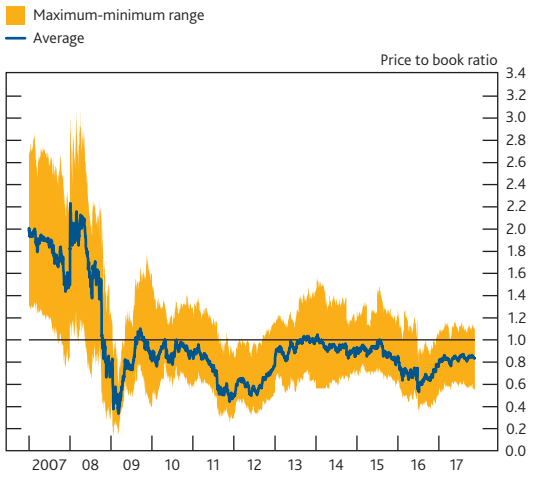


Sources: Bloomberg Finance LP, IHS Markit and Bank calculations.

(a) UK banks are Barclays, HSBC, Lloyds Banking Group and RBS.
(b) Constant-maturity unweighted average of secondary market spreads to mid-swaps for UK banks' five-year euro-denominated senior unsecured bonds issued by the operating company (OpCo) or a suitable proxy when unavailable.
(c) Unweighted average of five-year euro-denominated senior credit default swaps (CDS) premia for UK banks.
(d) Constant-maturity unweighted average of secondary market spreads to mid-swaps for UK banks' five-year euro-denominated senior unsecured bonds issued by the holding company (Hold Co) or a suitable proxy when unavailable.
(e) Constant-maturity unweighted average of secondary market spreads to swaps for UK banks' five-year euro-denominated covered bonds or a suitable proxy when unavailable.

Chart B.6 Price to book ratios have improved since their mid-2016 trough but remain below one for some banks

UK banks' average price to book ratio[a][b][c][d]



Sources: Bloomberg Finance LP, Thomson Reuters Datastream and Bank calculations.

(a) UK banks are Barclays, HSBC, Lloyds Banking Group and RBS.
(b) Relates the share price with the book, or accounting, value of shareholders' equity per share.
(c) HSBC's price to book ratio is adjusted for currency movements.
(d) The underlying data have been sourced from Thomson Reuters Datastream up to 2013, and from Bloomberg from 2014 onwards.

firms[1] are implementing restructuring plans to meet the statutory deadline of 1 January 2019, but significant further work remains to be done.

Implementation of ring-fencing also carries operational risks. It will involve some major reorganisations and transfers to ensure customers are served from separate legal entities; and it has necessitated some banks to move a large number of customer accounts to new sort codes. The majority of these phased sort code migrations are now complete and to date there have been no major technical or operational issues. The PRA is monitoring the implementation of ring-fencing closely, and firms have plans in place to mitigate the risk of disruption.

Market participants have recognised banks' resilience in funding costs, which remain low.

Reflecting the overall resilience of the UK banking sector, as well as the low interest rate environment, bank funding costs remain low (**Chart B.5**). For example, five-year credit default swap premia, which measure the cost of insuring against bank default, have stabilised around 45 basis points, close to their post-crisis lows.

Market valuations of banks' equity have been improving but remain low for some banks…

UK banks' equity prices have recovered from their mid-2016 troughs, although domestically focused banks' equity prices have underperformed their internationally focused peers in that period. Price to book ratios, which measure the market value of equity relative to the value of equity recorded on banks' balance sheets, have also improved since their mid-2016 trough, but still remain below one for some banks (**Chart B.6**). In the past few months, the average price to book ratio of UK banks has remained stable, at around 0.8.

The FPC continues to judge that UK banks' equity prices can likely be explained by market concerns over expected future profitability rather than by concerns about asset quality. Consistent with that view, the correlation of UK and international banks' price to book ratios with a measure of their asset quality (**Chart B.7**) has remained much weaker than the correlation with their expected future profitability (**Chart B.8**). The Bank's stress-test results reflect the market outlook for banks' profitability.[2]

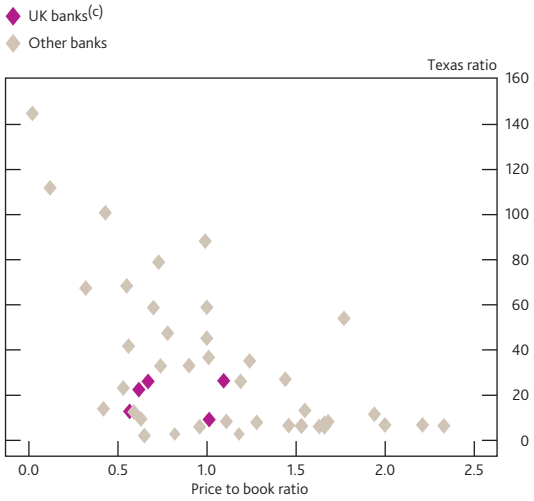
…consistent with persistent headwinds to bank profitability.

UK banks' profitability has been persistently weak since the crisis and continues to face substantial headwinds, although it improved in the first nine months of 2017 compared to the same period last year.

(1) Ring-fencing requirements will apply to banks with more than £25 billion of retail deposits from 2019.
(2) See Annex 3 in 'Stress testing the UK banking system: 2017 results'; www.bankofengland.co.uk/financialstability/Documents/fpc/results281117.pdf.

Chart B.7 There is a weak positive correlation between banks' price to book ratios and estimates of their asset quality

Price to book ratios for major global banks compared with Texas ratios[a][b]

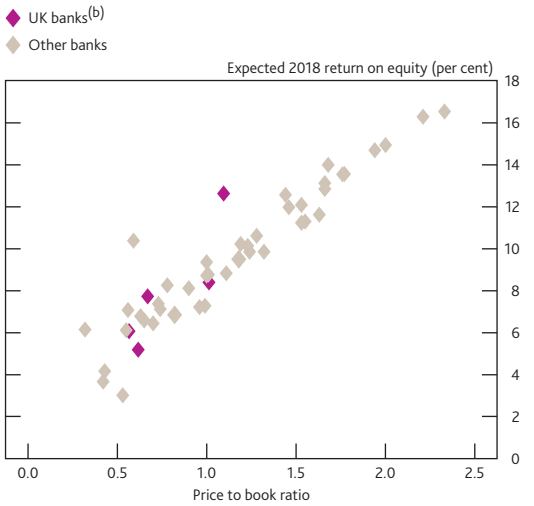


Sources: Bloomberg Finance LP, Thomson Reuters Datastream and Bank calculations.

(a) The Texas ratio is calculated as non-performing loans over common equity Tier 1 capital and loan loss reserve. Latest available data (2016 or 2017 H1) are used for each bank.
(b) The price to book ratio relates the share price with the book, or accounting, value of shareholders' equity per share.
(c) UK banks are Barclays, HSBC, Lloyds Banking Group, RBS and Standard Chartered.

Chart B.8 There is a strong positive correlation between banks' price to book ratios and expected returns on equity

Price to book ratios for major global banks compared with expected one year ahead returns on equity[a]



Sources: Bloomberg Finance LP, Thomson Reuters Datastream and Bank calculations.

(a) The price to book ratio relates the share price with the book, or accounting, value of shareholders' equity per share.
(b) UK banks are Barclays, HSBC, Lloyds Banking Group, RBS and Standard Chartered.

Costs related to past misconduct remain a drag on UK banks' profits. As a result, banks' 'underlying' return on equity (RoE), which strips out misconduct costs as well as one-time charges such as restructuring costs, has been significantly higher than statutory RoE, that is RoE actually achieved (**Chart B.9**).

UK banks' investment banking revenues have also been weak since the crisis, with estimated average returns below those for retail banking (**Chart B.10**). This is consistent with the fall in investment banking revenues by banks globally, although UK banks have also lost market share in the increasingly concentrated market. One headwind to global investment banks' profitability has been low financial market volatility (see Asset valuations chapter). It has likely reduced trading volumes as well as demand for hedging instruments sold by banks. Structural factors, like higher capital and liquidity requirements, and clients' shift towards passive investing, which tends to generate lower revenues for banks, have also added pressure on profitability. As a result, the outlook for investment banking returns remains challenging.

New structural factors may also lead to challenges to banks' business models.

In addition to the headwinds to profitability that UK banks have faced in recent years, new regulatory measures aimed at increasing transparency and competition in the banking sector may add further pressure on banks' business models.

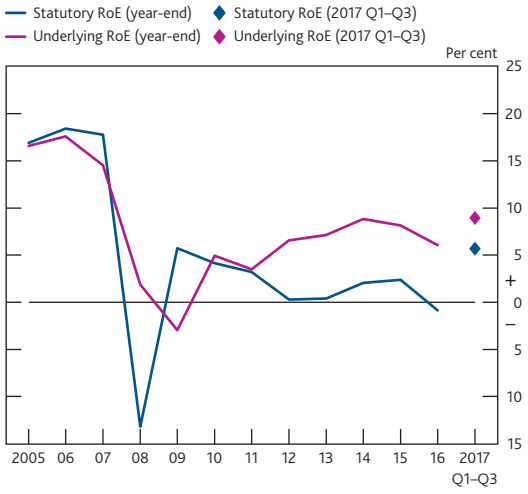
When the revised EU Payment Services Directive and the Competition and Markets Authority's 'Open Banking' reform are introduced in January 2018,[1] banks will be obliged, among other things, to give regulated third parties access to customer accounts data, subject to customer permission. This could facilitate the introduction of more automated price comparison and switching services, improving competition and innovation in the market for financial services. The reforms will also strengthen customer authentication processes and the supervision of third parties.

However, these changes also pose a number of potential challenges for banks. They may cause a squeeze on bank profitability, if competitive pressures intensify. It is important that banks give sufficient attention to this, among the other risks to profitability explored in the Bank's biennial exploratory scenario. If customers choose to transfer deposits between accounts more frequently, it may also have implications for liquidity risk. In addition, although these reforms aim to provide better security for payment services, greater sharing of customer data may also contribute to a rise in operational and cyber risks associated with unauthorised access to these data. The FPC and other relevant authorities will continue to

(1) Open Banking reform is part of the wider package of reforms introduced by the Competition and Markets Authority in order to improve competition in the banking sector. See www.gov.uk/government/news/open-banking-revolution-moves-closer for more details.

Chart B.9 Bank profitability improved in 2017

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

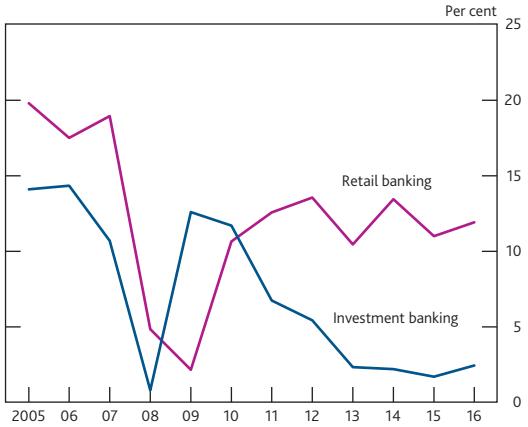


Sources: Published accounts and Bank calculations.

(a) Weighted average by 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, Lloyds Banking Group and RBS.
(d) Diamonds show averages of quarterly results for 2017 Q1–Q3. Data are annualised and may display seasonality. They are not directly comparable to full-year results.

Chart B.10 Investment banking has been less profitable than before the global financial 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 varies across institutions depending on their public disclosures.
(b) Net income for each business segment is estimated by applying the UK corporate tax rate and bank surcharge 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.

monitor these risks as regulation comes into force, including as part of the work to build wider cyber resilience in the UK financial sector (see Box 7 in the June *Report* for more details).

The FPC and PRC have completed an exploratory exercise examining major UK banks' long-term strategic responses to a low rate, low growth macroeconomic environment.

The FPC and PRC have completed an exploratory exercise examining major UK banks' long-term strategic responses to an extended low growth, low interest rate environment with increasing competitive pressures from FinTech. Although banks suggest they could, by reducing costs, adapt without major strategic change or taking on more risk, there are clear risks to this. Competitive pressures enabled by FinTech may cause greater and faster disruption to banks' business models than banks project. The cost of maintaining and acquiring customers in a more competitive environment may reduce the scope for cost reductions or result in greater loss of market share. And the cost of equity for banks may be higher than the 8% level they expect in this scenario. In a low growth, low interest rate environment, investors may perceive downside economic risks to be greater, raising the equity risk premium. Supervisors will now discuss the results of the exercise with banks, including the potential implications of these risks.[1]

(1) See 'Stress testing the UK banking system: 2017 results'; www.bankofengland.co.uk/financialstability/Documents/fpc/results281117.pdf.

Box 3
Results of the 2017 annual cyclical scenario(1)

This box sets out details of the 2017 annual cyclical scenario (ACS) — the Bank's fourth concurrent stress test of the UK banking system. The test covered seven major UK banks and building societies (hereafter referred to as 'banks'), accounting for around 80% of the outstanding stock of PRA-regulated banks' lending to the UK real economy.(2) The results of the 2017 ACS have been published alongside the November 2017 *Financial Stability Report*.

Summary

For the first time since the Bank launched its stress tests in 2014, no bank needs to strengthen its capital position as a result of the stress test.

The Prudential Regulation Committee (PRC) judged that all seven participating banks now have sufficient capital to meet the standard set by the test.

The Financial Policy Committee (FPC) has increased the system-wide UK countercyclical capital buffer rate, which applies to all banks, from 0.5% to 1%. This was informed by the losses banks made on their UK credit assets in the stress test.

Capital buffers for individual banks ('PRA buffers') will be set by the PRC in light of the stress-test results. PRA buffers will in part reflect the judgement made by the FPC and PRC in September 2017 that, following recent rapid growth, the loss rate on consumer credit in the first three years of the scenario would be 20%.

The setting of the countercyclical and PRA buffers, as informed by the stress test, will not require banks to strengthen their capital positions. It will require them to incorporate some of the capital they currently have in excess of their regulatory requirements into their regulatory capital buffers.

2017 ACS

The 2017 ACS was calibrated to reflect the FPC and PRC's March 2017 assessment of risks. At that time, the FPC judged that domestic credit risks were at a standard level overall, while global vulnerabilities were elevated and had increased somewhat over the past year. Reflecting these risks, in the scenario:

- World GDP falls by 2.4%
- UK GDP falls by 4.7%
- UK unemployment rises to 9.5%
- UK residential property prices fall by 33%
- UK commercial real estate prices fall by 40%
- UK Bank Rate rises and peaks at 4%
- The sterling exchange rate index falls by 27%

Overall, the scenario is more severe than the financial crisis. The path of Bank Rate is very different. In the crisis it was cut by 5 percentage points from 5.5% at the start of 2008 to 0.5% by March 2009, but in the stress scenario it rises by 3.75 percentage points to 4%. Although the fall in UK GDP is smaller than in the financial crisis, the increase in unemployment is larger. The scenario also includes a bigger fall in UK residential property prices. The fall in world GDP of 2.4% is larger than the 1.9% fall in the financial crisis.

The increase in Bank Rate reflects a challenging trade-off between growth and inflation in the scenario, triggered by a sudden increase in the return investors demand for holding sterling assets and an associated fall in sterling.(3)

What does the 2017 ACS tell us about bank resilience?

Performance in the test was assessed against the Bank's hurdle rate framework which comprises elements expressed both in terms of risk-weighted capital and leverage ratios.

Overall, the 2017 ACS reduces the aggregate CET1 ratio from 13.4% at the end of 2016 to a low point of 8.3% in 2018.

Relative to the baseline, by the low point at end-2018 the stress reduces the aggregate CET1 capital ratio by 6.0 percentage points. This reflects a range of factors, including:

- Loan impairment charges amounting to almost £50 billion on UK domestic exposures and over US$40 billion on overseas lending over the first two years of the stress.
- Traded risk losses, including the shortfall of investment banking revenue net of costs, which reduces bank capital by over £33 billion by the end of 2018, relative to the baseline projection.
- A stronger profile for aggregate net interest income, which is almost £23 billion higher in the first two years of the stress, relative to the baseline.
- Stressed projections for misconduct costs beyond those provided for at the end of 2016. Around £30 billion of these additional misconduct costs are projected to be realised by the end of 2018.
- A projected 51% rise in aggregate credit 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 zero in the first two years of the stress.

