



BANK OF ENGLAND

October 2015

The Bank of England's approach to stress testing the UK banking system



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This approach document sets out the main features of the Bank's stress-testing framework to 2018.

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The Bank of England's approach to stress testing the UK banking system

Executive summary

In March 2013, the Financial Policy Committee (FPC) recommended that, 'looking to 2014 and beyond, the Bank and the Prudential Regulation Authority (PRA) should develop proposals for regular stress testing of the UK banking system. The purpose of those tests would be to assess the system's capital adequacy'.⁽¹⁾

A stress test examines the potential impact of a hypothetical adverse scenario on the health of the banking system and individual institutions within it. In doing so, stress tests allow policymakers to assess banks' resilience to a range of adverse shocks and ensure they are adequately capitalised, not just to withstand those shocks, but also to support the real economy if a stress does materialise.

Stress tests therefore contribute to the FPC's statutory objective to protect and enhance the stability of the UK financial system, and, subject to that, support the economic policy of the Government. Equally, they contribute to the PRA's general objective to promote the safety and soundness of the banks it regulates, and its secondary objective to facilitate effective competition in the markets for services provided by the banks it regulates.⁽²⁾

The concurrent stress test conducted by the Bank in 2014 and the ongoing 2015 test constitute important steps towards the development of a stress-testing framework in the United Kingdom.

This approach document sets out the main features of the Bank's stress-testing framework to 2018. This framework has been shaped both by lessons learnt during the 2014 and 2015 tests, and feedback to the 2013 Discussion Paper.⁽³⁾ Over the next three years, the Bank is aiming to:

- Develop an approach to stress testing that is explicitly countercyclical, with the severity of the test, and associated regulatory capital buffers, varying systematically with the state of the financial cycle.
- Improve the consistency between the concurrent stress test and the overall capital framework, including by ensuring that systemically important banks are held to higher standards.

- Enhance its own modelling capability, while ensuring that participating banks continue to play an important role in producing their own projections of the impact of the stress.

Key features of the Bank's approach

A concurrent stress test of banks will be run annually. Each year, there will be a scenario whose severity will reflect policymakers' assessment of the state of the financial cycle.

Every year, the Bank will design and run a scenario intended to assess the risks to the banking system emanating from the financial cycle — the 'annual cyclical scenario'.

The severity of this scenario will increase as risks build and decrease after those risks crystallise or abate. The scenario might therefore be most severe during a period of exuberance — for example, when credit and asset prices are growing rapidly and risk premia are compressed. That might well be the point when markets and financial institutions consider risks to be lowest. And severity will be lower when exuberance has corrected — often the time at which markets assess risks to be largest. In leaning against these tendencies, the stress-testing framework will lean against the cyclicity of risk taking: it will be countercyclical.

The Bank aims for the severity of this scenario to vary through time only with its assessment of the risks facing the banking system, both in the United Kingdom and globally. It should not vary because of a change in policymakers' tolerance of risk. In this way, the severity of the scenario will vary systematically. Markets and banks should, over time, be able to anticipate broad movements in the scenario. But its precise calibration will not be mechanical — it will reflect policymakers' judgements over the magnitude of prevailing imbalances.

The assessment of imbalances will be based on a wide range of indicators, both domestic and global. Policymakers will form a view of imbalances across a range of markets and sectors, for

(1) Unless otherwise stated, references to the Bank or Bank of England throughout this document include the PRA.

(2) Unless otherwise stated, references to 'banks' refers to all PRA-regulated banks, building societies and investment firms.

(3) For a summary of the feedback received on the 2013 Discussion Paper see www.bankofengland.co.uk/financialstability/fsc/Documents/discussionpaper1013feedback.pdf.

example: in property and asset prices, in the pricing of risk in financial markets, and in the level and growth rate of credit extended by the banking system. Many of these are captured by the FPC's 'core indicators'.⁽¹⁾ In general, these indicators will not all point to the same degree of risk at any point in time. Accordingly, some elements of the stress scenario may be more severe than others.

The results of this scenario will help inform the setting of countercyclical capital buffers by the FPC, as well as any additional individual bank capital buffers set by the PRA.

Every other year, there will be a second scenario to explore a wider range of risks that might threaten financial stability.

Every other year, the annual cyclical scenario will be complemented by an additional scenario intended to probe the resilience of the system to risks that may not be neatly linked to the financial cycle — the 'biennial exploratory scenario'.

This scenario will explore emerging or latent threats to financial stability. It will not be used to change the Bank's risk tolerance, but will aim to explore risks that are not captured by the annual cyclical scenario. For example, it could explore a set of structural macroeconomic developments that are unusual from a historical perspective, such as the persistent deflationary pressures that were a feature of the 2015 scenario. Or it could be used for a more detailed test of the asset quality of particular sectors, for example buy-to-let mortgages, or exposures to vulnerable countries or regions. Similar to the annual cyclical scenario, the severity of the biennial exploratory scenario will reflect policymakers' risk tolerance. But, while the annual cyclical scenario will be expected to evolve systematically with indicators of the financial cycle, the biennial exploratory scenario will vary in nature from exercise to exercise.

The Bank's intention to run the exploratory scenario biennially will ensure that the burden on participating banks remains reasonable and proportionate. In 2016, there will be a European Banking Authority (EBA) stress test, and the Bank will run the cyclical scenario only. In 2017, the Bank intends to run both the cyclical and exploratory scenarios for the first time. In 2018, the Bank intends to run the cyclical scenario only.

To further ensure proportionality, the Bank will select the participants in the exploratory scenario based on the nature of the scenario. Banks for which the scenario may be less relevant will not be asked to participate.

In addition to the concurrent stress tests, banks will continue to be expected to explore a range of scenarios as part of the Internal Capital Adequacy Assessment Process (ICAAP).⁽²⁾

An enhanced role for Bank of England modelling, with a focus on system-wide dynamics.

The final stress-test projections are informed by a range of models and analysis, including models developed by both participating banks and in-house by Bank of England staff. In the future, the Bank intends to enhance the role that its own models play in the stress test.

The Bank continues to believe that there is merit in requesting participating banks to model the impact of stress scenarios themselves. Doing so allows participants and regulators alike to gain an insight into the strengths and weaknesses of banks' models. And these insights should spur improvements in banks' risk management capabilities, which in turn will improve the quality of their stress testing, both within and outside of the concurrent stress-testing framework. At the same time, modelling performed by the Bank of England can act as an important cross-check on banks' own projections, and help ensure consistency in the overall results of the stress test. In order to realise these benefits, the Bank will develop its modelling capability further.

Moreover, the Bank plans to develop its capability to model system-wide dynamics, including amplification mechanisms and spillovers. Including these dynamics — which can magnify the effects of any initial stress — will better exploit the potential of a concurrent stress test to assess the resilience of the banking system. For example, in the recent financial crisis, uncertainty over the solvency of different banks led to strains in funding markets, which in turn impaired banks' ability to provide credit to households and businesses. The Bank is better placed than participants to coherently and consistently model such risks because it has the ability to view data and projections across participating banks.

An integrated framework for deliberations and decisions around the setting of capital buffers, supporting the overall capital framework.

The results of the annual cyclical and biennial exploratory scenarios, together with the results of the stress tests that banks conduct as part of the ICAAP, will provide the FPC and the PRA with a rich information set. This information, along with other indicators and analysis, will help the FPC and the PRA co-ordinate their policy responses to ensure that the banking system as a whole, and individual banks within it, have sufficient capital buffers to be able to withstand a future stress. They can do so by adjusting a range of regulatory capital buffers, including the UK countercyclical capital buffer

⁽¹⁾ Available at www.bankofengland.co.uk/financialstability/Pages/fpc/coreindicators.aspx.

⁽²⁾ See Chapter 3 of SS31/15 www.bankofengland.co.uk/pradocuments/publications/ss/2015/ss3115update.pdf.