(1) See Bank of England (2017), 'Stress testing the UK banking system: 2017 results'; www.bankofengland.co.uk/financialstability/Documents/fpc/results281117.pdf.
(2) 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.
(3) See Bank of England (2017), 'Stress testing the UK banking system: key elements of the 2017 stress test'; www.bankofengland.co.uk/financialstability/Documents/stresstesting/2017/keyelements.pdf.

Box 4
IFRS 9

On 1 January 2018, most banks in the United Kingdom will need to adhere to a new accounting standard called International Financial Reporting Standard 9 (IFRS 9).

Under the new accounting standard, banks will set aside provisions for expected credit losses on all loans, not just where a loan is past due or has already fallen into default. Banks will therefore set aside provisions to cover potential losses in a more timely way than under the current approach to accounting, in which credit losses are recognised only once a loss event has actually happened (known as an 'incurred loss' basis).

IFRS 9 accounting will support financial stability. 'Expected loss' accounting means that provisions for potential credit losses will be made in a timely way. As identified by the G20, banks' provisions during the financial crisis lagged market expectations of likely credit losses, causing investors to question banks' true underlying strength.

The change in accounting standard will not change the cumulative losses banks incur during any given stress episode. The losses will, however, be provided for at an earlier point in the stress. Other things equal, bank capital, as measured under IFRS 9, will fall more sharply in the early part of a stress, before recovering more rapidly.

The FPC's judgement of the necessary level of loss-absorbing capacity for the banking system is invariant to accounting standards. The Committee's judgement of the appropriate level of capital for the banking system was calibrated such that banks could absorb the cumulative losses in historical stress episodes and continue to provide essential services to the real economy, regardless of the timing of when those losses were actually measured.

The Bank's annual stress test of major banks examines the potential impact of a hypothetical adverse scenario on the capital of the banking system and individual institutions within it. **The severity of the stress-test scenario reflects the FPC's and PRC's risk appetite and will not change in response to the new accounting standard.** But the effect of IFRS 9 on the timing of losses during a stress period will be seen in the results of future tests. Banks' capital ratios will fall more sharply at the beginning of the stress.

Without adjustments to the stress-testing framework and/or associated prudential capital requirements, this would imply banks need to maintain higher capital ratios to meet the standard demanded by the tests. **The FPC will take steps to ensure that the interaction of IFRS 9 accounting with its annual stress test does not result in a *de facto* increase in capital requirements.** As part of the 2017 stress test, participating banks were asked to run a separate IFRS 9 exercise to explore how their IFRS 9 credit impairment models might behave under stress. The information obtained through this exercise is being used to inform the FPC's judgements. The FPC plans to communicate further on this issue in 2018 H1.

Lenders have been finalising their approaches to IFRS 9 and it will take time for the precise magnitude of impacts to be understood fully. The United Kingdom has supported EU authorities' proposals that transitional arrangements should be used to smooth the impact of introducing IFRS 9. Transitional arrangements are currently being finalised.

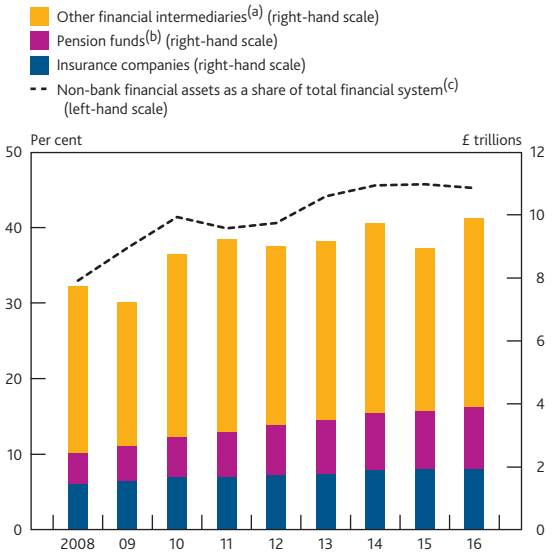
Given the uncertainty about the precise magnitude of effects and the need to make accompanying adjustments to stress tests and/or prudential requirements, the FPC and PRC encourage firms to use any internationally agreed transitional arrangements as they adjust to the new regime, provided the arrangements are broadly similar to those currently being considered. The FPC and PRC will respect firms' choices in future capital assessments and stress tests. Observing how IFRS 9 is applied during the transitional period will inform the precise calibration of the necessary adjustments to the stress testing and/or prudential capital frameworks to accommodate IFRS 9.

Market-based finance

Market-based finance is an increasingly important component of the UK financial system, accounting for almost half of its total assets. The resilience of market-based finance relies on the behaviour of a range of intermediaries and investors that, in combination, determine how smoothly markets function. Core intermediaries, such as dealers, are more resilient and have recently increased their repo activity. Demand for illiquid and lower-rated assets from life insurers also remains strong. But dealers' willingness to 'warehouse' risk remains constrained in some markets, making those markets susceptible to large-scale sales during a stress, including from open-ended investment funds. The FPC has considered, and will continue to monitor, risks to the provision of market-based finance from the growth of electronic and algorithmic trading. It has also completed its annual assessment of risk and regulation beyond the core banking sector.

Chart B.11 Non-bank financial institutions are an important component of the UK financial system

UK non-bank financial institutions' balance sheet assets



Sources: Bank of England, Office for National Statistics and Bank calculations.

(a) Other financial intermediaries include: investment funds (including money market funds), hedge funds, real estate investment trusts, trust companies, broker-dealers, structured finance vehicles, central counterparties, finance companies, captive financial institutions and money lenders, bank holding companies and financial auxiliaries.
(b) Bank of England estimate for 2016, based on asset price movements and known investment since 2015.
(c) Total financial system includes: banks, Bank of England, pension funds, insurance companies and other financial intermediaries. Non-bank financial institutions include non deposit-taking entities that may be part of banking groups.

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

Market-based finance refers to the system of markets, non-bank financial institutions and infrastructure that (alongside banks) provide financial services to support the real economy. These services include intermediating between saving and investment and the transfer of risks.

Market-based finance has become increasingly important since the crisis. Globally, assets held by non-bank financial institutions have increased by more than a third since the financial crisis, and non-bank financial intermediation now comprises 47% of the global financial sector.(1) In the United Kingdom, non-bank financial institutions account for almost 50% of the UK financial system's total assets, up by 13 percentage points since 2008 (**Chart B.11**).

That growth has diversified the supply of finance to the real economy. This mitigated cutbacks in bank credit following the global financial crisis as the core banking system repaired its balance sheet. For example, since the crisis, nearly all net finance raised by UK private non-financial corporations in the United Kingdom has been through the issuance of tradable securities, and most of this through corporate bond issuance (**Chart B.12**).

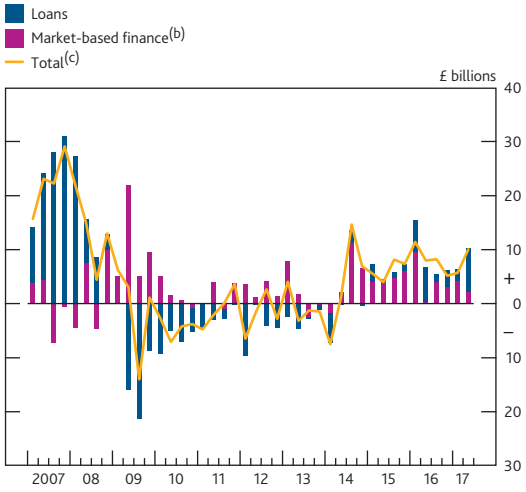
…and relies on the behaviour of a range of intermediaries and investors that, in combination, determine how smoothly markets function.

The resilience of market-based finance reflects the extent to which it can absorb, rather than amplify, shocks, and thus

(1) Financial Stability Board (2017), 'Global Shadow Banking Monitoring Report 2016'; www.fsb.org/wp-content/uploads/global-shadow-banking-monitoring-report-2016.pdf.

Chart B.12 Market-based finance is an important source of financing for UK companies

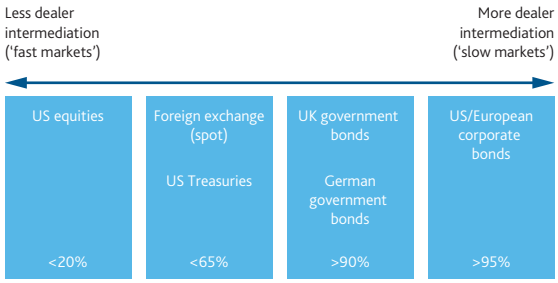
Net finance raised by UK private non-financial corporations (PNFCs)[a]



Sources: Bank of England and Bank calculations.

(a) Finance raised by PNFCs from UK MFIs and from capital markets. Data cover funds raised in both sterling and foreign currency, converted to sterling. Seasonally adjusted. Bonds and commercial paper are not seasonally adjusted.
(b) Market-based finance is composed of bonds, equities and commercial paper.
(c) Owing to the seasonal adjustment methodology, the total series may not equal the sum of its components.

Figure B.2 Importance of dealer intermediation in core markets[a][b][c]



Sources: Bank of England, Bank for International Settlements, Debt Management Office, Federal Reserve Bank of New York, ICAP BrokerTec, McKinsey and Greenwich Associates, US Securities and Exchange Commission and Bank calculations.

(a) Figures show estimates of the proportion of transactions executed as a 'request-for-quote' via both voice and electronic trading, including via single and multi-dealer trading platforms.
(b) Includes dealer-to-client and interdealer transactions.
(c) Data reproduced from Anderson, N, Beale, D, Crowley-Reidy, L, Noss, J and Webber, L (2015), 'The resilience of financial market liquidity', *Bank of England Financial Stability Paper No. 34*; www.bankofengland.co.uk/financialstability/Documents/fpc/fspapers/fs_paper34.pdf.

continue to provide vital functions to support the real economy. For markets to be a resilient source of finance, they need to be liquid and function smoothly, even during stress. More liquid and better functioning markets provide both borrowers and investors with the confidence they need to participate in market-based finance. In contrast, uncertainty about the ability to undertake market transactions at reasonable prices can deter both borrowers from relying on markets to fund productive investment opportunities and investors from financing those opportunities.

No part of the system of market-based finance can be assessed fully in isolation. The system relies on the behaviour of a range of intermediaries and investors that, in combination, determine how smoothly markets function.

Markets function smoothly when potential buyers and sellers of financial assets are able to transact easily with one another. In some markets, such as equity markets, transactions take place primarily on exchanges, often at high frequency, and the provision of market liquidity relies on the resilience of trading infrastructure and the ability of market participants to respond quickly to shocks. The proportion of electronic trading in financial markets has increased substantially over recent decades; particularly in markets with relatively standardised products. The FPC has considered, and will continue to monitor, risks to the provision of market-based finance from the growth of electronic and algorithmic trading (see Box 5).

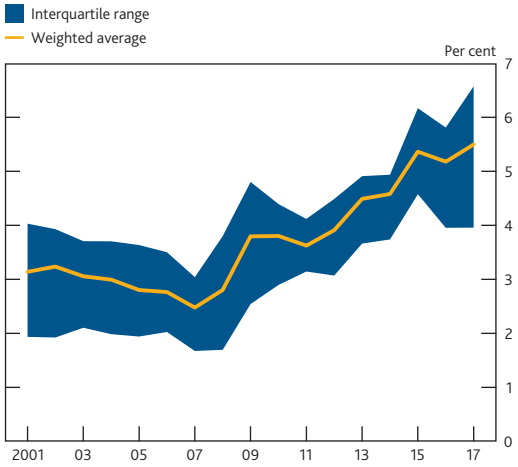
Other markets, such as corporate bond and repo markets, rely heavily on dealers to intermediate between investors (**Figure B.2**). In these markets, dealers have a crucial role in absorbing selling pressure, by warehousing assets that are waiting for a buyer. Dealers also provide short-term financing to other investors who may act as buyers of assets, such as hedge funds, aiding market liquidity and allowing markets to function more efficiently. The resilience of such markets is threatened when the supply of liquidity (buying power) is overwhelmed by demand for liquidity (selling pressure). In that event, a destabilising feedback loop could emerge, with falling asset prices incurring losses for dealers, impairing the provision of liquidity service further and prompting further asset sales by other investors.

Dealers are more resilient to shocks…

Post-crisis reforms have made dealers much stronger, as reflected in measures of dealer resilience. The aggregate leverage ratio of the world's largest dealers was 5.5% at end-September 2017, up from 5.2% at end-December 2016 (**Chart B.13**) and materially higher than its level in 2007. Since the June 2017 *Report*, market perceptions of UK dealers' credit risk, as measured by the cost of default protection (CDS premia), have decreased.

Chart B.13 Dealers' leverage ratios remain high

Dealers' leverage ratios[a][b]

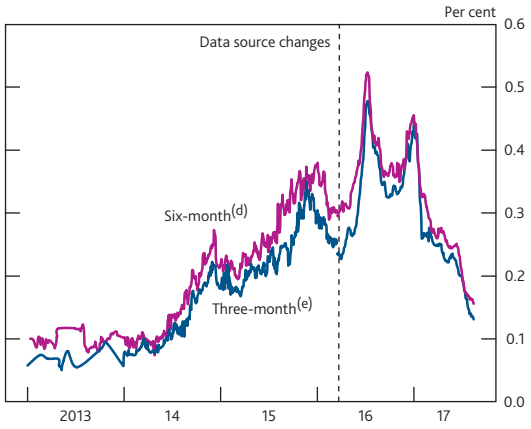


Sources: Banks' published accounts, SNL Financial, The Banker Database and Bank calculations.

(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.

Chart B.14 Term repo rates for asset managers have fallen

Term gilt repo rates paid by selected asset managers in excess of expectations of policy interest rates[a][b][c]



Sources: Data collected from a number of UK asset managers, Bank of England Sterling Money Market data collection and Bank calculations.

(a) Prior to March 2016, data were submitted to BIS CGFS Study Group by a number of UK asset managers. Data thereafter are from Bank of England Sterling Money Market data collection, and the calculation is based on 20-day moving average.
(b) After March 2016, selected asset managers include hedge funds.
(c) Expected policy interest rates are measured by three-month and six-month overnight indexed swaps.
(d) After March 2016, data include repo with original maturity between 100 and 140 business days.
(e) After March 2016, data include repo with original maturity between 50 and 70 business days. Prior to March 2016, data include three-month and four-month maturities.

…and have recently increased their repo activity…

Market contacts suggest that the willingness of dealers to intermediate repo transactions has increased recently. There is evidence of dealers adjusting how they conduct their repo business to minimise the impact on their balance sheets and hence the regulatory costs. For example, dealers have increased the proportion of repo loans that can be netted against repo borrowings with the same counterparty.

These trends appear to have contributed to signs of an improvement in repo market functioning. For example, asset managers borrowing cash in gilt repo markets have experienced narrower spreads (**Chart B.14**). The volume of trading activity in gilt repo markets has also increased in 2017. Market contacts suggest similar improvements in US and euro-area government bond repo markets. However, the impact of these developments on the resilience of repo markets is yet to be tested in stressed conditions.

In corporate bond markets, market contacts suggest dealers are increasingly pre-arranging buyers and sellers, meaning they do not need to use their inventory of bonds, lowering the cost of the trade. While this development benefits market functioning in normal times, dealers' ability to pre-arrange to match buyers and sellers could be impeded in stress and increase the time to execute the trades significantly.

…while demand for illiquid and lower-rated assets from life insurers also remains strong.

In the United Kingdom, life insurance portfolios held by insurers stood at £1.8 trillion at end-2016, accounting for a significant proportion of the total assets outstanding in several UK securities markets.