(CCyB), sectoral capital requirements (SCRs) and the PRA buffer.⁽¹⁾

Should the FPC and the PRA decide to change capital buffers following the stress test, the FPC will move first. It will consider the case for adjusting system-wide capital buffers through a combination of the CCyB and SCRs. The PRA will then consider setting additional buffers for individual banks, taking into account any system-wide buffer that has already been set.

A clear and transparent framework for determining whether banks need to strengthen their capital positions, including a 'hurdle rate' framework that aligns with the overall capital framework.

As well as informing the appropriate size of regulatory capital buffers, the stress-test framework also examines whether a bank currently has enough capital resources. If it does not, it will have to take action to strengthen its capital position over an appropriate time frame.

A key determinant of the type of action that a bank will be required to take depends on where its capital ratio falls in the stress, relative to the level of capital that banks are expected to maintain even under the stress scenario. The latter is often referred to as the 'hurdle rate'.

In the 2015 stress test, the hurdle rate framework included a threshold set at 4.5% of risk-weighted assets (RWAs) to be met with common equity Tier 1 (CET1) capital and a 3% leverage ratio threshold to be met with Tier 1 capital (of which relevant additional Tier 1 instruments would be permitted to comprise up to 25%). There was a strong presumption of action if a bank's capital was projected to fall below these thresholds in the stress.

As the Bank made clear in 2014 and 2015, the stress test is not a mechanical pass/fail regime. For example, even if a bank did not breach the above thresholds, but breached any of its other minimum capital requirements in the stress, including those set specifically for that institution, it might be required to take action.

To improve the consistency between the concurrent stress test and the regulatory capital framework, the hurdle rate framework will evolve in two ways.

First, each bank will be expected to meet all of its minimum risk-based CET1 capital requirements in the stress scenario. These comprise both the internationally agreed minima ('Pillar 1') and additional requirements that are set by the PRA ('Pillar 2A'). Pillar 2A requirements are intended to correct for risks that are not captured (or not adequately captured) in Pillar 1, such as risks associated with banks' own pension

schemes. Given that, the Bank judges that Pillar 2A CET1 requirements should be treated in the same way as Pillar 1 CET1 requirements, and therefore be explicitly and transparently included in the hurdle rate. As in 2015, each bank will continue to be expected to meet its minimum leverage ratio requirements.

Second, consistent with the overall capital framework, systemically important banks will be held to higher standards. For example, Barclays, HSBC, RBS and Standard Chartered have been designated as global systemically important banks (G-SIBs), with associated G-SIB buffers ranging from 1% to 2.5% of CET1 capital.⁽²⁾ These buffers will start transitioning in from 2016. In order to be consistent with the internationally agreed desire to hold systemically important banks to higher standards, G-SIB buffers will also be included in the hurdle rate framework.

Including Pillar 2A CET1 capital requirements and buffers for systemically important banks in the hurdle rate framework will mean that there is no longer a common threshold across all banks. But the Bank judges that these developments are necessary to improve consistency between the hurdle rate and the UK capital framework.

The supervisory response to a breach of Pillar 1 and Pillar 2A CET1 requirements in the stress will be more intensive relative to a failure to meet systemic buffers. For banks that fall below their minimum Pillar 1 and Pillar 2A CET1 capital requirement in the stress, there will be a strong presumption of an intensive supervisory response to rebuild capital. Systemically important banks that fall into their systemic buffers, but not their minimum CET1 capital requirements, will still be expected to strengthen their capital positions.⁽³⁾ But the supervisory response will be less intensive across one or more dimensions, including the size, nature and timing of required remedial actions.

A transparent framework, supporting accountability and building confidence.

The Bank remains committed to the principle that the outcomes of, and analysis associated with, the annual stress tests should be made public. In 2015, and over the medium term, the Bank intends to continue to ensure that it publishes information to explain stress-test results effectively. This information set may change from test to test, as the risks being explored change, and as the stress-testing framework develops further.

(1) For more information see www.bankofengland.co.uk/financialstability/Documents/fpc/policystatement140113.pdf and www.bankofengland.co.uk/prd/Documents/publications/ps/2015/ps1715.pdf.
 (2) See www.bankofengland.co.uk/prd/Pages/crdiv/updates.aspx.
 (3) See Box 3 for more details on regulatory capital buffers.

A transparent stress-testing framework provides a device through which the Bank can be held accountable to Parliament, and the wider public. And transparency can bolster the credibility of the framework and associated policy interventions. This can, in turn, strengthen public and market confidence in the banking system (Bernanke (2013)).

A framework that includes all major UK banks and building societies.

The annual cyclical scenario will include all PRA-regulated banks and building societies with total retail deposits greater than £50 billion, whether on an individual or consolidated basis, at a bank's financial year end date. At present, this criterion would lead to the inclusion of Barclays plc, HSBC Holdings Group, Lloyds Banking Group, Nationwide Building Society, Royal Bank of Scotland Group, Santander UK plc and Standard Chartered Bank Group — the same set of banks included in the 2015 test.

Coverage of the biennial exploratory scenario is likely to be more flexible. Coverage may, for instance, be limited to a subset of these banks, depending upon the risks being explored.

In determining the coverage of its concurrent stress tests, the Bank has sought to achieve sufficient coverage of the UK banking sector to make the test useful for assessing systemic risks, without placing a disproportionate burden on participating institutions. For example, medium-sized UK lenders will not be included in the framework, and banks will only be included in a given biennial exploratory scenario if their exposures to the risks being explored are material.

The Bank does not intend to bring the UK investment banking subsidiaries of foreign-owned investment banks into the scope of its concurrent stress test at this time. Although some of these banks' subsidiaries are systemically important in the United Kingdom, they are inextricably linked to their wider groups and are often used to house only a narrow part of their groups' activities. The financial strength of these entities is reliant on the overall financial strength of the group. A stress test of the UK entity alone is therefore likely to be less informative than a group-level test, and in this respect, they differ from the UK retail and commercial banking subsidiaries of foreign-owned banks.

The Bank's supervisory approach to the UK investment banking subsidiaries of foreign-owned banks therefore focuses on working with their home regulators to assess the extent to which the parent group can support its UK operations in the event of a stress. The Bank also ensures that, in the event that the parent entity were to become stressed, plans are in place to resolve the UK entity in an orderly way.

In light of this supervisory approach, the Bank believes that a better picture of the risks faced by these inherently global banks can be obtained through co-operation and information sharing with their home regulators, including on group-level stress-test results. The Bank will keep its supervisory strategy and the inclusion of these entities in the test under regular review, and stands ready to include these entities if doing so would enhance UK financial stability.

The Bank believes there is merit in seeking to develop tools for stress testing the UK financial system as a whole, going beyond the core banking sector. The focus of this sort of test would be to explore the behaviour of the wider financial system in a stress — including the potential for disruptions to the provision of financial services to the real economy — rather than the resilience of individual institutions. Making this vision a reality will require further research to understand and model interactions between different parts of the financial system, improvements in data, and greater international co-operation to capture interconnections across the global financial system.

A framework that supports a continued improvement in banks' own risk management and capital planning capabilities.

A key objective of the stress-testing framework is to support a continued improvement in banks' own risk management and capital planning capabilities. As part of the annual stress test, the Bank conducts a rigorous review of participants' stress-testing practices. The findings of that qualitative review are then fed back to banks. The Bank expects participants to demonstrate sustained improvements in their capabilities over time, in particular in any areas of weakness identified in the qualitative review. If participants fall short of expectations in this area, the Bank may take action, including by using the findings of the qualitative review to inform the setting of capital buffers for individual banks.

Introduction

This document sets out the Bank of England's approach to stress testing the UK banking system over the coming years, focusing in particular on the period to 2018.

Background

A stress test examines the potential impact of a hypothetical adverse scenario on the health of the banking system and individual institutions within it. In doing so, stress tests allow policymakers to assess banks' resilience to a range of adverse shocks and ensure they are sufficiently capitalised, not just to withstand those shocks, but also to support the real economy in a potential future stress.

In March 2013, the FPC recommended that the Bank of England and PRA should develop proposals for regular stress testing of the UK banking system. As a first step towards fulfilling the FPC's recommendation, the Bank released a Discussion Paper in October 2013 setting out the main features of the proposed stress-testing framework.⁽¹⁾ That paper aimed to elicit feedback from interested parties to help inform FPC and PRA decisions over the ultimate design of the stress tests.

Feedback from the 2013 Discussion Paper was supportive of regular, concurrent UK stress testing.⁽²⁾ That feedback influenced the design of the Bank's first concurrent stress test, run in 2014. The Bank launched a second test in 2015, the results of which will be published on 1 December 2015. The stress scenarios associated with both these tests reflected the views of the FPC and PRA on some of the most important risks facing the UK banking sector.

The concurrent stress tests conducted thus far represent important steps in the development of the stress-testing framework envisaged by the Bank in the medium term. This approach document covers the development of that framework to 2018 and has been shaped by feedback to the 2013 Discussion Paper as well as lessons learned from the 2014 and (to date) 2015 tests. The framework aims to embody international best practice, as set out by the International Monetary Fund (IMF) for example.⁽³⁾

The purpose of stress testing

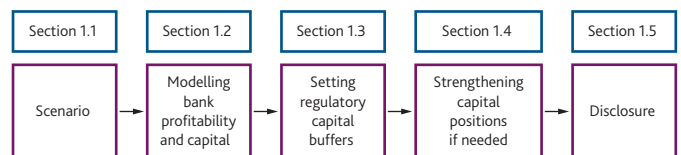
The purpose of the Bank of England's concurrent stress-testing framework remains broadly as stated in the 2013 Discussion Paper. The overarching aim is to support both the FPC and the PRA in meeting their statutory objectives (see Box 1) by providing a quantitative, forward-looking assessment of the capital adequacy of the UK banking system and individual banks within it. But stress testing is not solely about calculating estimates of bank capital in an adverse scenario. Rather, it represents a set of tools that allows policymakers to explore and better understand the vulnerabilities of the banking system. The stress-testing framework should therefore deliver a broad range of benefits:

- An integrated, regular process for decision-making around bank capital adequacy at both the system-wide and individual-institution level.
- A device through which the Bank can be held accountable to Parliament, and the wider public, against its financial stability objective.
- A strengthened supervisory approach, with a richer evidence base to inform supervisory judgements.
- Enhanced public confidence in the banking system.
- Improved risk and capital management practices within banks.

Organisation of this approach document

The focus of this document is on concurrent stress testing, which will continue to be complemented by stress tests carried out by individual banks as part of their ICAAP.⁽⁴⁾ The remainder of this document is arranged across three main parts. The first part covers the core elements of the UK stress-testing framework (**Figure 1**), including sections on: scenario design (Section 1.1); modelling bank profitability and capital in a stress (Section 1.2); using the results to set capital buffers (Section 1.3); determining whether banks need to take actions to strengthen their capital positions (Section 1.4); and the Bank's framework around the communication associated with stress testing (Section 1.5).

Figure 1 Core elements of a stress-testing framework



The second part details the implementation of the framework, including: coverage (Section 2.1); frequency of the stress tests (Section 2.2); timing of the annual cycle (Section 2.3); data collection (Section 2.4); and the qualitative assessment of banks' risk management and capital planning capabilities (Section 2.5). The final part of the document looks ahead, outlining the timeline for implementation of the framework (Section 3.1) and some future developments affecting the evolution of the stress-testing framework (Section 3.2).

(1) See Bank of England (2013), 'A framework for stress testing the UK banking system: a Discussion Paper', October; www.bankofengland.co.uk/financialstability/fsc/Documents/discussionpaper1013.pdf.
 (2) See Bank of England (2014), 'Summary of feedback received on the stress testing Discussion Paper', May; www.bankofengland.co.uk/financialstability/fsc/Documents/discussionpaper1013feedback.pdf.
 (3) See International Monetary Fund (2012), 'Macrofinancial stress testing — principles and practices'; www.imf.org/external/np/pp/eng/2012/082212.pdf.
 (4) See PRA Supervisory Statement SS31/15, 'The Internal Capital Adequacy Assessment Process (ICAAP) and the Supervisory Review and Evaluation Process (SREP)', July 2015; www.bankofengland.co.uk/pradocuments/publications/ss/2015/ss3115.pdf.

Box 1

The contribution of stress testing to the FPC's and the PRA's objectives

The overarching aim of the concurrent stress-testing framework is to support the FPC and the PRA in meeting their statutory objectives. This box describes how the developments to the Bank's approach to stress testing set out in this document will help to achieve this.

The contribution of stress testing to the FPC's objectives

The FPC's primary objective is to contribute to the Bank's financial stability objective to protect and enhance the stability of the UK financial system. Subject to that, the FPC's secondary objective is to support the economic policy of the Government.

How the stress-testing framework will contribute to the FPC's primary objective

The FPC's responsibility in relation to the Bank's financial stability objective relates primarily to the identification of, monitoring of, and taking action to remove or reduce systemic risks with a view to protecting and enhancing the resilience of the UK financial system.

The framework set out in this document will enhance the ability of stress testing to support each of the following aspects of the FPC's primary objective, which together serve to protect and enhance resilience:

- **Identifying risks:** The introduction of an annual cyclical scenario will create a device through which the FPC can assess risks emanating from the financial cycle. The biennial exploratory scenario will allow policymakers to assess the impact of risks stemming from a wide range of sources. Enhancements to the Bank's modelling capability should improve the information available to the Committee on the amplification and feedback mechanisms through which risks are likely to propagate at the system-wide level.
- **Monitoring risks:** The two common stress scenarios, as well as the baseline scenario, will provide quantitative benchmarks against which to monitor developments in the economy and financial system. The annual cyclical scenario will evolve systematically with policymakers' assessment of prevailing imbalances. Making that assessment each year to calibrate the scenario will ensure that policymakers monitor how risks associated with the financial cycle are developing over time.
- **Taking action to remove or reduce risks:** The stress-testing framework will equip the FPC with an evidence base and a

quantitative apparatus to inform policy interventions designed to mitigate systemic risks. The annual cyclical scenario will serve as an input into policy interventions designed to mitigate the build-up of cyclical risks, including setting the CCyB. And, by strengthening public confidence in the banking system, stress testing can directly contribute towards reducing systemic risk.

In addition, the Bank is investigating the longer-term possibility of stress testing the wider financial system and aiming to boost its capability to conduct quantitative system-wide analysis (see Box 5). This programme should support the Committee's intention to broaden its focus to consider resilience across the entire financial system, as encouraged in the July 2015 FPC Remit Letter.⁽¹⁾

How the stress-testing framework will contribute to the FPC's secondary objective

The Government's current economic policies are set out in the July 2015 FPC Remit Letter. The stress-testing framework set out in this document will help the FPC meet its responsibilities to support the Government's economic policies set out in that letter:

- **Facilitating the supply of finance for productive investment.** An important feature of the Bank's stress tests is that the banking system must maintain the supply of credit in the stress scenario. This feature is incorporated in the stress scenario, which specifies paths for aggregate bank lending to the UK real economy. And any proposed management actions that involve reductions in the supply of credit are generally not accepted by the Bank. This approach allows the FPC to assess how much capital the banking system needs to absorb losses in a stress without deleveraging and disrupting the supply of finance for productive investment. To the extent that the FPC sets the CCyB in response to the stress-test results, it will do so to maintain the likelihood that the banking system is able to sustain the supply of credit to the real economy in a stress.
- **Supporting competition and innovation in the financial services industry.** The framework has been carefully designed to ensure that the burden placed on banks by stress testing is proportionate and reasonable in order to support competition and innovation. For example, this consideration informed the decision not to expand coverage of the concurrent stress tests to capture medium-sized lenders.
- **Supporting the international competitiveness of the UK financial services industry.** The increasing use of stress tests internationally reflects their ability to strengthen

(1) Available at www.bankofengland.co.uk/financialstability/Pages/fpc/remit.aspx.

public confidence in the stability of the banking system. Having a credible stress-testing framework in the United Kingdom helps the UK banking system be internationally competitive, for example by supporting access to international funding markets. Improving consistency with the international capital framework by explicitly holding global systemically important banks to higher standards will also help to bolster confidence in the stability of these institutions.