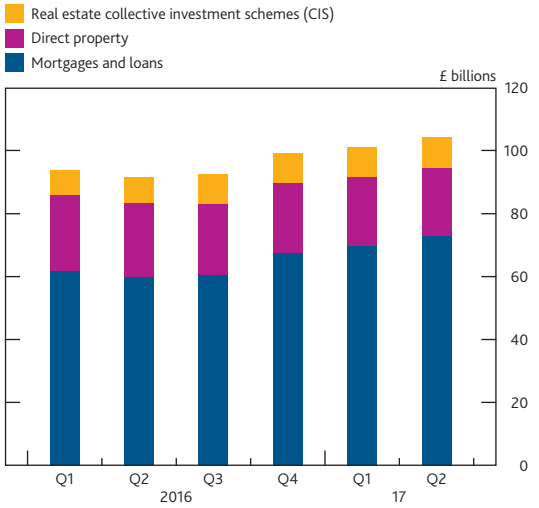
Low market interest rates continue to provide an incentive for life insurers to invest in more illiquid assets in order to earn higher returns. These assets include lower-rated fixed-income securities and real-economy assets, such as equity release mortgages and commercial real estate. For example, property-related non-linked exposures (exposures where insurance firms bear all or part of the market risk) increased from £99 billion in 2016 Q4 to £104 billion in 2017 Q2, representing 12% of total non-linked assets (**Chart B.15**). UK life insurers have also increased their holdings of lower credit rated bonds. BBB and BB-rated holdings increased from 27% to 37% of insurers' total corporate bond holdings between 2009 Q4 and 2017 Q2.

Insurers are further incentivised to invest in illiquid assets to match long-dated stable liabilities, such as annuities, because the 'matching adjustment' under Solvency II[1] allows insurers to look through the impact of short-term market movements on assets.[2] Matching long-dated illiquid liabilities with

(1) The prudential regulatory regime for European insurance companies.
(2) The matching adjustment replaces the so-called 'liquidity premium' under the former Individual Capital Adequacy Standards regime.

Chart B.15 UK life insurers are increasingly investing in illiquid assets[a]

Stock of property-related non-linked illiquid assets during 2016 and 2017[b]

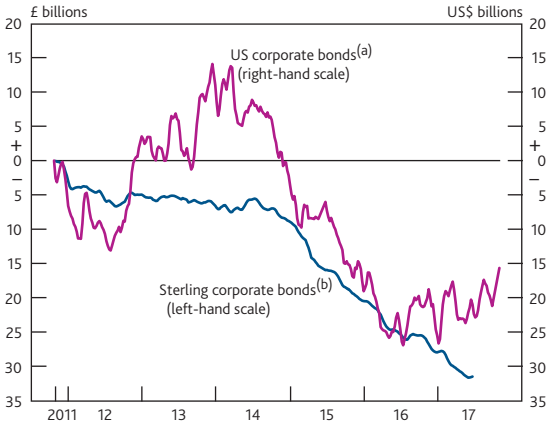


Sources: Solvency II submissions and Bank calculations.

(a) Trend is also driven in part by insurers reclassifying illiquid assets.
(b) Illiquid assets cover: direct property; mortgages and loans; and CIS real estate funds.

Chart B.16 Dealer inventories in sterling and US corporate bond markets have fallen

Cumulative change in dealers' inventories of sterling and US corporate bonds



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

(a) Monthly moving average of cumulative change of US primary net dealer positions in US corporate bonds. Data from 2 November 2011 to 8 November 2017.
(b) Monthly moving average of cumulative change in dealers' inventories of sterling corporate bonds. Cumulative inventory change calculations only include transactions reported by FCA-regulated dealers on a principal basis and in instruments issued more than three months ago. Duplicate, erroneous and outlier transactions have been removed on a best-endeavours basis. Data include intra-group transactions. Data from 2 November 2011 to 28 June 2017.

suitable long-dated illiquid assets can help ensure availability of finance to the wider economy, but can also present risks where firms may not have adequate systems and controls to manage the risks associated with these assets. The PRA issued a consultation paper on the 'matching adjustment' in October 2017, which included additional guidance on the eligibility of assets for the matching adjustment and provided greater clarity on expectations for firms in relation to its application.[1]

But dealers' willingness to 'warehouse' risk remains constrained in some markets…

Although post-crisis regulatory reforms have made dealers much stronger, the reforms — together with a low interest rate environment — might have constrained the ability and willingness of dealers to act as intermediaries, particularly during periods of stress. For example dealer intermediation and liquidity in repo and corporate bond markets remain materially lower than earlier in the decade.

In corporate bond markets, for example, average trade sizes and indicators of market depth have fallen. There is also evidence that dealers' inventories of both UK and US corporate bonds have fallen (**Chart B.16**). And the findings from an international study of developments in repo markets, published in April 2017 by the Committee on the Global Financial System, showed that in some jurisdictions there was evidence that dealers had become less willing or able to undertake repo market intermediation. In some cases, this had led to other financial institutions finding it difficult to place cash in repo markets.

…making those markets susceptible to large-scale sales from open-ended investment funds…

The functioning of dealer-intermediated markets could be tested by high demand for liquidity, including from open-ended investment funds. These funds offer short-term redemptions to investors while investing in some cases in longer-dated and potentially illiquid assets.

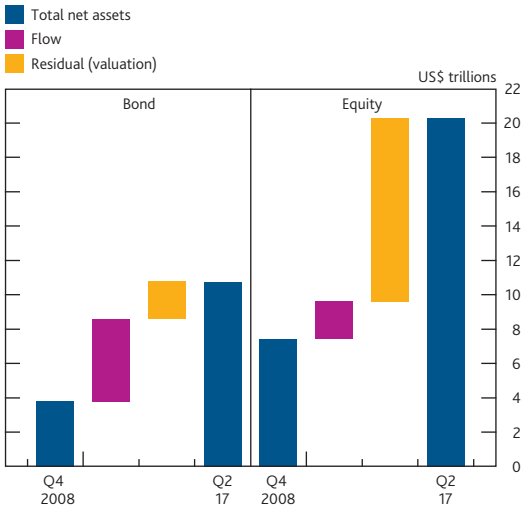
Total assets managed by open-ended funds worldwide have more than doubled following the global financial crisis. While strong growth in equity funds' assets largely reflects valuation gains, net inflows of US$4.8 trillion have played a bigger role in the growth of bond funds (**Chart B.17**). Consistent with this, open-ended funds hold a much larger share of corporate bonds in issuance than in 2008 (**Chart B.18**).

Large-scale redemptions could result in sales of assets by some funds if they have a liquidity mismatch. If these sales exceed the ability of dealers and other investors to absorb them, this could impair market liquidity. These effects could

(1) Bank of England (2017), 'Solvency II: Matching adjustment', *PRA Consultation Paper CP21/17*; www.bankofengland.co.uk/pra/Documents/publications/cp/2017/cp2117.pdf.

Chart B.17 Total assets of open-ended funds worldwide have more than doubled since 2008

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

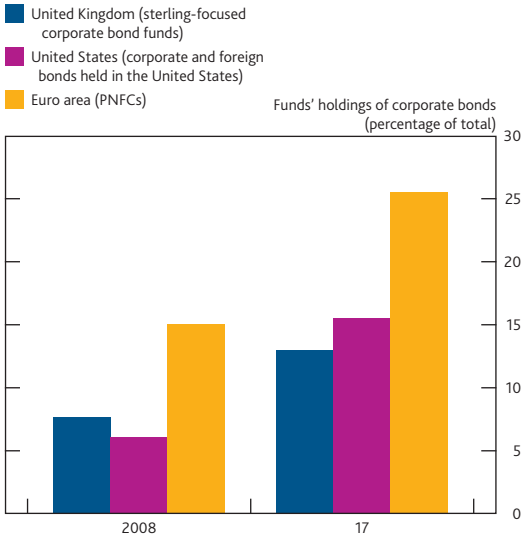


Sources: European Fund and Asset Management Association, Investment Company Institute and Bank calculations.

(a) Adjusted for a break in the series due to expanded coverage in 2014 Q4 on best-endeavours basis. Including money market funds but excluding funds of funds where possible. In 2008 Q4, bond and equity funds accounted for half of all open-ended funds; in 2017 Q2 it was two thirds.

Chart B.18 Open-ended investment bond funds' holdings of corporate bonds have increased

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



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

(a) United Kingdom: sterling corporate bond funds (open-ended and exchange-traded funds) 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 funds holdings of bonds issued by euro-area non-financial corporations as a share of total. UK data until July 2017. US data until 2017 Q1. Euro-area data until 2017 Q2.

be amplified if resulting falls in prices lead to further asset sales by investors. For example, a recent Bank study(1) found that asset managers sold bonds as prices fell during the 2013 'taper tantrum'.

Funds do have liquidity tools, such as fair value pricing and fund suspensions, which can be used to limit redemptions under stress. Following the EU referendum, these tools, when applied in property funds, were effective in preventing market uncertainty from escalating further.(2) However, the anticipated use of some of these tools could create incentives for investors to redeem ahead of others. Progress on a number of measures by international authorities to address structural vulnerabilities from open-ended funds are summarised in the Financial stability risk and regulation beyond the core banking sector chapter.

…or procyclical behaviour from life insurers in a stress.

In stressed conditions, life insurers may not be as willing to invest in risky assets as they are at present, given the current design of some elements of Solvency II rules. For example, the 'risk margin' — a provision that increases the value of a firm's liabilities 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. This 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 further deterioration in their solvency positions. Such behaviour could amplify changes in market prices.

The FPC assessed the propensity of UK life insurers to invest procyclically in 2016 and concluded that limiting the sensitivity of the 'risk margin' to changes in risk-free interest rates would have macroprudential benefits.(3) **Table B.1** in the Financial stability risk and regulation beyond the core banking sector chapter provides a progress update on work undertaken by the Bank and other authorities in relation to this issue.

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

In July 2017, the Bank published a paper that presented a simulation of how the interaction between dealers and open-ended investment funds participating in European corporate bond markets could propagate and amplify shocks.

(1) Czech, R and Roberts-Sklar, M (2017), 'Investor behaviour and reaching for yield: evidence from the sterling corporate bond market', *Bank of England Staff Working Paper No. 685*; www.bankofengland.co.uk/research/Documents/workingpapers/2017/swp685.pdf.
(2) Financial Conduct Authority (2017), 'Review of property funds and liquidity risks'; www.fca.org.uk/publications/multi-firm-reviews/review-property-funds-and-liquidity-risks.
(3) Bank of England (2016), 'Risks to financial stability from insurers' investment behaviour', *Financial Stability Report*, November, pages 47–51; www.bankofengland.co.uk/publications/Documents/fsr/2016/fsrnov16.pdf.

The stress simulation indicated that, under a severe set of assumptions regarding market participant behaviours, redemptions from open-ended investment funds could result in material increases in spreads in the European corporate bond market, and in the extreme, in corporate bond market dislocation.(1)

This exercise is an initial step in the Bank's ongoing work to develop a system-wide stress simulation to model how various sectors across the financial system — funds, insurers and dealers — absorb or amplify stress. Such work is particularly important given that the current system of market-based finance has yet to be tested by severe shocks and, because it has changed so much, the system's past behaviour may not be a good guide to the future.

The FPC has completed its annual assessment of risk and regulation beyond the core banking sector.

Given the importance of market-based finance, the FPC has conducted an annual assessment of risk and regulation beyond the core banking sector, covering non-bank financial institutions, markets and infrastructure (see Financial stability risk and regulation beyond the core banking sector chapter). These annual assessments support the FPC's medium-term priority to complete post-crisis reforms to market-based finance in the United Kingdom.

(1) Baranova, Y, Coen, J, Lowe, P, Noss, J and Silvestri, L (2017), 'Simulating stress across the financial system: the resilience of corporate bond markets and the role of investment funds', *Bank of England Financial Stability Paper No. 42;* www.bankofengland.co.uk/financialstability/Documents/fpc/fspapers/fs_paper42.pdf.

Box 5
Developments in 'fast markets'

This box sets out the structural developments seen in 'fast markets' in recent years, and examines their potential implications for financial stability.(1)

What are 'fast markets'?

The proportion of electronic trading(2) in financial markets has increased substantially over recent decades, particularly in markets with relatively standardised products, such as equities. This migration to electronic trading has allowed for greater transparency around the prices at which market participants can transact.

Greater price transparency has, in turn, allowed greater access to data. Combined with advances in technology and regulation, this has led to an increase in algorithmic trading — where trading decisions and execution are automated. This includes algorithmic trading at very high frequencies — in some cases securities are bought and sold in a matter of microseconds. Markets where these trends have progressed furthest can be thought of as 'fast markets' (**Table 1**).

Table 1 The markets with the most standardised assets are also those with highest trading speed and degree of electronification

Asset class	Market electronification(a)(b)	
Futures	90%	High speed
US equities	80%	High standardisation
Spot foreign exchange	65%	
European government bonds	60%	Low speed
US high-yield bonds	25%	Low standardisation

Sources: Bank for International Settlements and Bank calculations.

(a) Percentages quoted as proportion of trading volume.
(b) Figures are approximations.

There is evidence that the growth of high-frequency, algorithmic trading has improved the headline measures of day-to-day liquidity of these markets; that is, the degree to which participants are able to transact at reasonable size in a timely manner, close to prevailing prices. For example, empirical research has found that the presence of automated traders has been associated with an improvement in effective spreads (which measure the round trip cost of a trade), in 'fast markets' over the past 20 years.(3)

Recent structural developments

The structure of fast markets — and the behaviour of their participants — has adapted in recent years to the increases in transparency, automation and speed at which trading can be undertaken.

In 'fast markets' there is less need for intermediaries, such as broker-dealers, to 'warehouse' risk over long periods when facilitating trading than in slower markets, such as corporate bonds.(4) Fast market trading venues facilitate a faster match between buyers and sellers. This has allowed for the emergence of principal trading firms (PTFs) as increasingly important participants in fast markets. PTFs are smaller, non-bank market participants that trade on a proprietary basis and specialise in using algorithms to execute and route orders at high speed.

Partly as a consequence of these competitive pressures, some banks' business models have transitioned away from risk warehousing. But PTFs remain reliant on the banking sector to provide market access, clearing and credit through banks' prime brokering and clearing businesses. Such business involves substantial, and increasing, fixed costs, serving as a barrier to entry. As a result, market intelligence suggests that servicing of PTF activity is concentrated in a small set of the most technologically sophisticated banks, leading to a concentration of 'nodes' of market access for short-term liquidity providers.

The rise in high-frequency trading has also increased incentives for market participants to protect information that could signal their trading intentions. This is to reduce the risk of being disadvantaged by trading with other, faster-moving, market participants, and thus receiving a worse average price. These incentives have led to two observable developments:

- First, there has been a partial reversal in the trend toward greater price transparency, as market participants have shifted their trading towards venues with less price transparency and/or a narrower range of counterparties. In equity markets this takes the form of 'off-book trading', where investors transact bilaterally through broker-crossing networks; including on venues where prices are not shown pre-trade.(5)

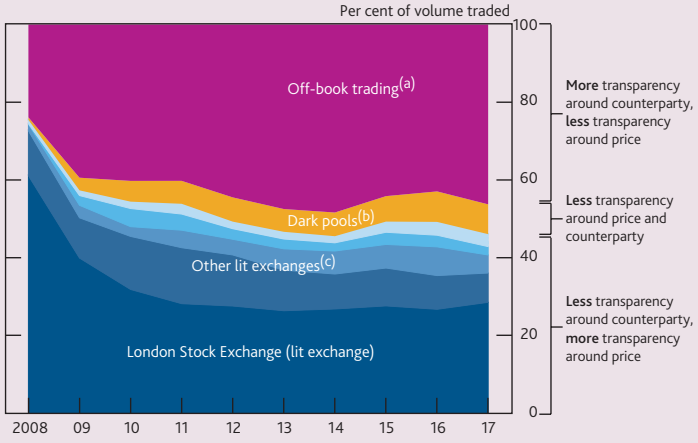
- Second, market participants' desire to avoid revealing information on their trading intentions has led them to increase the degree to which they split up large orders, including via the use of algorithms. For example, the average size of trades in UK equity markets has decreased by around 70% over the past decade.

(1) See also Salmon, C (2017), 'Keeping up with fast markets'; www.bankofengland.co.uk/publications/Documents/speeches/2017/speech1004.pdf.
(2) Trading that uses electronic messages to execute transactions, rather than open outcry floor trading or voice-based trading.
(3) Hendershott, T, Jones, C M and Menkveld, A J (2011), 'Does algorithmic trading improve liquidity?', *Journal of Finance*, Vol. 66, No. 1, pages 1–33.
(4) Risk warehousing involves holding securities on balance sheet and bearing the associated market and liquidity risk. See **Figure B.2** in Market-based finance chapter, for information on the levels of risk warehousing in various financial markets.
(5) Known as dark pools, which are quote-driven trading venues.

Regulation has also played a role in the structural development of 'fast markets'. For example, the introduction of MiFID[1] (the legislation that allows firms to trade financial instruments across the European Union) in 2007 increased competition between traditional stock exchanges and alternative trading venues, contributing to activity in fast markets becoming more fragmented across different types of trading venue (**Chart A**).

Chart A Trading in equity markets is increasingly fragmented

Share of trading across venues in UK equity markets



Source: Fidessa Fragulator®.

(a) Off-book trading refers to bilateral transactions by investors.
(b) Dark pools refer to trading venues with no pre-trade transparency.
(c) Lit exchanges refer to regulated exchanges and lit multilateral trading facilities, which are subject to: pre and post-trade transparency and non-discriminatory access.

Financial stability implications of the developments in 'fast markets'

'Fast markets' bring some important benefits to the resilience of financial markets. For example, because they place less reliance on risk warehousing by intermediaries, 'fast markets' were generally resilient during the 2008–09 financial crisis. They displayed less of the illiquidity demonstrated in markets that relied on dealer balance sheets, such as repo markets.

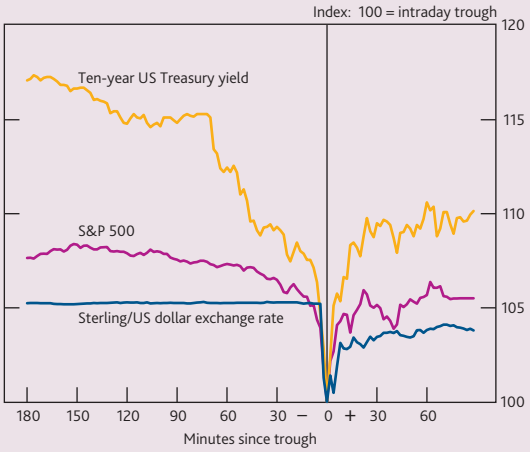
But the growth of high-frequency trading, and the more recent structural developments described above, have a number of implications for financial stability more broadly.

Flash episodes

The growth of electronic and automated trading has given rise to a series of flash episodes. These are large and rapid changes in the price of an asset that do not coincide with — or in some cases substantially overshoot — changes in economic fundamentals, often before retracing. Several such episodes have occurred in markets that are among the largest and most liquid in the world, including US equities, US Treasuries and foreign exchange markets (**Chart B**). In the sterling flash episode on 7 October 2016 sterling depreciated by around 9% against the US dollar in less than 40 seconds, before quickly

Chart B There have been several flash episodes in usually highly liquid markets

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) and US Treasury market flash-rally 15 October 2014 (orange).
(b) Data shown in two minutes intervals, and may not fully capture the lowest traded prices.

retracing much of the move (see Box 3 in the November 2016 *Financial Stability Report*).[2]

Flash episodes are characterised by a large imbalance between demand for, and supply of, liquidity. Algorithms have the potential to exacerbate this by:

- **withdrawing liquidity** as algorithms put less capital at risk;
- **demanding liquidity** irrespective of the level of, or changes in, underlying liquidity conditions; and
- **causing cross-market contagion** because algorithms use prices in multiple markets for arbitrage and risk management.

None of these behaviours is unique to algorithms, but algorithms can behave in a correlated manner, to a greater degree and over a shorter horizon than is possible in manual trading.[3]

Flash episodes appear to be symptomatic of changes in the structure of 'fast markets', and in the nature of their

(1) The Markets in Financial Instruments Directive (MiFID) was introduced in Europe in November 2007. See Committee of European Securities Regulators (2009), 'Impact of MiFID on equity secondary markets functioning', *CESR/09–355*, and European Securities and Markets Authority (2014), 'High-frequency trading activity in EU equity markets', Economic Report 1.
(2) See also the BIS Markets Committee report on 'The sterling 'flash event' of 7 October 2016'; www.bis.org/publ/mktc09.htm.
(3) Evidence from the London Stock Exchange suggests that high-frequency trading (HFT) activity is more correlated than non-HFT activity. However, this does not appear to be associated with excess volatility (see Benos, E, Brugler, J, Hjalmarsson, E and Zikes, F (2015), 'Interactions among high-frequency traders', *Bank of England Working Paper No. 523*; www.bankofengland.co.uk/research/Documents/workingpapers/2015/wp523.pdf).

participants. They have not, as yet, posed risks to financial stability because episodes have been short-lived, and prices have stabilised relatively quickly. There are also mitigants in place in many markets. For example, circuit breakers are specifically designed to attenuate destabilising momentum in prices.

However, market dysfunction could be longer-lasting in any future episode; for example, if the occurrence of a flash event interacted with aspects of financial market infrastructure, such as with benchmark fixings in foreign exchange markets, or a margin call related to equity or derivative markets. The resulting impact on the recorded values of a range of assets could risk mechanically prompting further sales and price falls. The FPC will continue to monitor the risks posed by flash episodes becoming more frequent and of market dysfunction being longer-lasting in any future episode.

Changing distribution of risk for individual firms

The changes in 'fast markets' alter the speed of crystallisation of, and distribution of, risks to which banks and end-investors, such as asset managers and corporates, are exposed.

Banks' — and their clients' — algorithmic trading activity can be a significant source of risk, particularly where trading takes place at high frequency and gives rise to large intraday positions, which are not typically reflected in prudential capital frameworks.

These changes increase the importance of firms' risk management. MiFID II, which is due to be implemented in January 2018, introduces requirements for firms engaged in algorithmic trading and the trading venues on which they operate. The Bank has conducted selective reviews of algorithmic trading and provided feedback, as appropriate (see Box 4 in the December 2014 *Report*).

The distribution of risk has also changed for end-users when trading. The splitting of trades into smaller sizes, and therefore executing over a longer time horizon — including using execution algorithms — means that end-users now bear more execution risk. This is the risk that the price moves before completion of a trade, and was traditionally held with intermediaries.

Fragmentation of trading and liquidity

There is evidence that the fragmentation of trading across venues — and the associated complexity of execution — can worsen the extent of price dislocation under stress. This may be because investors find it harder to judge underlying liquidity conditions when trading is more fragmented. MiFID II will introduce a range of measures to improve the resilience of liquidity. For example, it will cap trading in dark pools at 8% of pan-European market turnover.

Concentration in critical nodes

Given the provision of market access for short-term liquidity providers has become more concentrated, it has led to the development of critical 'nodes'. The failure or paralysis of one or more of these nodes has the potential to deny access to a large number of market participants, which could result in a period of disruption. Such a failure could occur due to reasons unconnected to activity in 'fast markets', for example due to an operational incident. The Financial Conduct Authority and Prudential Regulation Authority undertake supervision to promote the resilience of these critical nodes.

Conclusion

The structural developments in fast markets outlined in this box bring both benefits and risks. The FPC will continue to monitor the risks posed by 'fast markets' on an ongoing basis, as well as further structural developments in these markets, particularly in light of the implementation of MiFID II.

Financial stability risk and regulation beyond the core banking sector

Market-based finance has become increasingly important since the crisis. It provides finance to the real economy and supports other vital functions like risk-sharing. The FPC's annual assessment of risk and regulation beyond the core banking sector examines non-bank financial institutions, markets and infrastructure. By considering how the non-bank financial system can affect financial stability, the FPC decides which activities to explore in depth. This year, the FPC completed an in-depth assessment of post-crisis reforms to derivatives markets. It has also asked for an in-depth assessment of the role of leverage in the non-bank financial system, especially leverage created through non-banks' use of derivatives.

The FPC is responsible for identifying, assessing, monitoring and taking action in relation to financial stability risks across the UK financial system.(1) This includes risks arising from beyond the core banking sector. In meeting this responsibility, the FPC performs an annual assessment of financial stability risk and regulation beyond the core banking sector, covering non-bank financial institutions, markets and infrastructure.

In its annual assessments, the FPC considers fragilities and transmission channels through which the non-bank financial system can affect financial stability. It also considers to what extent domestic and international workstreams have addressed or will address such vulnerabilities. On that basis the FPC then decides which activities to explore in depth, and whether to recommend any changes to regulation. This could involve recommending activities move into the 'regulatory perimeter' (the boundary between regulated and non-regulated activities in the UK financial system). It could also involve recommending a change in regulation for activities already within the perimeter.(2)

These annual assessments support the FPC's medium-term priority to complete post-crisis reforms to market-based finance in the United Kingdom, and improve the assessment of systemic risks across the financial system.

This chapter provides an overview of the FPC's 2017 annual assessment. In summary:

- The FPC is not recommending any changes to the regulatory perimeter at this stage.

- The FPC has asked for an in-depth assessment of the role of leverage in the non-bank financial system, especially leverage created through non-banks' use of derivatives. This will examine measures of leverage, and its use and distribution throughout the non-bank financial system. It will include analysis of non-banks' use of derivatives transactions, drawing on trade repository data. The assessment will also seek to develop the FPC's understanding of what financial stability benefits and risks arise from non-bank leverage. It will support related international work, focused on the development of consistent measures of leverage in the fund sector.(3)

- The FPC has completed an in-depth assessment of the post-crisis reforms to derivatives markets (see The FPC's assessment of post-crisis reforms to derivatives markets chapter).

- The FPC has previously conducted in-depth assessments on open-ended investment funds, market liquidity and insurance companies. These areas continue to motivate work in the Bank and other regulatory authorities.

- The FPC will continue to monitor developments closely in exchange-traded funds, peer-to-peer lending and financial technology innovation.

- The Bank continues to develop a system-wide stress simulation. This aims to model how sectors across the financial system absorb or amplify stress.

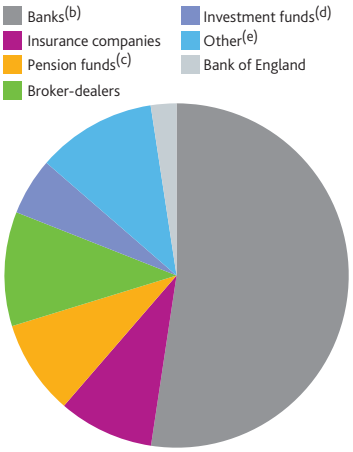
Market-based finance

Market-based finance refers to the system of markets, non-bank financial institutions and infrastructure that (alongside banks) provide financial services to support the real

(1) The Bank of England Act 1998, as amended by the Financial Services Act 2012 ('the Act'), gives the FPC this statutory responsibility.
(2) 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 information gathering powers.
(3) See www.fsb.org/wp-content/uploads/FSB-Policy-Recommendations-on-Asset-Management-Structural-Vulnerabilities.pdf.

Chart B.19 Non-bank financial institutions are an important component of the UK financial system

UK financial institutions' balance sheet assets[a]



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

(a) Data as at December 2016, except for Bank of England assets which are as at February 2017.
(b) Defined as UK deposit-taking entities. Entities classified elsewhere may also be part of banking groups.
(c) Pension fund assets are Bank estimates for 2016, based on assets at December 2015, and asset price movements and investment since then.
(d) Includes money market funds.
(e) 'Other' includes bank holding companies, CCPs, structured finance vehicles, real estate investment trusts, finance companies, hedge funds and statistical discrepancies (between bottom-up categories listed — plus broker-dealers and investment funds — 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.

economy. It is an important component of the UK financial system (**Chart B.19**), increasingly so since the crisis (see Market-based finance chapter).

Some aspects of market-based finance that had previously made the financial system particularly vulnerable and contributed to the global financial crisis have since declined in size. These include structured investment vehicles and asset-backed commercial paper programmes. Their decline reflects changes in risk appetite and post-crisis policy measures.[1]

However, other areas — including pension funds, insurance companies and investment funds — have grown since the crisis, globally and in the United Kingdom. Given this growth and the evolution and innovation in market-based finance, continued monitoring for emerging risks is crucial.

The risk assessment framework

The FPC's annual assessment uses a framework that considers three key transmission channels through which activities of the non-bank financial system can affect financial stability:

(i) The provision of critical services. These include:

- intermediating between saving and investment, eg through direct lending to the real economy; supporting those supplying such lending; or intermediating between buyers and sellers;
- insuring against and dispersing risk, eg through derivatives markets and insurance companies; and
- offering payment and settlement services, and other critical infrastructure.

(ii) Risks to systemically important counterparties. Providers of critical services, such as banks, insurers and infrastructure providers, often have significant exposure to the non-bank financial system. Problems in financial markets or non-bank financial institutions can therefore affect these firms' ability to continue to provide critical services.

(iii) Disruption to systemically important financial markets. Problems in the non-bank financial system can transmit distress to systemically important markets, such as repo and corporate bond markets. For example, during the crisis, rapid asset disposals and investor runs in secured funding markets impaired wider financial market liquidity.

Each of these transmission channels is likely to be more acute when there are also sources of fragility. The framework considers two types of fragility:

(i) 'Microfinancial' fragilities: fragilities that make individual non-bank financial institutions, sectors and financial market infrastructure vulnerable to shocks, eg:

- **maturity and liquidity mismatch**, ie when assets are less liquid or longer-dated than liabilities;
- **leverage**, ie allowing a financial institution to increase its exposure to a risk factor (eg asset prices or interest rates) beyond what would be possible through a direct investment of its own funds in the underlying risk factor or instrument;
- **imperfect credit risk transfer**, eg through providing credit enhancements such as guarantees (which replace credit risk with counterparty risk); and
- **operational risk**, ie the risk of loss resulting from inadequate or failed internal processes, people and systems, or from external events (eg cyber risks).

(ii) 'Macrofinancial' fragilities: system-wide fragilities amplifying shocks to the financial system, eg:

- **procyclicality or herding** by market participants, where they exacerbate the degree and impact of fluctuations in market prices; or
- fragilities in market structure such as **concentration** and **interconnectedness** leading to contagion.

2017 annual assessment

The FPC conducted its 2017 annual assessment in line with the framework set out above. It assessed which market-based finance activities had significant transmission channels and fragilities. It also assessed where domestic or international workstreams have addressed (or will address) such vulnerabilities.

For example, potential financial stability risks related to some open-ended investment funds remain material. But the FPC

(1) See 'Assessment of shadow banking activities, risks and the adequacy of post-crisis policy tools to address financial stability concerns'; www.fsb.org/wp-content/uploads/P300617-1.pdf.

explored these risks in a previous in-depth assessment and there is ongoing international work to tackle them (see **Table B.1** and the Market-based finance chapter).

In contrast, some other activities, such as those of money market funds (MMFs), do not pose material UK financial stability risks at present. This is partly due to recent reforms that have addressed MMFs' liquidity mismatches and improved their ability to respond to the risk of investor runs.

The FPC also considered whether to recommend any changes to regulation. Based on this year's assessment, the FPC is not recommending any changes to the regulatory perimeter at this stage.

In-depth assessment of the role of leverage in the non-bank financial system

Leverage is an important fragility in many sectors. Assessing risks from leverage in the non-bank financial system is challenging. In particular, data gaps hinder the ability to observe leverage, and there is a need to improve the definitions used to measure leverage. The FPC has therefore asked for an in-depth assessment of the role of leverage across the non-bank financial system, especially leverage created through non-banks' use of derivatives.

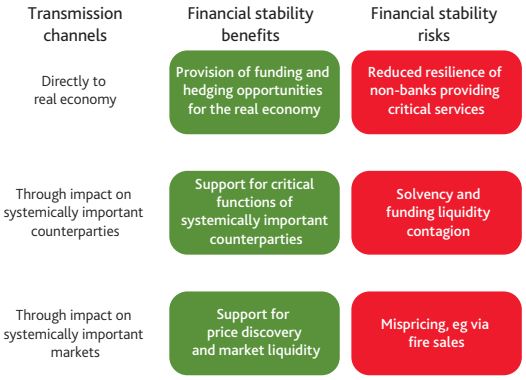
Leverage allows a financial institution to increase its exposure to a risk factor (eg asset prices or interest rates) beyond what would be possible through a direct investment of its own funds in the underlying risk factor or instrument.

Leverage can be generated in two ways — first, through borrowing, eg through repo (known as financial leverage); or second, through investing in instruments which amplify exposures (known as 'embedded leverage'), eg through derivatives — 'synthetic leverage'.