Stress testing in the context of the objectives of the PRA

The PRA's objectives include:

- A general objective to promote the safety and soundness of the banks it regulates.⁽¹⁾
- A secondary objective to facilitate effective competition in the markets for services provided by the banks it regulates.

These objectives are advanced by the PRA using two key tools. First, through regulation, it sets the standards that it expects banks to meet. Second, through supervision, it assesses the risks that banks pose to the PRA's objectives and, where necessary, takes action to reduce them.

The PRA's approach to using regulation and supervision has three characteristics. It is:

- Judgement based. The PRA uses judgement in determining whether banks are safe and sound.
- Forward looking. The PRA assesses banks not just against current risks, but also against those that could plausibly arise in the future.
- Focused. The PRA focuses on those issues and those banks that pose the greatest risk to the stability of the UK financial system, and is committed to applying the principle of proportionality in its supervision of banks.

How the stress-testing framework will contribute to the PRA's general objective

The stress-testing framework supports the PRA's general objective by informing the PRA's judgements on the safety and soundness of individual banks. In general, stress testing provides a forward-looking assessment of banks' resilience to possible future stresses. By doing so, it helps the PRA assess the need for, and impact of, supervisory responses, taking into account any system-wide policy actions by the FPC. Stress testing also supports a qualitative review of banks' stress-testing practices, which in turn helps to drive improvements in banks' capital and risk management capabilities.

The developments to the framework set out in this document will improve the ability of stress testing to support the PRA further, in particular, through the introduction of a dual scenario approach. The annual cyclical scenario will provide the PRA with a comparable set of results across all of the major UK banks, so informing the PRA's assessment of the adequacy of individual banks' capital positions. By evolving from year to year in line with economic and financial developments, the scenario will also enable the PRA to understand how risks have evolved over time. At the same time, the introduction of the biennial exploratory scenario will provide flexibility to explore new and/or different risks that may be most relevant for a subset of banks only.

How the stress-testing framework will contribute to the PRA's secondary objective

While all banks gain from a credible regulatory framework, the PRA is committed to ensuring that the demands on banks remain proportionate. Proportionality is a key feature of the entire framework set out in this document. For example:

- The biennial frequency of the exploratory scenario limits the number of scenarios that banks will be required to run.
- Not including medium-sized UK lenders in the annual cyclical scenario, but instead exploring their vulnerabilities through ICAAPs reduces the burden that these banks face.
- Explicitly holding systemically important banks to higher standards by introducing systemic buffers into the hurdle rate is consistent with these banks posing a more material threat to financial stability.

(1) The Financial Services (Banking Reform) Act 2013 has amended the PRA's general safety and soundness objective to the effect that, when discharging its general functions in relation to ring-fencing (which takes effect from 2019), ring-fenced banks (RFBs) and groups containing RFBs, the PRA should seek to:

- ensure that the business of RFBs is carried on in a way that avoids any adverse effect on the continuity of the provision in the United Kingdom of core services (as defined in section 142C of the Financial Services and Markets Act);
- ensure that the business of RFBs is protected from risks (arising in the United Kingdom or elsewhere) that could adversely affect the continuity of the provision in the United Kingdom of core services; and
- minimise the risk that the failure of an RFB or of a member of an RFB's group could affect the continuity of the provision in the United Kingdom of core services.

1 The core elements of the stress-testing framework

1.1 Scenario design

An overarching principle underpinning the Bank's approach to stress testing is to explore a range of scenarios over time. Any single scenario is almost certain not to materialise. And it is not desirable from a regulatory perspective that the banking system as a whole is only assessed against a single 'bad state of the world'. Moreover, from a practical perspective, differences in banks' business models imply that scenarios that might be stressful for one bank might be much less so for another. To make the framework useful for policymakers, stress tests should explore different vulnerabilities and manifestations of possible future stresses.

So a central feature of the Bank's approach is the intention to run two types of stress scenarios that will be common across participating banks. The first type of scenario, an **annual cyclical scenario**, would be used to assess risks to the banking system associated with the state of the financial cycle. The second type of scenario, a **biennial exploratory scenario**, would probe the resilience of the system to risks that policymakers judge to be emerging threats to financial stability and individual banks, but may not be neatly linked to the financial cycle. Together, the two scenarios will provide a rich set of information about the banking system's vulnerabilities.

In addition, banks will continue to be expected to explore a range of scenarios as part of the ICAAP. These scenarios will continue to be designed by banks themselves to ensure their relevance to banks' own circumstances, business models, and the markets in which they operate.

Approach to the design of the annual cyclical scenario

The Bank of England's annual cyclical scenario will be calibrated to reflect policymakers' assessment of prevailing financial imbalances — the state of the financial cycle. The severity of this scenario will increase as risks build and decrease after those risks crystallise or abate. This systematic approach should mean that markets and banks will be better able to anticipate the broad shape and severity of the scenario over time. But the precise calibration will not be mechanical — it will reflect policymakers' judgements over the magnitude of prevailing imbalances.

The starting point for the calibration of the annual cyclical scenario will be a systematic review of a range of indicators. Policymakers will seek to assess the prevailing gap, or imbalance, between the current levels of indicators and their equilibrium or long-run levels. They will form a view of imbalances across a range of markets and sectors, for example: in property and other asset prices, in the pricing of risk in financial markets, and in the level and growth rate of credit extended by the banking system.

Policymakers will review the scale of potential imbalances in any one market or sector using a wide range of indicators. For example, in assessing any potential imbalance in the housing market, they would consider the level of house prices relative to trends, household incomes, estimates of rental yields and debt serviceability metrics. This exercise will be repeated across markets and sectors to build up a picture of whether, because of the potential for imbalances to unwind, the distribution of risks to which the banking system is exposed is particularly skewed.

This sort of approach featured — in part, at least — in the design of the 2014 and 2015 scenarios. For example, in 2014 the scenario incorporated a severe house price fall, in part reflecting the rapid increase in house prices that had been observed in the housing market over 2013. In the future, the Bank intends to develop a more systematic approach to determining the severity of the annual cyclical scenario from year to year. This development is in line with feedback received to the 2013 Discussion Paper in support of stress tests being calibrated to take account of prevailing economic and financial conditions.

This approach explicitly recognises that systemic risk depends, in part, on the state of the financial cycle, and, so, is time-varying. Box 2 sets out a stylised illustration of how the scenario would vary with the cycle. Importantly, the severity is likely to be greater in a boom, for example when growth in credit is rapid and asset prices unsustainably high. In such episodes, financial markets and institutions might believe that risks are low. That risk illusion may cause risk premia to be compressed, which in turn fuels further growth in credit and asset prices. The severity of the scenario will be greater in these circumstances. By leaning against these tendencies, the stress-testing framework will be countercyclical.

Box 2

The severity of the annual cyclical scenario

This box illustrates, in a highly stylised way, how the severity of the scenario will evolve with the financial cycle.