Non-bank leverage can have both systemic benefits and risks (**Figure B.3**). On the one hand, it can support the provision of critical services to the real economy. On the other hand, leverage can make non-banks less resilient. By increasing interconnectedness, it can also lead to negative externalities for systemically important counterparties (eg via credit losses or withdrawal of funding) or markets (eg via fire sales).

Systemic risks associated with non-bank leverage are most acute when it interacts with other fragilities, such as liquidity and maturity mismatch. In addition, low volatility at present could underpin excessive risk-taking; for example by increasing leverage, building up fragilities in the financial system. According to market contacts, there has also been an increase in the use by investors (including non-banks) of derivatives strategies that sell insurance against a rise in volatility, a form of synthetic leverage. Should there be a sharp increase in volatility, some investors using these strategies may be forced to adjust their positions which could lead to sales of assets and further test market liquidity (see Asset valuations chapter).

Figure B.3 Impact of non-bank leverage on provision of critical services to the UK real economy



The in-depth assessment will seek to develop the FPC's understanding of how non-banks use leverage, and what financial stability benefits and risks arise from leverage. It will examine measures of leverage and its distribution throughout the non-bank financial system. This will include analysing non-banks' use of derivatives transactions, drawing on trade repository data.

The assessment will also support the Bank and FCA's engagement with international work in this area. In January 2017, the Financial Stability Board (FSB) recommended that by the end of 2018 the International Organization of Securities Commissions (IOSCO) should identify and/or develop consistent measures of leverage for the fund sector. This aims to enable better monitoring of leverage for financial stability purposes.(1)

Progress update on previous in-depth assessments

The FPC has previously conducted in-depth assessments of open-ended investment funds, market liquidity and insurance companies. These areas continue to motivate work in the Bank and other authorities. **Table B.1** summarises recent developments.

The FPC has completed an in-depth assessment of the post-crisis reforms to derivatives markets (see The FPC's assessment of post-crisis reforms to derivatives markets chapter).

Developments that the FPC is monitoring closely

During the 2016 assessment, the FPC committed to monitor closely a number of fast-growing or developing areas: exchange-traded funds, peer-to-peer lending and financial technology innovation. Given the continued fast growth and

(1) See www.fsb.org/wp-content/uploads/FSB-Policy-Recommendations-on-Asset-Management-Structural-Vulnerabilities.pdf.

Table B.1 Progress update on previous in-depth assessments by the FPC

In-depth assessment	Key findings	Progress over the past year
Open-ended investment funds (published in the December 2015 *Report*)	• Some open-ended funds can have liquidity mismatch, offering short-term redemptions while holding less liquid assets. • Investors' and fund managers' procyclical behaviour could amplify shocks. • Data gaps around leverage prevent holistic risk assessment.	• In January 2017, the FSB published recommendations to reduce structural vulnerabilities from asset management activities, eg liquidity mismatch and leverage.(a) • In response to these, IOSCO consulted in July 2017 on liquidity recommendations and good practices. This work is to be finalised by the end of 2017.(b) • In February 2017, the FCA published a discussion paper on the risks when open-ended investment funds invest in illiquid assets (eg land, buildings or infrastructure).(c) • In July 2017, the Bank published a paper simulating interactions between dealers and open-ended investment funds in European corporate bond markets. It showed how these could propagate and amplify shocks. This was a pilot step in the Bank's work to develop a system-wide stress simulation.(d)
Market liquidity (July 2016 *Report*)	• Key dealer-intermediated markets, including some corporate bond and repo markets, had seen a reduction of liquidity — in part attributable to post-crisis regulation of dealers.	• In April 2017, the Committee on the Global Financial System (CGFS) published a review of repo market functioning to which the Bank contributed.(e) It concluded that repo markets were in transition; and that in some jurisdictions, banks were less willing and able to intermediate. The report recommended a further study within two years. • As part of the FPC's continuing analysis of market liquidity, it has also been analysing developments in fast, electronic markets (see Box 5). • MiFID II revises the legislation that allows firms to trade financial instruments across the European Union. It comes into force in January 2018. It contains measures to improve the resilience of market-based finance, and influence how firms trade.
Insurance companies (November 2016 *Report*)	• Limiting the sensitivity of the 'risk margin' to changes in risk-free interest rates would have macroprudential benefits.	• The Bank has engaged in the International Association of Insurance Supervisors' work to develop International Capital Standards for insurers. It has also engaged in the European Commission's review of Solvency II to explore limiting sensitivity of the risk margin. • In November 2017, as part of the Solvency II review, the European Insurance and Occupational Pensions Authority consulted on draft advice to the European Commission, recommending no change to the current risk margin design. The final advice is due in February 2018. The FPC continues to believe that reform of the risk margin would have macroprudential benefits.

(a) See www.fsb.org/wp-content/uploads/FSB-Policy-Recommendations-on-Asset-Management-Structural-Vulnerabilities.pdf.
(b) See www.iosco.org/library/pubdocs/pdf/IOSCOPD573.pdf and www.iosco.org/library/pubdocs/pdf/IOSCOPD574.pdf.
(c) See www.fca.org.uk/publication/discussion/dp17-01.pdf.
(d) See Baranova, Y, Coen, J, Lowe, P, Noss, J and Silvestri, L (2017), 'Simulating stress across the financial system: the resilience of corporate bond markets and the role of investment funds', *Bank of England Financial Stability Paper No. 42*; www.bankofengland.co.uk/financialstability/Documents/fpc/fspapers/fs_paper42.pdf.
(e) See 'Repo market functioning', *CGFS Paper No. 59*; www.bis.org/publ/cgfs59.pdf.

signs of evolution in each of these areas, the FPC will continue to monitor developments.

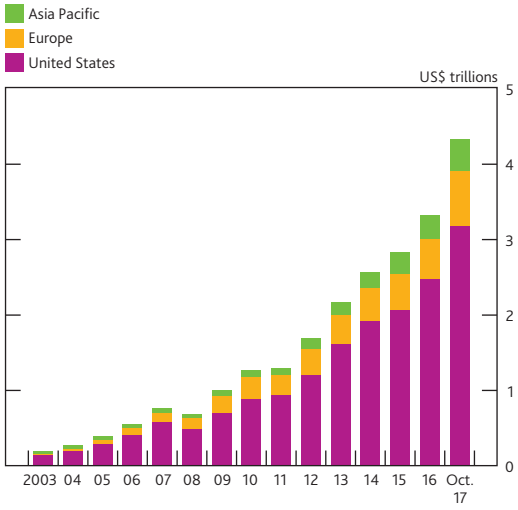
Exchange-traded funds (ETFs)

ETFs' assets under management have grown sixfold over the past decade (**Chart B.20**). ETFs are a low-cost way to invest in diversified strategies, most of which passively track the performance of an index or portfolio. 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 to keep the price of ETF shares close to the value of the underlying securities.

ETFs may present benefits for financial stability. In stress, secondary markets in ETFs may provide a valuable source of extra liquidity. ETF shares often trade at a discount or premium to their net asset value, which may help reduce fire sales. And ETFs whose creation and redemption occurs mainly in kind (ie in exchange for a basket of the underlying securities) may be less prone to risks of investor runs than open-ended funds.

ETFs may however also present financial stability risks. Some ETFs whose shares may be redeemed in cash could present similar financial stability risks to those posed by open-ended investment funds. Like open-ended fund investors, ETF investors may act procyclically, selling when prices fall. Furthermore, a small proportion of ETFs (with leveraged, short, momentum or some volatility-contingent investment strategies) will automatically behave procyclically, selling when prices fall, so may amplify stress.

Chart B.20 Exchange-traded funds continue to grow
Assets under management of exchange-traded funds by domicile



Sources: Bloomberg, Thomson Reuters Datastream and Deutsche Bank estimates.

Given their continued fast growth, the FPC will continue to monitor ETFs closely and consider potential risks, in conjunction with other international organisations.

Financial technology innovations (FinTech)

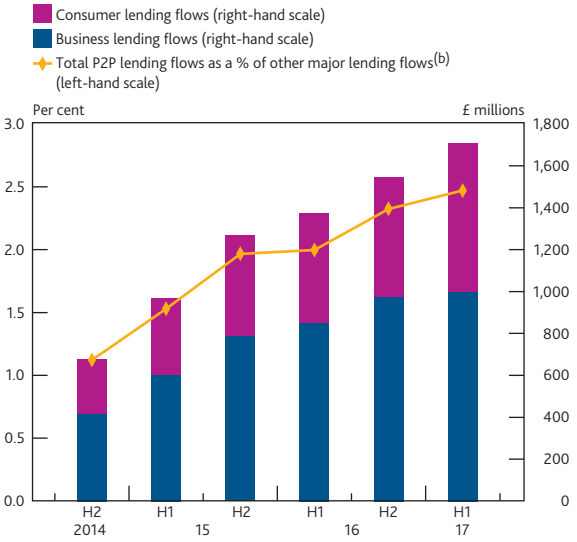
As part of the FPC's close monitoring of FinTech, Bank and FCA staff contributed to an FSB report on its implications for financial stability.(1) While this work did not find compelling current financial stability risks, FinTech warrants further monitoring given its dynamic nature.

The FSB report developed a framework that defines the scope of FinTech activities and identifies the potential benefits and risks to financial stability. The report applies this framework to a sample of FinTech activities, including wholesale payments innovations and digital currencies. This provides a basis on which to perform future analysis and monitoring.

The FinTech label includes a diverse range of activities. The FPC will therefore include specific aspects of FinTech in relevant areas in its annual assessment or other relevant workstreams in future. For example, it will analyse FinTech payments systems alongside traditional forms of payment infrastructure.

In January 2018, the revised EU Payment Services Directive (PSD2) and the Competition and Markets Authority's 'Open Banking' initiative will come into force. Banks will be obliged to give third parties access to customer accounts data, subject to customer permission (see Banking sector resilience chapter). Such third parties could become an important part of the UK financial system, for example if they were to provide popular 'apps' that customers use to interact with their banks. The Bank will monitor these developments.

Chart B.21 Peer-to-peer lending continues to grow
Gross new UK P2P lending(a)



Sources: Bank of England, Peer to Peer Finance Association (P2PFA) and Bank calculations.

(a) New lending originated on platforms that are current or previous members of the P2PFA.
(b) 'Other major lending flows' is a sum of consumer and business lending. Consumer lending is consumer credit gross lending from monetary financial institutions (MFIs) and other lenders (excluding student loans and credit cards). Business lending is UK MFIs' gross lending (excluding overdrafts) to non-financial small and medium-sized enterprises.

Peer-to-peer lending (P2P)

UK P2P lending, an example of FinTech activity, continues to grow rapidly (**Chart B.21**). And P2P lenders are looking to evolve and diversify their business models. Continued monitoring therefore remains important.

P2P lending could improve financial stability by providing an alternative source of finance for consumers and small businesses. However, it may also give rise to risks, for example by lowering lending standards, or through procyclicality if rising default rates in a downturn made investors more reluctant to provide credit.

The FCA has continued to review the regulatory framework for P2P platforms. In its interim feedback report on this work, the FCA raised concerns around information quality, inconsistent disclosures and insufficient wind-down procedures for some firms. In addition, the FCA has set out expectations of firms operating loan-based crowdfunding platforms which facilitate loans to lending businesses, as this activity may constitute 'accepting deposits'.(2)

(1) See 'Financial stability implications from FinTech'; www.fsb.org/wp-content/uploads/R270617.pdf.
(2) See www.fca.org.uk/publication/correspondence/dear-ceo-letter-crowdfunding-lending-businesses.pdf.

The FPC's assessment of post-crisis reforms to derivatives markets

In November 2016, the FPC commissioned an in-depth assessment of the financial stability risks associated with derivatives transactions. This followed the FPC's annual assessment in 2016 of risks and regulation beyond the core banking sector (see Financial stability risk and regulation beyond the core banking sector chapter of this *Report* for an overview of the FPC's 2017 annual assessment).

The aim of the FPC's in-depth assessment of derivatives markets was to examine progress in implementing the G20-led post-crisis reforms of over-the-counter (OTC) derivatives markets, and consider the implications for the resilience of the financial system.(1)

This chapter presents the FPC's conclusions. These are aligned with those of the Financial Stability Board's (FSB's) 'Review of OTC derivatives market reforms' for G20 Leaders, published in June 2017.(2)

- Derivatives markets provide important services to the economy, but the interconnectedness to which they give rise in the financial system can amplify shocks. This came into sharp relief during the global financial crisis.

- After the crisis, G20 Leaders agreed major reforms to global OTC derivatives markets, in part to mitigate systemic risk and improve transparency.

- The FPC judges that these reforms have improved the resilience of the financial system. Globally, the rate of collateralisation of OTC derivatives exposures has increased, and so over US$1 trillion more collateral (or 'margin') was held against OTC derivatives exposures at end-2014 compared to end-2006, according to industry estimates.(3)

- A central counterparty (CCP) is an institution which places itself between the original counterparties to a 'centrally cleared' transaction and effectively guarantees that if one counterparty fails, the CCP will continue to meet the obligations due to the other party. Promoting greater central clearing in OTC derivatives markets has been a key aspect of post-crisis reforms, in order to make the network more resilient under stress. The percentage of outstanding single-currency OTC interest rate derivatives globally that are centrally cleared has increased from an estimated 24% at end-2008 to at least 62% at end-June 2017.

- Since post-crisis reforms have made the financial system more dependent on CCPs in order to reduce systemic risk, reforms have also made the CCPs themselves more resilient, although it is important that authorities globally finalise and implement standards for CCP resolution. The most significant global CCPs are now expected to hold sufficient pre-funded resources to meet the losses that could arise from the default of their two largest clearing members in extreme but plausible market conditions.(4) To improve further its assessment of the resilience of CCPs, the Bank has started to consider design options for supervisory stress tests of CCPs.

- Not all derivatives are suitable for central clearing. However, greater collateral and bank capital have reduced systemic risk arising from the uncleared segment of the derivatives markets by increasing the resources available to cover institutions' exposures to their derivatives counterparties. The ongoing implementation of mandatory margin requirements for uncleared trades is a further positive step.

- By enabling an institution's derivatives positions with multiple original counterparties to be netted against each other, greater central clearing leads to lower costs for market participants than if margin requirements were exchanged on a completely bilateral basis. This increases the efficiency of the extra loss absorbency in the system. Furthermore, the FPC continues to judge that some refinements could be made to how banks' capital requirements for their clients' centrally cleared derivatives transactions are calculated in order, without compromising banks' resilience, to support the availability and affordability of central clearing (as set out in its July 2016 *Report)*.

- Initial margin (IM) requirements for uncleared transactions are likely to be quite stable over the financial cycle,

(1) Derivatives can be either traded as standardised instruments on exchanges or transacted bilaterally ('over-the-counter') between counterparties. All exchange-traded derivatives are centrally cleared, ie they go via central counterparties (CCPs). OTC derivatives can be either centrally cleared or uncleared. Introductions to CCPs and derivatives can be found in the following *Quarterly Bulletin* articles: www.bankofengland.co.uk/publications/Documents/quarterlybulletin/2013/qb130206.pdf and www.bankofengland.co.uk/publications/Documents/quarterlybulletin/2015/q306.pdf.
(2) www.fsb.org/wp-content/uploads/P290617-1.pdf.
(3) US$290 billion of this is for centrally cleared trades.
(4) Clearing members are institutions with direct access to a CCP in order to centrally clear their own trades and/or those of their clients.

including during stress, when large increases in margin requirements might otherwise force liquidation of derivatives positions, thereby amplifying the stress.(1)

- Derivatives markets are now more transparent, and new trade repository (TR) data have enhanced UK authorities' analysis of these markets. However, there is further to go in this and other areas to enhance the positive benefits of derivatives reform. The FPC's upcoming in-depth assessment of the role of leverage in the non-bank financial system will draw heavily on TR data to analyse non-banks' use of derivatives (see Financial stability risk and regulation beyond the core banking sector chapter).

Derivatives provide important services to the economy…

Over US$600 trillion of derivatives are outstanding globally in terms of gross notional amounts outstanding.(2) Derivatives enable financial and non-financial institutions to transfer risks to which they are exposed in the course of their activities — from changes in interest rates, exchange rates, sovereign and corporate creditworthiness, equity prices and commodity prices (**Charts B.22** and **B.23**) — to other institutions with different risk profiles and appetites.