The series shown in **Figure A** represents the path of a variable, for example house prices, relative to its equilibrium over a stylised financial cycle. If policymakers judge that house prices are elevated relative to equilibrium, as shown by point A, then that might imply that the distribution of possible future changes in house prices is as represented by the blue profile in **Figure B**. Conditional on being elevated relative to equilibrium, as at point A, house prices are more likely than not to fall relative to the baseline scenario.⁽¹⁾

Figure A Severity of house price falls across the cycle

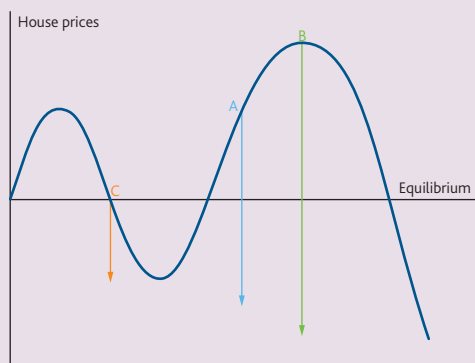
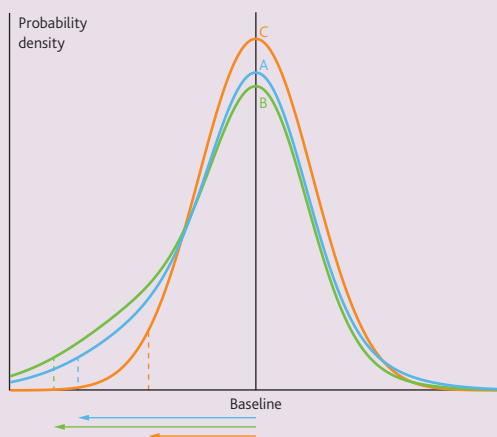


Figure B Conditional distributions of changes in expected house prices across the cycle



The severity of the fall in house prices in the scenario will be a product of both policymakers' assessment of the distribution of risks (blue line in **Figure B**) and their risk tolerance. If policymakers judge that the banking system should be able to withstand a tail event that represented the xth percentile of risks (blue dashed line in **Figure B**), then the scenario would involve the fall in house prices represented by the blue arrows in **Figure A** and **Figure B**.

If, from one year to the next, house prices increased further to point B, then the distribution of risks might have shifted to the green profile in **Figure B**. As house prices are now more elevated relative to equilibrium, the expected path of house prices is lower and the risk of a tail event is greater. Accordingly, the xth percentile of that distribution (green dashed line in **Figure B**) — and therefore the scenario — would involve a greater fall in house prices than the previous year (green arrows in **Figure A** and **Figure B**). That increased severity would reflect the change in the distribution of risks associated with the upturn in the financial cycle, for example, because prices are now further away from equilibrium. In addition, any overshoot may be larger. Crucially though, the change in severity would not reflect a change in policymakers' risk tolerance.

When indicators suggest that house prices are broadly at equilibrium (point C in **Figure A**), the distribution of risks may be more symmetric, like the orange profile in **Figure B**. Importantly, even when imbalances are not large, stress events will likely remain in the distribution of possible outcomes, as shown in **Figure B**. But the tail of the distribution is likely to be less 'fat', so the fall in house prices associated with the xth percentile of the distribution would be commensurately smaller (orange arrows in **Figure A** and **B**).

Of course, this is a highly stylised example and based only on a single variable to aid illustration. In practice, the scenario design process will involve an assessment of how prevailing imbalances might unwind across a range of sectors and markets. Policymakers will need to reach a view on whether identified imbalances across sectors are driven by common factors and whether risks are likely to be correlated.

There may be times, for example when imbalances are not especially large, or in a downturn, when policymakers might want to deviate from the stylised framework set out here. For example, they might wish to ensure that — even if the distribution of risks is not particularly skewed — the banking system is able to withstand a stress of a given magnitude.

⁽¹⁾ For a description of the baseline scenario see Section 1.1.

The annual cyclical scenario would have both domestic and global elements. The United Kingdom is a highly open economy with an internationally exposed banking system. Developments in the rest of the world are likely to have a sizable impact on the UK economy and financial sector through a range of channels. The annual cyclical scenario will, therefore, attempt to capture the unwinding of financial imbalances in relevant overseas economies, to the extent that they are likely to pose material risks to the UK banking sector.

As in the 2015 test, the annual cyclical scenario will include a traded risk and structured finance component. This traded risk stress will be linked, as far as possible, to the macroeconomic aspects of the annual cyclical scenario.

The results of this scenario will provide an assessment of the risks to the capital adequacy of the banking system associated with the financial cycle. Policymakers can respond to that assessment in a number of ways. In particular, they might consider whether the vulnerabilities of the system to the financial cycle warrant activating, or adjusting, system-wide or bank-specific capital buffers. The role of the annual cyclical scenario in setting capital buffers is discussed in more detail in Section 1.3.

Approach to the design of the biennial exploratory scenario

The biennial exploratory scenario will be designed to allow policymakers to probe the resilience of the banking system to a wider range of risks, with its focus changing over time. As the name suggests, it will be exploratory in nature, seeking to shed light on, and quantify the threat posed by particular risks.

The risks involved might therefore be unusual from a historical perspective, not least because future episodes of stress will almost certainly be different from those previously observed. The scenario will not change the Bank's risk tolerance, but the source of the stress will reflect policymakers' judgement over what they perceive to be the emerging or latent threats to financial stability or a group of participating banks.

An important feature of the exploratory scenario is that it will seek to assess the resilience of the system to different types of stresses over time, so the set of institutions covered by the exploratory stress test may vary (see Section 2.1). The nature of the risks that the banking system is exposed to is likely to alter over time as global macroeconomic and financial conditions evolve. In addition, from a practical perspective, the range of business models that exist among participating banks means just one type of scenario is unlikely to be able to produce a similarly challenging level of stress for all participating banks.

There is a wide range of salient risks that could pose a material threat to financial stability but may not be closely linked to the financial cycle. For example:

- Different cross-correlations in variables to those seen in the past or captured in the cyclical scenario — for example, a fall in nominal corporate profits that is unusually severe relative to the fall in real output.
- The implications of a single event or structural break, such as the default of a major sovereign or financial institution, or a change in policy regime. Such an event could impact the financial system in a number of ways, for example by causing a freeze in wholesale funding markets.
- The vulnerabilities associated with particular business lines or portfolios of assets held by banks.
- Structural changes that pose challenges for banks. For example, the 2015 stress scenario incorporated persistent deflationary pressures and further falls in short and long-term interest rates, both of which are, to some extent, unprecedented.

The results of this scenario will provide an assessment of how risks not captured in the annual cyclical scenario might threaten the capital adequacy of both individual institutions and the system as a whole.

The annual baseline scenario

As well as assessing the resilience of the banking system to stress scenarios, or tail risks, the Bank will continue to form a view of resilience under a central case — the 'baseline scenario'. The insights gained from the baseline scenario can inform judgements about the adequacy of banks' capital resources given current expectations about the state of the economy, and can be used to track performance from one year to the next. The baseline scenario also provides a benchmark against which to assess the performance of both individual banks and the system as a whole in the stress scenarios.

The Bank envisages that the baseline scenario will be produced using an approach similar to that adopted for the 2015 stress test. Bank staff will produce projections of key macroeconomic and financial variables. These will aim to be consistent with the MPC's central view of the UK economy, as communicated in the *Inflation Report*, and the IMF's latest outlook for the world economy.

Approach to the design of scenarios for bank-specific stress tests

In addition to any concurrent stress tests the largest banks participate in, all banks are already required to carry out a broad range of stress tests and scenario analyses relevant to

their business models as part of their ICAAP.⁽¹⁾ Relative to concurrent stress tests, greater responsibility for ICAAP stress tests lies with banks themselves, and the results are not made public. The scenarios should, therefore, be designed by banks to be relevant to their circumstances, business models, and the markets in which they operate.

Responsibility for ICAAP stress tests will remain with banks, who will continue to be expected to explore stresses to which they would be particularly exposed.⁽²⁾ As part of this process, banks should also consider running their own updates of earlier exploratory scenarios, where the key features of the scenario are relevant to their business models.

In addition, the Bank is conducting further work on how to assess the impact of the annual cyclical scenario on banks that do not participate in the concurrent stress test, including through their ICAAPs.

This approach ensures that bank capital requirements and supervisory actions are based on a comprehensive and wide-ranging assessment of the risks faced by individual banks while being proportionate and flexible.