…but they can amplify shocks to financial stability.

However, derivatives can create complex and opaque interconnectedness in the financial system, potentially amplifying shocks.

This came into sharp relief during the global financial crisis. Bilaterally transacted (ie OTC rather than exchange traded) derivatives were opaque to market participants and authorities, and contributed to a complex web of interlinkages between counterparties. OTC derivatives were largely uncleared, ie many did not go through a CCP. Furthermore, institutions did not exchange sufficient collateral (nor in the case of banks did they have enough capital) to cover their exposures to their derivatives counterparties.

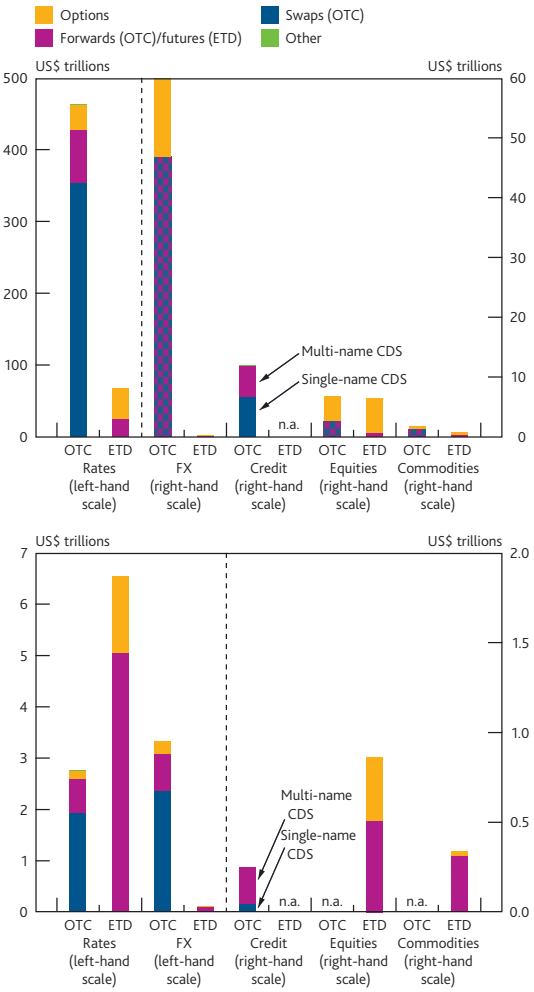
A 2010 study by the Financial Services Authority found that the investment banking operations of ten major international banks operating in the United Kingdom lost approximately US$68 billion from derivatives exposures in 2007–09.(3) A large part of this was from 'credit valuation adjustment' (CVA) charges from declines in the credit quality of their derivatives counterparties. CVA risk was not at that time reflected in regulatory capital requirements.

Uncertainty about how losses at one institution might flow through to others, in part via derivatives exposures, led to counterparties withdrawing funding from each other and cutting unsecured exposures, which amplified stress.

A further amplification mechanism arose from the liquidity strains posed by sharp increases in margin requirements from previously inadequate levels. For example, credit rating downgrades of US insurer AIG in 2008, combined with falls in the value of mortgage-related securities on which AIG had sold credit default swap (CDS) protection (contracts where AIG effectively insured others against declines in mortgages' credit quality), forced AIG to post US$40 billion of collateral to its counterparties. These counterparties had previously not

Charts B.22 and **B.23** Derivatives enable financial and non-financial institutions to transfer risks to which they are exposed in the course of their activities

Gross notional amounts outstanding (top) and average daily trading volumes (bottom) globally in 2016 in exchange-traded (ETD) and OTC derivatives(a)



Sources: Bank for International Settlements, The Depository Trust & Clearing Corporation, World Federation of Exchanges and Bank calculations.

(a) The figures for equity and commodity ETDs are underestimates, since not all exchanges report notional amounts data to the World Federation of Exchanges. Gross notional amounts outstanding data are as at end-June 2016 except for equity and commodity ETDs (end-2015). Daily trading volume data (by notional amounts) are averages over 2016, except for OTC products (April 2016). Cross-currency swaps are in the 'OTC Rates' category. ETDs on exchange-traded funds are assumed all to be equity ETDs. Columns are chequered where the underlying data do not separate forwards from swaps.

(1) Derivatives margin requirements have two components. 'Initial margin' is posted at the beginning of a transaction to cover potential future adverse changes in the market value of the contract, and is recalculated on a regular basis. 'Variation margin' is exchanged to cover actual changes in the market value of the contract during its life.
(2) Gross notional amounts outstanding is the sum across all open contracts of the nominal amounts referenced to calculate their cash flows.
(3) Table 5.1, www.fca.org.uk/publication/discussion/dp10_04.pdf. See also Box 5 ('A comparison of banks' losses in the 2017 stress test and the financial crisis') in 'Stress testing the UK banking system: 2017 results'; www.bankofengland.co.uk/financialstability/Documents/fpc/results281117.pdf.

required much collateral from AIG when it was an AAA-rated company. This contributed to AIG's reliance on US authorities for funding support.

After the crisis, G20 Leaders agreed major reforms to global derivatives markets.

In response, G20 Leaders agreed in 2009 and 2011 a series of reforms to global OTC derivatives markets, in part to mitigate systemic risk and improve transparency. Standardised products would be centrally cleared (ie through CCPs) and traded on exchanges or electronic trading platforms. Uncleared transactions would be subject to higher capital requirements and mandatory margin requirements. Details of each transaction would be reported to TRs.

These reforms have improved the resilience of the financial system. Greater central clearing has reduced the number and size of derivatives exposures generated by a given trading volume, and makes the network more resilient under stress.

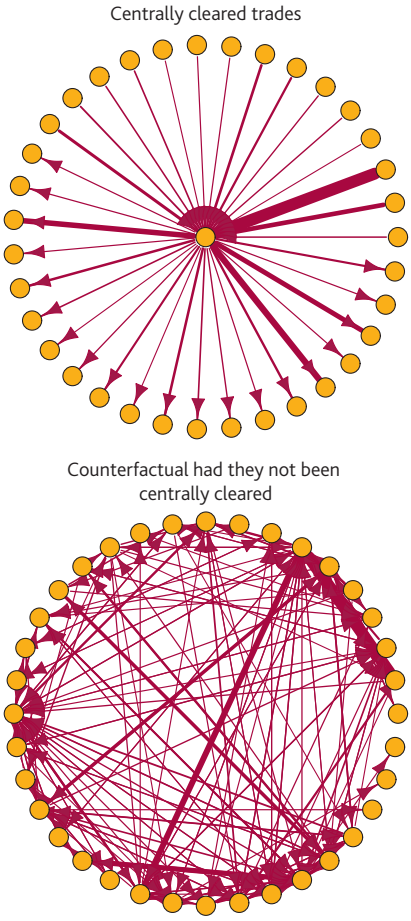
There has been a marked increase in rates of central clearing in some of the largest asset classes underlying OTC derivatives. For example, the minimum percentage of outstanding single-currency OTC interest rate derivatives globally that are centrally cleared has increased from 24% at end-2008 to 62% at end-June 2017; for CDS, it has increased from 5% at end-June 2010 to 34% at end-June 2017.(1)

Greater central clearing has reduced systemic risk in derivatives markets and increased the resilience of the derivatives network. CCPs maximise the netting of offsetting positions — if a market participant has two offsetting exposures but with two different counterparties, these cannot be netted when they are uncleared, but they can be when they are both centrally cleared at the same CCP. This 'multilateral netting' at CCPs reduces aggregate counterparty credit risk and simplifies the network of exposures (**Figure B.4**) — particularly for example when central clearing is not fragmented among multiple CCPs. Research suggests that, in a stress, greater netting of margin calls generated by price moves in a centrally cleared market promotes resilience by reducing the demand on firms' liquid assets.(2)

After reducing aggregate counterparty credit risk via multilateral netting, CCPs ensure robust collateralisation of the remaining exposures, and maintain a pre-funded default fund contributed to by all clearing members to mutualise extreme losses. These pre-funded financial resources at UK CCPs' derivatives clearing services totalled approximately £120 billion on average in 2016. Even before post-crisis enhancements to CCP regulation, pre-funded financial resources at UK CCP LCH proved sufficient to withstand the bankruptcy of US investment bank Lehman Brothers in 2008. LCH used around one third of the US$2 billion of the IM it had called from Lehman, the default fund was not required, and thus counterparties to Lehman's centrally cleared trades did not incur a loss.(3)

Figure B.4 'Multilateral netting' at CCPs reduces aggregate counterparty credit risk and simplifies the network of exposures

Centrally cleared trades executed on 20 February 2017 in sterling interest rate swaps referencing six-month Libor (top) — and the counterfactual had they not been centrally cleared (bottom)(a)



Sources: DTCC Derivatives Repository Ltd, Unavista Ltd and Bank calculations.

(a) Each yellow node is a clearing member (the central node in the top chart is the CCP). An arrow pointing into/out of a clearing member from/to a counterparty denotes that, once all transactions between the clearing member and the counterparty on 20 February 2017 are netted with each other, the clearing member is receiving/paying a fixed rate from/to their counterparty. The thickness of the red arrows is proportional to the size of the net transactions (in terms of notional amount) between the clearing member and their counterparty.

The centralised, rules-based management of a clearing member's default by a CCP, combined with the incentives created by mutualisation, also enhances the system's resilience and continuity during a stress. For example, in 2008, LCH supported the market by closing out or hedging the major risk exposures in Lehman's interest rate derivatives portfolio (which had a gross notional amount outstanding of US$9 trillion) within one week of Lehman's bankruptcy. In contrast, it was over four years before the first payment to Lehman's uncleared creditors was made.

(1) These are underestimates of the true central clearing rate, and so are described as minimum percentages, because the source data do not identify trades centrally cleared by non-dealers (see page 7, www.bis.org/publ/otc_hy1711.pdf). The FSB estimate for end-2008 is contained in section 3.2.1, www.fsb.org/wp-content/uploads/P290617-1.pdf.
(2) Heath, A, Kelly, G, Manning, M, Markose, S and Rais Shaghaghi, A (2016), 'CCPs and network stability in OTC derivatives markets', *Journal of Financial Stability*, No. 27, pages 217–33.
(3) Gregory, J (2014), *Central counterparties: mandatory central clearing and bilateral margin requirements for OTC derivatives*, John Wiley & Sons, pages 42–43.

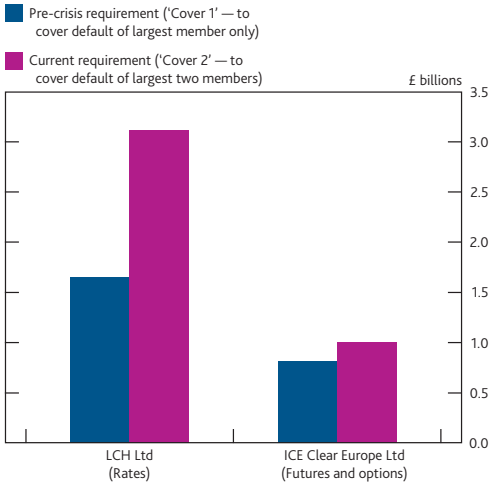
CCPs themselves are more resilient, although it is important that authorities globally finalise and implement standards for CCP resolution.

Reforms to promote central clearing in order to reduce systemic risk have by design increased the dependence of the financial system on the continued orderly functioning of CCPs. Therefore, enhancing CCP resilience, recoverability and resolvability has been a key priority for authorities internationally since the crisis. The United Kingdom is home to multiple CCPs of global systemic importance, which since 2013 have been supervised by the Bank of England.(1) Several CCPs domiciled outside the United Kingdom are also important for UK financial stability.

The most significant global CCPs are now expected to hold sufficient pre-funded resources (comprised of margin and other resources, which may include an amount of the CCP's own capital and a default fund) to meet the losses that could arise from the default of their two largest clearing members in extreme but plausible market conditions. This is based on running multiple historical and hypothetical stress scenarios on a daily basis, and is known as a 'Cover 2' standard. This compares to a 'Cover 1' standard pre-crisis, meaning that required pre-funded resources are now larger than they would have been (**Chart B.24**).

Chart B.24 Major CCPs are now required to have greater pre-funded resources than before the financial crisis

Resources held in addition to initial margin to cover extreme losses at major UK clearing services — averages over year to 30 June 2017(a)



Sources: CPMI-IOSCO public quantitative disclosures by LCH Ltd and ICE Clear Europe Ltd and Bank calculations.

(a) UK CCPs LCH Ltd and ICE Clear Europe Ltd each centrally clear multiple product types. These are organised in different 'clearing services' within the same CCP, covered by separate default funds. This chart shows, for each CCP, the clearing service with the largest default fund.

In the event of the default of a clearing member, CCPs may have to liquidate some of their pre-funded resources in order to absorb losses and prevent them from spreading to surviving clearing members. CCPs therefore face liquidity risk, and are required by regulation to maintain sufficient liquid resources. To support this, since 2014 the Bank has made parts of its sterling deposit and lending facilities (the 'Sterling Monetary Framework') available to CCPs. These enable CCPs to maintain some sterling resources in their most liquid possible form (central bank reserves), and to borrow from the Bank of England using their other pre-funded resources as collateral in the event that they are unable to liquidate them themselves.

Since 2014, UK CCPs have also been required to have recovery plans to deal with extreme losses in a way that enables them to continue to provide their critical services to the markets they serve.

To enhance further the regulatory regime for CCPs, it is important that jurisdictions implement swiftly and consistently the new international guidance on CCP resilience, recovery and resolution (published in July 2017 to complete the workplan on CCPs that the G20 requested in 2015).(2)

Resolution regimes for CCPs, including international standards for these, are less well developed than rules around CCP resilience and recovery. In addition to the guidance it published in July 2017, the FSB is doing further work assessing the quality of financial resources available for an effective resolution and how owners' equity should be treated in the process. Completing this work will be an important step in ensuring that CCPs are fully resolvable and the FPC will receive regular updates on progress. Recognising the importance of UK CCPs to the global financial system, the United Kingdom continues to play a leading role in the development of policy on CCP resolution. A domestic resolution regime for CCPs has been in place since 2014, with an EU legislative proposal currently being developed that will enhance it, and the Bank was the first authority to establish crisis management groups to facilitate cross-border resolution planning for the largest UK CCPs.

To improve further its assessment of the resilience of CCPs, the Bank has started to consider design options for supervisory stress tests of UK CCPs. This has helped contribute to the development of an international framework for supervisory stress testing of CCPs, which was published for consultation in July 2017.(3)

A supervisory stress test for CCPs aims to assess systemic effects associated with multiple CCPs responding to the same stress events. This approach aims to evaluate interdependencies which are not captured in CCPs' own stress tests. As highlighted by an international cross-authority study published in July 2017, in which the Bank participated, a major clearing member default could now impact multiple large CCPs in multiple jurisdictions across multiple product

(1) More detail on the Bank's supervision of CCPs can be found in its annual reports on its supervision of financial market infrastructures; www.bankofengland.co.uk/publications/Pages/fmi/default.aspx.
(2) www.fsb.org/2017/07/international-committees-complete-the-april-2015-workplan-on-central-counterparty-resilience-recovery-and-resolvability/.
(3) www.bis.org/cpmi/publ/d161.pdf.

classes.(1) Furthermore, the study documents CCPs' dependence on their clearing members for other critical services — eg as custodians, settlement banks or counterparties to the reinvestment by CCPs of participants' cash collateral — although it finds there is generally no strong relationship at a given CCP between the size of an institution's activity as a clearing member and size of its activity as a service provider.

As well as highlighting the importance of supervisory stress testing of CCPs alongside that of their clearing member banks, this work also underlines the global systemic importance of many CCPs located in the United Kingdom and elsewhere. Therefore, close co-operation on CCP supervision among authorities in different jurisdictions is vital. In respect of the major CCPs it supervises, the Bank of England chairs colleges of authorities both within the European Union and globally to enable these jurisdictions to contribute to, and have confidence in, the Bank's supervision. In addition to these multilateral arrangements, the Bank also co-operates particularly closely on a bilateral basis with the European Central Bank in respect of UK CCPs with significant euro-denominated business, and with US and other overseas authorities in respect of UK CCPs also registered in other countries.(2)

Not all derivatives are suitable for central clearing…

Not all OTC derivatives products are suitable for central clearing, and there would be risks from CCPs clearing unsuitable products. This is because central clearing requires an adequate degree of standardisation of a product's contractual terms and operational processes, sufficient market liquidity to support management of a clearing member's default by a CCP in potentially stressed conditions, and reliable pricing sources to support accurate margining.(3)

Therefore, enough OTC derivatives transactions need to be centrally cleared in order to reduce meaningfully the systemic risk posed by interconnectedness, but without going so far as to force unsuitable products into central clearing since this would increase systemic risk.

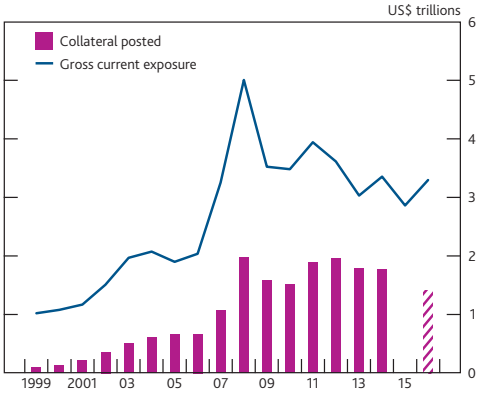
Hence, there will still be a role for uncleared derivatives so that market participants can trade bespoke or complex products. Bank capital requirements and mandatory margin requirements address the systemic risk posed by uncleared derivatives by increasing the resources available to cover institutions' exposures to the creditworthiness of their derivatives counterparties and (in the case of bank capital) to adverse market moves.

…but greater collateral and capital have reduced systemic risk arising from the uncleared segment.

Globally, greater central clearing and greater collateralisation of uncleared trades mean over US$1 trillion more collateral was estimated to be held against OTC derivatives exposures at end-2014 (US$1.77 trillion, US$290 billion of which was for centrally cleared trades) compared to end-2006 (US$0.67 trillion) (**Chart B.25**). As a result, global banks' ratio of collateral to current credit exposures is estimated to have increased from 36% to 63% over the same period.(4)

Chart B.25 OTC derivatives exposures are better collateralised than before the financial crisis

Global OTC derivatives current credit exposures versus collateral posted(a)



Sources: Bank for International Settlements, International Swaps and Derivatives Association (ISDA) and Bank calculations.

(a) ISDA collateral data are unavailable for end-2015. Dashed bar shown at end-2016 is ISDA data as of end-March 2017 for only the 20 largest market participants to uncleared derivatives — this data point is an underestimate since an estimate for the entire market is not available. Collateral posted includes some initial margin posted to cover potential future exposure not current exposure. Collateral for centrally cleared trades is only explicitly included since end-2010.

The implementation of mandatory margin requirements for uncleared derivatives, which began in September 2016 in many jurisdictions globally (February 2017 in the European Union) and will complete in 2020, is a positive step towards further systemic risk reduction in derivatives markets.

Capital held by banks against derivatives exposures has also increased. For example, the introduction of a CVA component to bank capital requirements, to capitalise banks against the risk of a decline in the credit quality of their derivatives counterparties, has increased capital requirements for derivatives' counterparty credit risk by approximately 30% (just under £2 billion) as at end-2016 for the three UK banking groups with the largest CVA requirements.

Greater central clearing increases the efficiency of the extra loss absorbency in the system. Some refinements to bank regulation would support the availability and affordability of central clearing, without compromising resilience.

Although G20 reforms have raised the private cost of derivatives activity and this may have made some marginal derivatives activity uneconomical, the reforms have reduced the social cost that excessive interconnectedness and

(1) www.fsb.org/wp-content/uploads/P050717-2.pdf.
(2) www.bankofengland.co.uk/publications/Pages/news/2015/044.aspx.
(3) Sidanius, C and Wetherilt, A (2012), 'Thoughts on determining central clearing eligibility of OTC derivatives', *Bank of England Financial Stability Paper No. 14*; www.bankofengland.co.uk/financialstability/Documents/fpc/fspapers/fs_paper14.pdf.
(4) The collateral coverage ratio across all institutions over the same period, implicit in **Chart B.25**, increased from 33% to 53%.

inadequate counterparty credit risk mitigation among private counterparties imposed on the financial system pre-crisis.

Furthermore, because central clearing enables margin requirements to be calculated for each institution based on their multilaterally netted exposure, greater central clearing means that the cost of achieving this risk mitigation would have been much higher if transactions had remained uncleared and margin requirements were exchanged on a completely bilateral basis. One estimate by the Bank for International Settlements is that central clearing could reduce margin requirements compared to the uncleared alternative by nearly three quarters.(1)

The FPC continues to judge that refinements could be made to bank regulation that would, without compromising the resilience of the core system, support the availability and affordability of central clearing to institutions who cannot (or find it uneconomic to) be clearing members. As clearing members of CCPs, banks intermediate derivatives trades on behalf of their clients, incurring a potential future exposure (PFE), which could crystallise in the event of a client default. Clients post IM against this risk. However, under current international leverage ratio standards, banks have to count the full value of the PFE towards their leverage exposure and cannot use the IM posted by the client to reduce it. The FPC continues to judge that, as it set out in its July 2016 *Report*, there would be merit in any internationally agreed leverage ratio standard allowing IM posted by clients to reduce banks' potential exposures to a default of those clients in centrally cleared derivatives transactions, provided appropriate safeguards are in place. This would reduce the capital cost of client clearing to leverage-constrained dealers.

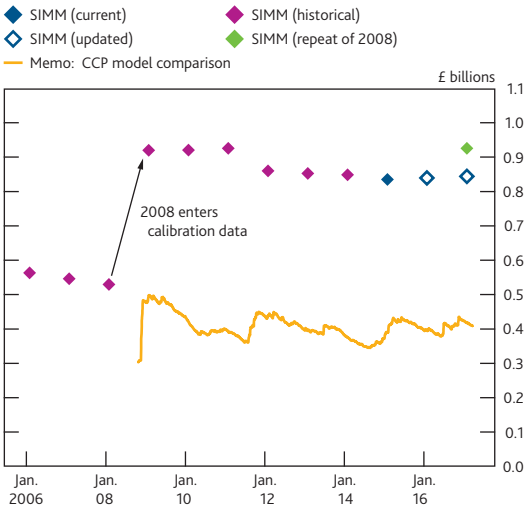
The FSB is now reviewing the effect and interaction of post-crisis reforms (including the leverage ratio) on incentives to centrally clear derivatives transactions. The FSB is working jointly with the Basel Committee on Banking Supervision, and will report to the G20 Leaders' summit in Argentina in 2018.

Initial margin requirements for uncleared transactions are likely to be quite stable over the financial cycle, including during stress, when large increases in requirements might otherwise force liquidation of derivatives positions, thereby amplifying the stress.
IM requirements for derivatives positions tend to vary with the market risk of those positions. IM requirements are often relatively low in the upswing of the financial cycle, when market volatility is typically subdued, and increase in the downswing with rising volatility. Increases in margin requirements, particularly if large and rapid, could be difficult for derivatives users to fund, forcing them to liquidate positions, which could amplify market volatility. Moreover, low IM requirements in the upswing may encourage users to take larger positions, making any liquidations and amplification of price moves in the downswing larger than otherwise.

As shown in **Chart B.26**, IM requirements for uncleared transactions generated by the International Swaps and Derivatives Association (ISDA) Standard IM Model (SIMM)™, a commonly used model for uncleared derivatives margining, are likely to be quite stable over the financial cycle. This reflects the design of the model, which sets requirements based on price movements from a combination of the past three years and a year of financial stress (eg 2008). The IM requirements could step up, however, if the stress ever approached or exceeded that of the prevailing stress year. To smooth the resulting payment obligations in such circumstances, EU law permits market participants to apply a 30-day transitional period to meet the new IM requirements.

Chart B.26 Initial margin requirements for uncleared transactions are likely to be quite stable over the financial cycle

ISDA SIMM™ initial margin requirements for a fixed portfolio of uncleared OTC interest rate derivatives — plus, for comparison, requirements from a CCP margin model(a)



Sources: Bloomberg, ISDA SIMM™ documentation and Bank calculations.

(a) For a fixed portfolio of USD, EUR and GBP interest rate swaps of various maturities as held by a major dealer in late 2014. In the chart, the 'current' ISDA SIMM™ calibration is based on seven years of data from early 2008 to early 2015. The updated calibration adds one and two years of subsequent data to that basis and the historical calibration is based initially on seven years of data to early 2006 and then adds subsequent years. Both the SIMM™ and CCP initial margin requirements exclude potential add-ons for large positions that could have a significant impact on prices if liquidated.

IM requirements for centrally cleared trades vary more over the financial cycle.(2) However, this is dampened somewhat by 'anti-procyclicality' mechanisms specified in EU regulation from which CCPs must choose. Under new international guidance on CCP resilience, transparency initiatives that provide market participants with information about possible future IM requirements may also discourage high levels of leverage when prevailing IM requirements are relatively low.(3)

(1) See pages 34–35; www.bis.org/publ/bcbs242.pdf.
(2) IM requirements for a given portfolio of uncleared derivatives are also typically higher than if calculated using a CCP margin model. A key driver of this is that regulation requires the former to assume a minimum period of ten days to close out an OTC derivatives portfolio following a default, rather than five days for a CCP (eg in the European Union and elsewhere), because: (i) uncleared products are typically less liquid than centrally cleared products; and (ii) CCP default management is centralised, rules-based and benefits from the incentives created by mutualisation.
(3) Paragraph 2.2.23; www.bis.org/cpmi/publ/d163.pdf.

Box 6
UK authorities' analysis of trade repository data

UK authorities have used TR data to support their objectives in a number of ways.

This includes:
(i) monitoring activity and positioning in derivatives markets around significant market events (such as in the run-up to and immediately following the United Kingdom's referendum on EU membership in 2016);
(ii) assessing the market impact of policy shocks (eg analysing the implications of the Swiss franc's depeg from the euro in 2015);(1) and
(iii) understanding the structure of key derivatives markets to inform policymaking (eg identifying the positions of market participants in the short sterling futures market, which provides information on monetary policy expectations) and supervisory decision-making (eg informing reviews of applications by supervised firms to expand the scope of their derivatives activity).

The FPC's upcoming in-depth assessment of the role of leverage in the non-bank financial system will draw heavily on TR data to analyse non-banks' use of derivatives (see Financial stability risk and regulation beyond the core banking sector chapter).

The Bank is investing in its capability and technology to collect, process and store data, which will in turn enhance the Bank's ability to query and analyse TR data. The new data architecture will solve some of the existing technological impediments to analysing TR data, most notably by combining the data available from multiple TRs into one integrated data set and automating the identification of duplicate copies of reported transactions. By improving data collection, processing and storage, the Bank will be able to analyse larger volumes of data, across multiple TRs and across time, significantly faster.

(1) Cielinska, O, Joseph, A, Shreyas, U, Tanner, J and Vasios, M (2017), 'Gauging market dynamics using trade repository data: the case of the Swiss franc de-pegging', *Bank of England Financial Stability Paper No. 41*; www.bankofengland.co.uk/financialstability/Documents/fpc/fspapers/fs_paper41.pdf.

The mechanisms that dampen cyclical variation in IM requirements for both centrally cleared and uncleared trades tend to do so by raising requirements when they would otherwise be relatively low. This may have economic costs by inducing market participants to hold more liquid securities than otherwise, foregoing potentially higher-yielding investments. Bank staff continue to analyse the trade-off between these costs and the benefits to financial stability of dampening fluctuations in IM requirements.(1)

Derivatives markets are now more transparent, but there is further to go in this area.
Transaction-level data on derivatives markets from TRs have increased the transparency of derivatives markets to authorities. Box 6 describes how these data have contributed to UK authorities' analysis of financial stability issues and explains that the Bank is investing in technology to improve its ability to analyse TR data.

The FPC judges that, in particular, reforms to transparency have further to go, in order to enhance the positive benefits of derivatives reform.

First, authorities lack a global view of global derivatives markets — at the moment, many authorities can only access data in local TRs. The Bank will work with other authorities internationally to promote the faster progress required at international level to resolve barriers to data quality, standardisation and sharing. In particular, no international work is currently under way to decide on how a cross-border data aggregation mechanism should work in practice.

Second, delays in the implementation schedule of some key reforms, such as requirements in the European Union to trade standardised OTC derivatives on electronic platforms, have meant the full extent of their effect is not yet clear. Those EU requirements should now come into force in 2018. Research by Bank staff has found that similar requirements already in place in the United States have led to greater transparency for market participants and a consequent reduction in execution costs relative to less-affected contracts by as much as US$3 million to US$4 million daily for end-users.(2)

(1) Murphy, D, Vasios, M and Vause, N (2016), 'A comparative analysis of tools to limit the procyclicality of initial margin requirements', *Bank of England Staff Working Paper No. 597*; www.bankofengland.co.uk/research/Documents/workingpapers/2016/swp597.pdf.
(2) Benos, E, Payne, R and Vasios, M (2016), 'Centralized trading, transparency and interest rate swap market liquidity: evidence from the implementation of the Dodd-Frank Act', *Bank of England Staff Working Paper No. 580*; www.bankofengland.co.uk/research/Documents/workingpapers/2016/swp580.pdf.

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 other 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 17/Q2/1 refers to the first Recommendation made at the 2017 Q2 Committee meeting.

Recommendations implemented or withdrawn since the previous *Report*

17/Q2/1	**FPC Recommendation on mortgage affordability tests**	Implemented

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, their mortgage rate were to be 3 percentage points higher than the reversion rate specified in the mortgage contract at the time of origination (or, if the mortgage contract does not specify a reversion rate, 3 percentage points higher than the product 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). This Recommendation applies to all lenders which extend residential mortgage lending in excess of £100 million per annum.

Lenders were required to have regard to the FPC's June 2017 revision to its June 2014 affordability Recommendation immediately, by virtue of the existing FCA MCOB rule. At its September 2017 meeting the FPC therefore considered that this revision had been implemented. At that meeting the FPC also confirmed that the affordability Recommendation did not apply to any remortgaging where there is no increase in the amount of borrowing, whether done by the same or a different lender.

17/Q3/1	**Leverage ratio**	Implemented

The FPC recommends to the PRA that its rules on the leverage ratio:

(i) 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; and

(ii) require a minimum leverage ratio of 3.25%.

At its meeting on 20 September 2017, and following consultation, the FPC confirmed its Recommendation to the PRA to set the minimum leverage requirement at 3.25%, with central bank reserves removed from the leverage exposure measure.

On 3 October 2017 the PRA published a Policy Statement(1) setting out how, with immediate effect, this Recommendation was to be implemented. And on the same day an FPC Policy Statement(2) on leverage ratio tools, updated to reflect this Recommendation, was published. Therefore at its meeting on 22 November the FPC decided to consider this Recommendation as implemented.

The explanation of the FPC's Recommendation is set out in the Record of the meeting on 20 September 2017,(3) Box 1 of the updated FPC Policy Statement and the joint FPC and PRA Consultation Paper.(4)

(1) www.bankofengland.co.uk/pra/Pages/publications/ps/2017/ps2117.aspx.
(2) www.bankofengland.co.uk/financialstability/Documents/fpc/policystatement010715ltr.pdf.
(3) www.bankofengland.co.uk/publications/Documents/records/fpc/pdf/2017/record1710.pdf.
(4) www.bankofengland.co.uk/pra/Documents/publications/cp/2017/cp1117.pdf.

Recommendations and Directions currently outstanding

There are currently no outstanding Recommendations or Directions awaiting implementation.

Other FPC policy decisions

Set out below are 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 is raising the UK CCyB rate from 0.5% to 1.0%, with binding effect from 28 November 2018. 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 and including 2.5%.

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 approaches to implementing this Recommendation: the PRA issued a Policy Statement in October 2014, including rules,(2) and the FCA issued general guidance in October 2014 which it clarified in February 2017.

The FPC reviewed this Recommendation in June 2017 and decided not to amend the calibration. The explanation for this is set out in the June 2017 *Financial Stability Report*.

(1) www.bankofengland.co.uk/financialstability/Pages/fpc/ccbrates.aspx.
(2) www.bankofengland.co.uk/pra/Pages/publications/ps/2014/ps914.aspx.