1.2 Modelling bank profitability and capital in a stress

An important building block of the stress-testing framework is using analytical tools to translate macroeconomic and financial scenarios into quantitative projections of bank capital ratios. The remainder of this section outlines the Bank's analytical approach used to derive projections of bank profitability and capital ratios.

Principles underpinning the Bank's approach to deriving projections

The Bank's overall approach to analysing the impact of scenarios is underpinned by the following principles:

Stress-test results should not be the mechanical product of running any single model. The Bank recognises that all models are simplifications of reality, with both known and — perhaps more importantly — unknown weaknesses. The results of models are therefore a baseline against which judgement should be applied and are not 'the answer'.

Incorporating a plurality of analytical perspectives. Given the weaknesses of any individual model, the Bank intends to continue to ask banks themselves to model the impact of the stress as well as producing its own estimates of the impact of the stress, an approach supported by the feedback received on the 2013 Discussion Paper. Having recourse to a suite of models and analysis reduces the exposure of the overall stress-testing framework to excessive model risk (as noted by Bernanke (2013)). And it ensures that a range of different

perspectives — macroeconomic, financial, bank-specific and risk-specific — are incorporated in the analysis.

Understanding systemic feedbacks and amplifications mechanisms beyond those captured by the scenario.

Relatively small initial stresses can have large adverse effects on the profitability and capital position of the banking system as a whole in the presence of amplification mechanisms. Ignoring system-wide amplification channels can lead to a material underestimation of the risks facing the system.

As proposed in the 2013 Discussion Paper, Bank staff will seek to enhance the way in which various feedbacks and amplification mechanisms — for example between the banking system and the wider economy or between individual banks — are captured as part of the Bank's analysis. These can have a crucial bearing on system-wide resilience, as illustrated in the recent crisis when uncertainty over bank solvency led to strains in funding markets, which in turn impaired banks' ability to provide credit to households and businesses.

Ensuring consistency in projections across banks. While the Bank is keen to encourage a diverse range of modelling techniques among stress-test participants, a key benefit of the concurrent stress-testing framework is that it helps deliver a greater degree of consistency in policymakers' assessment of capital adequacy across institutions. The Bank's aim is to ensure that variation in final published stress-test results across banks reflect — to the largest extent possible — underlying differences between the risks that individual banks are taking rather than differences in the methodology used.

Learning about banks' likely responses to stress. A key principle of the Bank's approach to stress testing is to incorporate potential management actions that banks could realistically take in a stress. This requires bank management and their Boards to consider carefully how they might respond to different hypothetical stress scenarios. In turn, such information can be particularly useful to policymakers, especially if it reveals information around the impact of banks' collective responses on the economy and financial system. Publishing this information will help to improve market discipline, for example by allowing investors and counterparties to understand better the circumstances under

(1) See Chapter 12 of the PRA's Internal Capital Adequacy Assessment rules.

(2) Para 3.18 of SS31/15 states that 'Firms should consider the relevance of the PRA's stress scenario in the context of their business and specific risk drivers, and use this scenario as a starting point to build and calibrate their own scenarios'. For firms with particular business models, para 3.19 of SS31/15 states that 'all firms should continue to develop their own scenarios and ensure that these are as severe in relation to their business model as the concurrent stress testing scenario (for firms participating in concurrent stress testing) or the scenario published by the PRA (for all other firms)'. Para 9.17 of the Pillar 2 Statement of Policy states that 'The PRA may also ask firms to run additional sensitivity analyses, the purpose of which will be to explore the impact on portfolios and/or regions which are not covered in the common scenarios (the concurrent stress test or the PRA published scenarios as appropriate) or the firms' idiosyncratic scenarios. The results of these sensitivity tests may be used to adjust the impact of the firm's chosen scenarios or the common scenarios'.

which dividends might be restricted or contingent capital instruments converted into common equity.

Exploring uncertainties and sensitivities. All projections are subject to inherent uncertainties, but uncertainty is particularly pervasive when trying to project the impact of a 'tail-risk' scenario. This is one of the main motivations for the Bank's suite of models approach. The degree of uncertainty around the final projections, even conditional on a particular stress scenario, is an important policy consideration. A central element of the Bank's analytical approach will be to assess these uncertainties in order to support policymaker decisions. Sensitivity analysis will form one part of this work.

Analytical inputs to the Bank's final projections

To apply the principles for deriving the projections described above, the Bank intends to continue to draw information from a range of areas. In addition to the results submitted by banks, these sources are likely to include:

- insights from in-depth supervisory reviews of participants' balance sheets, including asset quality reviews;
- portfolio-level models of key books, such as residential mortgages or commercial real estate lending;
- sectoral risk assessment for important asset classes, for example, UK household and corporate balance sheets;
- analysis of projections from a macro-perspective to ensure that they remain consistent when aggregated up;
- analysis of historical trends, particularly during times of stress;
- in-house and external analysis of the macroeconomic and financial environment in foreign jurisdictions;
- findings from foreign regulators' stress tests (see Box 4); and
- insights from internal and external research, for example, on systemic feedbacks and amplification mechanisms.

Achieving a balance between banks' own stress results and in-house assessment

The above set of principles point towards an overall analytical approach in which both in-house models and banks' own models have an important role to play in informing the stress-test results.

For example, only banks will have information about their likely response to a hypothetical stress and only the Bank of England, using information about the whole system, can ensure comparability across banks, and capture the potential

impacts of feedbacks and amplification mechanisms that could operate in a stress.

An important strategic choice relates to the relative weight attached to projections and analysis conducted by Bank staff, relative to those produced by participating banks (Hirtle and Lehnert (2014)). Put differently, within the suite of models approach, should in-house analytical tools be used primarily to cross-check the outputs of banks' models? Or should the framework employ in-house models to produce independent projections that are expected to form the basis of the final stress-test results?

In this respect, the Bank's approach to deriving the results of its 2014 stress test was closer to the former, with banks' own submissions used as the starting point for the final projections. Bank staff assessed the modelling approaches of participating banks, focusing particularly on those portfolios that were most likely to be affected by the stress scenario. A range of models and analysis was used to inform judgements by Bank staff on where banks' submissions should be adjusted. But overall, the starting point for the output of the stress test was banks' own submissions.

The models used by participating banks will always play a key role in the Bank's stress-testing framework. But going forward, the Bank intends to develop its own capabilities further. In the medium term, the Bank aims to give its own in-house models more weight in producing stress-test results, at least for some parts of the balance sheet. This will allow Bank staff to improve the consistency of results across banks, explore the sensitivities and uncertainties of stress-test results in more depth, and guard against any incentive banks may have to underpredict losses. Over time, greater use of in-house models will facilitate a richer understanding of the drivers of differences in results from one year to the next. And it should increase the efficiency and scalability of the Bank's stress-testing process, potentially allowing the coverage of concurrent stress testing to be expanded at a lower cost. Moreover, it will allow the Bank to incorporate amplification and feedback mechanisms in a more meaningful way.

Priorities for model development at the Bank

The Bank's primary focus in model development will be on developing tools to explore system-wide dynamics. This is one area highlighted by the IMF as vital for giving stress tests a macroprudential perspective (Demekas (2015)). The Bank is well placed to add value in this area, because it is able to access projections across banks, and judge the feasibility of banks' proposed management actions in the context of broader market conditions. Net interest margin projections are an example of one area where a more holistic approach could add value, because broader market dynamics can have a significant impact on banks' ability to generate returns.

As the experience of the recent financial crisis demonstrated, understanding spillovers and feedback channels between financial institutions, and between the financial sector and the real economy are crucial to quantifying the likely impacts of financial stresses. Analysis of these channels is an important element of stress tests and will be an area of focus going forward. At present, however, modelling in this area remains in its infancy among researchers and policymakers.

The Bank's secondary priorities for model development are portfolio and loan-level models. These are typically asset-specific models that aim to capture the detail of specific business activities and asset types, for example mortgage loans. The Bank expects to prioritise model development on the basis of the materiality of the relevant portfolios and broader relevance to concurrent stress testing.

Greater use of counterparty or loan-level data would increase the Bank's ability to assess the impact of changing dynamics in the distribution of risks, which could potentially lead to non-linear outcomes in a stress. Loan-level data can also be useful in exploring risk that may not have been observed in historical data — at least at the macro level. For example, in the 2014 stress test, the scenario involved a very sharp fall in nominal house prices, leading to unprecedented levels of negative equity in the stress. In those circumstances, using counterparty-level or loan-level data may help draw lessons from subsamples of the loan population, to improve policymakers' understanding of how an unprecedented macroeconomic event could play out. This sort of granular data has the potential to enhance a broad range of risk assessment, of which stress testing is just one part. The Bank is therefore considering how to expand its capabilities in this area (see Section 2.4).⁽¹⁾

1.3 Setting capital buffers

The results of the stress test are used by the Bank to ensure that the banking system as a whole, and individual banks within it, have sufficient capital to absorb losses and maintain the supply of credit to the real economy in a stress.

There are two, related, steps in using stress-test results to inform policy action.

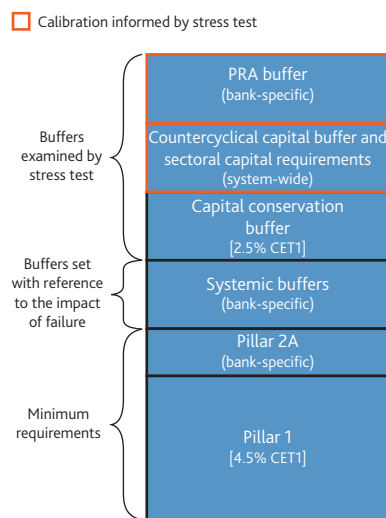
- First, the FPC and the PRA use the results of the stress test, alongside other inputs, to set the level of macro and microprudential regulatory capital buffers necessary to withstand a stress. This section describes that process.
- Second, the PRA uses the stress-test results to inform its determination of whether individual banks' current capital positions are adequate or need strengthening. Section 1.4 describes that process.

Stress tests and regulatory capital buffers

A regulatory capital buffer is the amount of capital that a bank needs to have over its minimum requirements (Box 3). In contrast to minimum requirements, which represent the amount of capital a bank is expected to maintain at all times, a regulatory buffer can be run down during stress. The existence of usable buffers allows banks to absorb losses without breaching minimum requirements, enabling them to maintain the supply of credit to the real economy in the face of adverse shocks.

Stress tests provide an estimate of the amount of capital banks might deplete in a hypothetical stress scenario. So they are well-suited to inform the calibration of capital buffers (Figure 2). More specifically, the stress-test results provide an assessment of whether the sum of the capital conservation buffer (CCoB), system-wide capital buffers (the CCyB and SCRs) and bank-specific capital buffers (the PRA buffer) is sufficient to absorb losses in a stress.⁽²⁾ Box 3 explains the purpose of these buffers in greater detail.

Figure 2 Capital buffers calibrated in response to stress-test results



Systemic buffers are designed to hold systemically important banks to higher capital standards. Their calibration reflects the more severe impact that failure of one of these banks is likely to have on the financial system and the wider economy. Stress tests are, therefore, not well-suited to examining the calibration of systemic buffers.

A key, but not the only, factor that helps determine whether regulatory capital buffers are sufficient to absorb losses in a stress is the projected fall in capital ratios in the stress. Policymakers compare this fall, at both the system-wide and

(1) In doing so the Bank will consider the impact of any associated data requests.
 (2) The prevailing CCyB rate at each bank will be a weighted average of the CCyB rates set in each country to which it is exposed.

individual-bank level, to the sum of the CCoB, the CCyB or SCRs (set by the FPC) and the PRA buffer (set by the PRA).⁽¹⁾

If that assessment demonstrates that these buffers are not appropriately calibrated to absorb the impact of the stress, the FPC and the PRA may act to adjust regulatory capital buffers. Conversely, if the assessment shows the current setting of regulatory capital buffers to be more than sufficient, the FPC and the PRA may act to reduce them.

System-wide resilience

If the results of the cyclical scenario suggest that the required capital buffer for the system as a whole should be adjusted, the FPC might act to adjust the UK CCyB rate.

From a practical perspective, there are several considerations that the FPC will want to take into account when using the stress-test results to guide the setting of the UK CCyB rate:

- First, the UK CCyB rate applies to banks' UK exposures, while the stress test applies to the entire balance sheet of participating banks. The FPC will therefore want to consider how much of the impact of the stress should be captured in the UK CCyB rate.
- Second, the losses incurred in the stress scenario will vary across banks but the UK CCyB rate applies across the banking system as a whole. The FPC will therefore have to consider the appropriate division of the results into system-wide, and bank-specific components.
- Third, the stress-test results will include the effects of items such as misconduct costs, which might not obviously relate to the UK financial cycle. The FPC might therefore wish to exclude the impact of some items when calibrating the UK CCyB rate.

These considerations mean that the FPC is likely to use the stress-test results as one input, alongside a range of other factors to inform — rather than mechanically determine — the setting of the UK CCyB rate.

In addition to using the stress-test results to consider whether or not to adjust the UK CCyB rate, there are a number of other actions the FPC may consider following a stress test to improve system-wide resilience. For example, the FPC has direction powers over SCRs, in particular for commercial and residential property exposures and financial sector exposures. If either the annual cyclical or biennial exploratory scenario shows the UK banking system to be particularly exposed to, or insufficiently capitalised against, risks emanating from one of these sectors, the FPC may decide to use its direction powers over SCRs to address these vulnerabilities.⁽²⁾

The resilience of individual banks

For some banks, their individual stress-test results might imply that the CCoB and the CCyB rate set for all banks is not consistent with the impact of the stress on them.

In that case, the PRA can increase regulatory capital buffers for individual banks further by adjusting their PRA buffers. The PRA buffer is an amount of capital that an individual bank should have, in addition to their minimum capital requirements and Capital Requirements Directive IV (CRD IV) buffers (which include the CCoB and CCyB, see Box 3), to cover losses that may arise under a stress scenario.⁽³⁾ This buffer is intended to capture material bank-specific risks, for example, higher sensitivity to cyclical risks than the sector as a whole.⁽⁴⁾

When setting PRA buffers, the PRA will consider results from the Bank's annual cyclical scenario, the Bank's biennial exploratory scenario, and any bank-specific scenarios undertaken as part of banks' ICAAPs together, as well as other relevant information. The weight attached to each will depend on the bank in question and the nature of the scenarios being tested that year. Where required, the Bank will consult with other European regulators through the Joint Risk Assessment and Decision process.

Co-ordinating policy

The framework set out in this document is designed to facilitate effective policy co-ordination between the FPC and PRA. With the FPC and PRA setting regulatory capital buffers for the system as a whole and individual banks respectively, it is important to develop a framework governing the interaction between the two policy committees and their instruments.

The key principle underpinning policy co-ordination is that, between them, the FPC and PRA set regulatory capital buffers so that both the banking system as a whole and individual banks within it are able to withstand the likely impact of a stress.

To operationalise the framework and avoid double counting, the FPC will move first. It will set the UK CCyB and any SCR rate after considering the impact of the stress on capital at the system-wide level, as described earlier. The PRA will then set PRA buffers for individual banks, taking into account the system-wide buffers that have already been set. When doing this, the PRA will take account of not just the CCyB rate on UK exposures, but also CCyB rates set by overseas regulators on foreign exposures.

(1) The FPC is responsible for setting the UK CCyB rate.

(2) For a more detailed exposition of the FPC's powers to supplement capital requirements see www.bankofengland.co.uk/financialstability/Documents/fpc/policystatement140113.pdf.