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 17 Nov. 2017)
Non-bank balance sheet stretch[d]						
1 Credit to GDP[e]						
Ratio	121.3%	163.6%	86.6%	177.7%	149.5%	149.8% (2017 Q2)
Gap	7.4%	9.4%	-28.7%	21.0%	-19.4%	-16.5% (2017 Q2)
2 Private non-financial sector credit growth[f]	9.9%	9.3%	-2.0%	23.9%	6.0%	5.1% (2017 Q2)
3 Net foreign asset position to GDP[g]	4.0%	-6.3%	-29.0%	21.4%	-8.5%	-5.1% (2017 Q2)
4 Gross external debt to GDP[h]	181.7%	317.4%	113.3%	403.1%	307.3%	307.0% (2017 Q2)
of which bank debt to GDP	*120.0%*	*194.2%*	*77.8%*	*266.4%*	*174.8%*	*173.1% (2017 Q2)*
5 Current account balance to GDP[i]	-1.9%	-3.1%	-7.1%	0.5%	-5.8%	-4.6% (2017 Q2)
Conditions and terms in markets						
6 Long-term real interest rate[j]	1.45%	1.23%	-2.05%	2.18%	-1.34%	-1.46% (17 Nov. 2017)
7 VIX[k]	19.1	12.8	9.8	65.5	15.9	10.7 (17 Nov. 2017)
8 Global corporate bond spreads[l]	84 bps	84 bps	74 bps	482 bps	127 bps	99 bps (17 Nov. 2017)
9 Spreads on new UK lending						
Household[m]	480 bps	352 bps	285 bps	849 bps	669 bps	635 bps (Sep. 2017)
Corporate[n]	104 bps	97 bps	82 bps	392 bps	236 bps	225 bps (June 2017)
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.	13.5%	14.5% (2017 Q3)
11 Leverage ratio[r]						
Simple	4.7%	4.1%	2.9%	6.7%	6.2%	6.7% (2017 H1)
Basel III (2014 proposal)	n.a.	n.a.	n.a.	n.a.	4.7%	5.0% (2017 H1)
12 Average risk weights[s]	53.6%	46.4%	32.6%	65.4%	33.9%	32.6% (2017 H1)
13 Return on assets before tax[t]	1.0%	1.1%	-0.2%	1.5%	0.3%	0.3% (2017 H1)
14 Loan to deposit ratio[u]	114.5%	132.4%	93.5%	133.3%	96.1%	94.6% (2017 H1)
15 Short-term wholesale funding ratio[v]	n.a.	24.6%	10.1%	26.7%	10.5%	10.1% (end-2016)
of which excluding repo funding	*n.a.*	*15.8%*	*4.5%*	*15.8%*	*4.5%*	*4.9% (end-2016)*
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 2016 Q2: DE, JP, KY, NL	In 2017 Q2: CH, DE, JP, KY, TW
17 CDS premia[y]	12 bps	8 bps	6 bps	298 bps	102 bps	38 bps (17 Nov. 2017)
18 Bank equity measures						
Price to book ratio[z]	2.13	1.94	0.50	2.86	0.73	0.87 (17 Nov. 2017)
Market-based leverage ratio[aa]	9.7%	7.8%	1.9%	15.7%	4.7%	5.7% (17 Nov. 2017)

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 17 Nov. 2017)
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.	13.5%	14.5% (2017 Q3)
2 Leverage ratio[r]						
Simple	4.7%	4.1%	2.9%	6.7%	6.2%	6.7% (2017 H1)
Basel III (2014 proposal)	n.a.	n.a.	n.a.	n.a.	4.7%	5.0% (2017 H1)
3 Average mortgage risk weights[ab]	n.a.	n.a.	11.8%	22.4%	13.7%	11.8% (2017 H1)
UK average mortgage risk weights[ac]	n.a.	n.a.	10.2%	15.8%	11.0%	10.2% (2017 H1)
4 Balance sheet interconnectedness[ad]						
Intra-financial lending growth[ae]	12.0%	13.0%	-20.5%	45.5%	10.2%	-20.5% (2017 H1)
Intra-financial borrowing growth[af]	14.1%	13.7%	-21.5%	33.3%	-7.0%	28.4% (2017 H1)
Derivatives growth (notional)[ag]	37.7%	34.2%	-25.9%	52.0%	17.8%	-1.5% (2017 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 2016 Q2: KY	In 2017 Q2: FR, HK, KY, US
Non-bank balance sheet stretch[d]						
6 Credit growth						
Household[ai]	10.7%	10.9%	-0.9%	21.6%	4.3%	4.6% (2017 Q2)
Commercial real estate[aj]	15.3%	18.5%	-9.7%	59.8%	1.5%	-1.7% (2017 Q3)
7 Household debt to income ratio[ak]	98.1%	139.1%	77.2%	147.0%	129.0%	133.9% (2017 Q2)
8 PNFC debt to profit ratio[al]	266.3%	363.8%	157.9%	431.2%	311.1%	310.5% (2017 Q2)
9 NBFI debt to GDP ratio (excluding insurance companies and pension funds)[am]	54.8%	128.3%	13.7%	173.0%	125.8%	126.3% (2017 Q2)
Conditions and terms in markets						
10 Real estate valuations						
Residential price to rent ratio[an]	100.0	151.0	66.9	160.5	141.2	143.8 (2017 Q3)
Commercial prime market yields[ao]	5.4%	4.1%	3.8%	7.1%	4.2%	3.9% (2017 Q3)
Commercial secondary market yields[ao]	8.5%	5.6%	5.1%	10.2%	6.1%	5.9% (2017 Q3)
11 Real estate lending terms						
Residential mortgage LTV ratio (mean above the median)[ap]	90.6%	90.6%	81.6%	90.8%	87.5%	87.4% (2017 Q3)
Residential mortgage LTI ratio (mean above the median)[ap]	3.8	3.8	3.6	4.2	4.1	4.2 (2017 Q3)
Commercial real estate mortgage LTV (average maximum)[aq]	77.6%	78.3%	57.3%	79.6%	57.7%	57.3% (2017 H1)
12 Spreads on new UK lending						
Residential mortgage[ar]	80 bps	50 bps	35 bps	379 bps	183 bps	138 bps (Sep. 2017)
Commercial real estate[as]	137 bps	135 bps	119 bps	422 bps	249 bps	263 bps (2017 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 end 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: ONS, Revell, J and Roe, A (1971), 'National balance sheets and national accounting — a progress report', *Economic Trends*, No. 211, UK Finance 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, implied from inflation swaps and nominal fitted yields. Data series runs from October 2004. Sources: Bloomberg, TradeWeb and Bank calculations.
(k) Measure of market expectations of 30-day volatility. Conveyed by S&P 500 stock index option prices (one-month moving average). 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. 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, Bloomberg, FCA Product Sales Data, UK Finance 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 amounts outstanding of loans. Series starts in October 2002. Sources: Bank of England, Bloomberg, De Montfort University, Department for Business, Energy and Industrial Strategy, ICE BofAML, UK Finance 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 until February 2015); 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 shareholders' equity over aggregate assets. The Basel III (2014 proposal) series corresponds to aggregate CRD IV end-point Tier 1 capital over aggregate leverage exposures, using the CRR definition since 2015 and the 2014 proposal before that. This series consists of Barclays, Co-operative Banking Group, HSBC, Lloyds Banking Group, Nationwide, RBS and Santander UK. In August 2016, the PRA implemented the FPC Recommendation allowing firms subject to the leverage ratio framework in the United Kingdom to exclude certain claims on central banks from their leverage exposures; no adjustment has been made for this. Sources: PRA regulatory returns, published accounts and Bank calculations.
(s) Aggregate peer group risk-weighted assets divided by aggregate peer group published balance sheet assets according to applicable regulatory regimes. The series begins in 1992 and is annual until end-2012 and half-yearly onwards. Latest published figures have been used (2017 H1). In the case of Nationwide, these relate to 2016 H2. Sources: Published accounts and Bank calculations.
(t) Calculated as major UK banks' 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. The latest value uses latest published figures, in the case of Nationwide these relate to 2016 H2. 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. The latest value uses latest published figures, in the case of Nationwide these relate to 2016 H2. 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. 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), Hong Kong (HK), Ireland (IE), India (IN), Italy (IT), Japan (JP), Republic of Korea (KR), Cayman Islands (KY), Luxembourg (LU), Netherlands (NL), Taiwan (TW), 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 from 2015. Series starts in 2003. In the latest value Nationwide's senior CDS is weighted by 2016 H2 total assets as the latest published figures relate to 2016 H2. The Co-operative Bank fell out of the population on 17 June 2017. 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 are weighted by end-year total assets until 2014 and by half-year assets from 2015. 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: Bloomberg, 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: Bloomberg, 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 2017 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 2017 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 2017 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 gross disposable income of the UK household and non-profit sector. Includes all liabilities of the household sector except for the unfunded pension liabilities and financial derivatives of the non-profit sector. Disposable income is adjusted for financial intermediation services indirectly measured (FISIM) and changes in pension entitlements. 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. 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, FCA Product Sales Data, UK Finance 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 17 Nov. 2017)
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%	87.5%	87.4% (2017 Q3)
Owner-occupier mortgage LTI ratio (mean above the median)[d]	3.8	3.8	3.6	4.2	4.1	4.2 (2017 Q3)
Buy-to-let mortgage LTV ratio (mean)[e]	n.a.	n.a.	61.0%	75.4%	63.8%	61.0% (2017 Q2)
2 Household credit growth[f]	10.7%	10.9%	-0.9%	21.6%	4.3%	4.6% (2017 Q2)
3 Household debt to income ratio[g]	98.1%	139.1%	77.2%	147.0%	129.0%	133.9% (2017 Q2)
of which: mortgages[h]	*68.5%*	*101.0%*	*49.2%*	*109.4%*	*96.5%*	*98.2% (2017 Q2)*
of which: owner-occupier mortgages[i]	*77.5%*	*92.4%*	*64.6%*	*96.7%*	*79.9%*	*81.2% (2017 Q2)*
Conditions and terms in markets						
4 Approvals of loans secured on dwellings[j]	97,938	119,078	26,707	134,413	64,216	66,232 (Sep. 2017)
5 Housing transactions[k]	129,508	139,039	51,660	221,978	96,420	100,850 (Sep. 2017)
Advances to homemovers[l]	48,985	59,342	14,300	93,500	31,300	32,200 (Sep. 2017)
% interest only[m]	53.3%	31.0%	1.8%	81.3%	2.2%	2.5% (Sep. 2017)
Advances to first-time buyers[l]	39,179	33,567	8,500	55,800	31,400	31,100 (Sep. 2017)
% interest only[m]	52.1%	24.0%	0.0%	87.9%	0.0%	0.0% (Sep. 2017)
Advances to buy-to-let purchasers[l]	10,128	14,113	3,600	29,100	6,400	6,200 (Sep. 2017)
% interest only[n]	n.a.	n.a.	50.0%	74.3%	70.7%	71.8% (2017 Q2)
6 House price growth[o]	1.8%	2.2%	-5.6%	7.0%	0.6%	1.5% (Oct. 2017)
7 House price to household disposable income ratio[p]	2.9	4.5	2.1	4.7	4.3	4.4 (2017 Q2)
8 Rental yield[q]	5.8%	5.1%	4.8%	7.6%	5.0%	4.8% (Sep. 2017)
9 Spreads on new residential mortgage lending						
All residential mortgages[r]	80 bps	50 bps	35 bps	379 bps	183 bps	138 bps (Sep. 2017)
Difference between the spread on high and low LTV residential mortgage lending[r]	18 bps	25 bps	1 bps	293 bps	91 bps	80 bps (Oct. 2017)
Buy-to-let mortgages[s]	n.a.	n.a.	61 bps	397 bps	258 bps	253 bps (2017 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 end 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 using the average LTV in equivalent buckets in loan level buy-to-let data gathered by UK Finance. Series starts in 2007. UK Finance data available from 2014; weights prior to this date are average LTVs across the respective buckets using all data gathered in 2014. The share of mortgages with LTV ratio at 75% from 2014 onwards used are adjusted to estimate the LTV of each loan before any fees or charges are added. This approximates the LTV at which the loan was originated. Sources: Bank of England, UK Finance 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 gross disposable income of the UK household and non-profit sector. Includes all liabilities of the household sector except for the unfunded pension liabilities and financial derivatives of the non-profit sector. Disposable income is adjusted for financial intermediation services indirectly measured (FISIM) and changes in pension entitlements. Sources: ONS and Bank calculations.
(h) Total debt secured on dwellings as a percentage of a four-quarter moving sum of gross disposable income of the UK household and non-profit sector. Disposable income is adjusted for FISIM and changes in pension entitlements. Sources: ONS and Bank calculations.
(i) Total debt associated with owner-occupier mortgages divided by the four-quarter moving sum of gross disposable income of the UK household and non-profit sector. Disposable income is adjusted for FISIM and changes in pension entitlements. 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: ONS, UK Finance 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: HMRC, UK Finance 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 UK Finance switches source. Data prior to 2002 are at a quarterly frequency. Sources: UK Finance 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 UK Finance switches source. Data prior to 2002 are at a quarterly frequency. Sources: UK Finance 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 sum of gross disposable income of the UK household and non-profit sector per household as the denominator. 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, LSL Property Services plc and Bank calculations.
(r) The overall spread on residential mortgage lending 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. 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. FCA Product Sales Data includes regulated mortgage contracts only. Sources: Bank of England, Bloomberg, FCA Product Sales Data, UK Finance 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 gilts by the number of buy-to-let fixed-rate mortgage products offered at these maturities. Series starts in 2007. Sources: Bank of England, Bloomberg, 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.
GDP – gross domestic product.
HICP – harmonised index of consumer prices.
Libor – London interbank offered rate.
RPI – retail prices index.

Abbreviations

ACS – annual cyclical scenario.
BHPS – British Household Panel Survey.
BIS – Bank for International Settlements.
BofAML – Bank of America Merrill Lynch.
CCyB – countercyclical capital buffer.
CCP – central counterparty.
CET1 – common equity Tier 1.
CGFS – Committee on the Global Financial System.
CLO – collateralised loan obligation.
CPMI – Committee on Payments and Market Infrastructures.
CRD IV – Capital Requirements Directive.
CRE – commercial real estate.
CRR – Capital Requirements Regulation.
CVA – credit valuation adjustment.
DSR – debt-servicing ratio.
DTI – debt to income.
EBITDA – earnings before interest, tax, depreciation and amortisation.
ECB – European Central Bank.
EEA – European Economic Area.
ETF – exchange-traded fund.
EU – European Union.
FCA – Financial Conduct Authority.
FISIM – financial intermediation services indirectly measured.
FPC – Financial Policy Committee.
FSA – Financial Services Authority.
FSB – Financial Stability Board.
FTSE – Financial Times Stock Exchange.
G7 – Canada, France, Germany, Italy, Japan, the United Kingdom and the United States.
G20 – The Group of Twenty Finance Ministers and Central Bank Governors.
HMRC – Her Majesty's Revenue and Customs.
IFRS – International Financial Reporting Standard.
IM – initial margin.
IMF – International Monetary Fund.
IOSCO – International Organization of Securities Commissions.
IRB – internal ratings based.
ISDA – International Swaps and Derivatives Association.
LTI – loan to income.
LTV – loan to value.
MCOB – Mortgages and Home Finance: Conduct of Business sourcebook.
MFI – monetary financial institution.
MiFID – Markets in Financial Instruments Directive.
MREL – minimum requirement for own funds and eligible liabilities.
MSCI – Morgan Stanley Capital International Inc.
NBFI – non-bank financial institution.
NPISH – non-profit institutions serving households.
NPL – non-performing loan.
NSFR – Net Stable Funding Ratio.
ONS – Office for National Statistics.
OTC – over the counter.
PNFC – private non-financial corporation.
PRA – Prudential Regulation Authority.
PRC – Prudential Regulation Committee.
PTF – principal trading firm.
P2P – peer to peer.
RBS – Royal Bank of Scotland.
RoE – return on equity.
RWA – risk-weighted asset.
SIMM™ – Standard IM Model.
SME – small and medium-sized enterprise.
S&P – Standard & Poor's.
TR – trade repository.
WEO – IMF *World Economic Outlook*.

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