(3) For more details on CRD IV see www.ec.europa.eu/finance/bank/regcapital/legislation-in-force/index_en.htm.

(4) It may also include an additional buffer amount to cover risks posed where a bank's risk management and governance is assessed by the PRA to be significantly weak.

Figure 3 Calibration of regulatory capital buffers for an illustrative bank

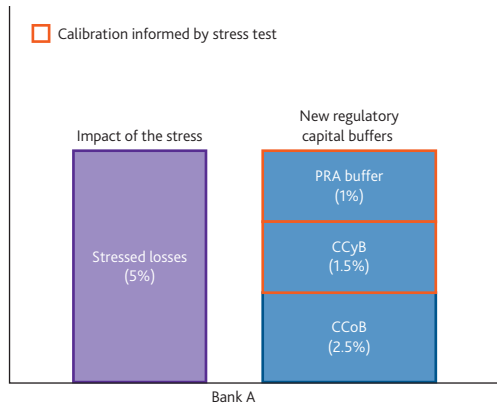


Figure 3 provides an illustrative example of how the results of the stress test would be used to calibrate regulatory capital buffers for a hypothetical UK-focused bank (Bank A). Assume that, before the test, the CCyB rate was set to zero and that Bank A was not subject to a PRA buffer. In the example, Bank A experiences peak losses in a stress equivalent to 5% of its risk-weighted assets.

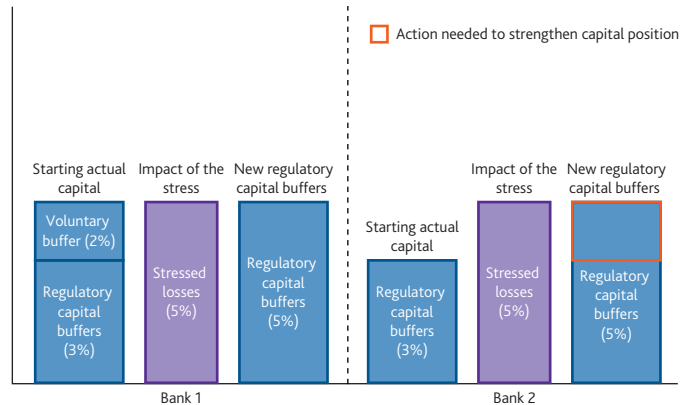
Suppose, in this example that, based on the system-wide results of the stress test, the FPC judges that an overall capital buffer against UK exposures of 4% is necessary to ensure system-wide resilience. It therefore sets a UK CCyB rate of 1.5% (4% less the 2.5% CCoB). But, for Bank A, the combination of the CCoB and the CCyB is not sufficient to absorb its projected losses in the stress. The PRA therefore sets a PRA buffer for Bank A of 1%. The combined total of the CCoB, the CCyB and the PRA buffer is then sufficient to absorb Bank A's projected losses in the stress.

1.4 Determining whether banks need to strengthen their capital positions

If the stress test reveals that a bank's existing regulatory capital buffers are not sufficient to absorb the impact of the stress, it is possible that it will need to take action to strengthen its capital position. This would not be the case for all banks. Some banks may — voluntarily — already have sufficient capital to absorb the impact of the stress. For example, the stressed losses (5%) of Bank 1 in Figure 4 exceed the sum of its regulatory capital buffers (3%). But since it already has sufficient capital to absorb the impact of the stress, Bank 1 is unlikely to be required to take remedial actions to strengthen its capital position following the stress test.

If a bank's stressed losses exceed the sum of its regulatory capital buffers and it does not have sufficient voluntary capital to be able to absorb an increase in its regulatory buffers, it will need to take action to improve its capital position. This is illustrated by Bank 2 in Figure 4, whose stressed losses exceed

Figure 4 Determining whether remedial actions are needed



the sum of its regulatory capital buffers. Bank 2's regulatory capital buffers can be expected to increase, and, since it does not have a voluntary capital buffer, it will need to take action to strengthen its capital position.

Determining the type of action required

The size, timing and nature of actions a bank is required to take to strengthen its capital position will depend on why the action is needed — in particular, the level to which its capital ratio falls in the stress test relative to the hurdle rate. The hurdle rate is the minimum level of capital that banks are expected to maintain in the stress scenario.

In the 2014 and 2015 stress tests, the hurdle rate framework consisted of:

- A strong presumption of action if, in the stress, a bank fell below key thresholds (4.5% CET1 capital ratio in both years, and, in 2015, 3% Tier 1 leverage ratio, of which up to 25% can be met with additional Tier 1 capital instruments).
- The possibility of action based on a range of other factors.

The FPC and the PRA will continue to set the hurdle rate at the outset of each year's stress test. Nevertheless, to improve the consistency between the concurrent stress test and the capital framework, the overall hurdle rate framework will evolve in two ways.

First, each bank will be expected to meet the entirety of its minimum CET1 capital requirements in the stress scenario. That will include Pillar 2A requirements that are set by the PRA to correct for risks not captured or not adequately captured in Pillar 1, such as those associated with banks' own pension schemes.

Second, consistent with the aim of the overall capital framework to hold systemically important banks to higher standards, buffers for systemically important banks will be included in the hurdle rate framework. These buffers will

be reflected in both risk-based capital and leverage (see Box 3).

The Bank acknowledges that these changes mean that there will no longer be a single CET1 capital ratio to which all banks are held. But, given that a bank's Pillar 2A requirement reflects risks that have either not been addressed or have only partially been addressed by Pillar 1, the Bank judges that Pillar 2A requirements should receive the same treatment as Pillar 1 requirements. Doing so is also more reflective of the likely supervisory response should a bank breach these requirements in practice.

Bringing buffers for systemically important banks into the hurdle rate framework is in line with the internationally agreed principle of holding these banks to higher standards. It also improves consistency between the hurdle rate framework for the stress test and the United Kingdom's bank capital framework.

Under the hurdle rate framework set out here, the type of action that a bank needs to take will depend on whether its current capital position is inadequate because in the stress scenario:

- It is projected to breach its minimum CET1 capital or leverage ratio requirements.
- It has sufficient capital to meet its minimum requirements, but is projected to fail to meet its systemic buffer(s), where applicable.
- It has sufficient CET1 capital to meet both its minimum requirements and systemic buffer(s), but is judged to be inadequately capitalised based on other factors.

Action in response to a projected breach of minimum CET1 capital and leverage ratio requirements

There is a strong presumption that the PRA would require a bank to take action if, at any point during the stress, a bank was projected to breach any of its minimum CET1 capital or leverage ratio requirements.

The minimum CET1 capital requirement will have two components: a common 4.5% (Pillar 1) requirement for all banks and an additional bank-specific add-on (Pillar 2A).⁽¹⁾ The PRA has consulted on rules imposing minimum leverage ratio requirements consisting of a 3% Tier 1 leverage requirement (of which up to 25% can be met with additional Tier 1 capital instruments).

Action in response to a projected failure to meet buffers for systemically important banks

If a bank is projected to fail to meet its systemic buffers, it will still be expected to strengthen its capital position over time.

But the supervisory response will be less intensive than if it was projected to breach its minimum capital requirements. This reflects the fact that the likely supervisory response to a failure to meet these buffers in practice would be less severe than for a failure to meet minimum requirements.

The intensity of the supervisory response could be varied across several dimensions, including the nature, size or timing of the required remedial actions. The intensity of the supervisory response would also take account of how fast and how far into the systemic buffers capital and/or leverage ratios were projected to fall.

Action in response to other factors

As is currently the case, banks not projected either to breach their minimum requirements or fail to meet their systemic buffers at any point during the stress may still be required to take action to strengthen their capital position.

For example, if the FPC judged the system as a whole required more capital and increased the UK CCyB rate, a bank less exposed to the cycle might still need to increase capital to meet the new buffer, even if it was projected to meet its minimum requirements and systemic buffers in the stress.

And there are a number of other factors the PRA takes into account when determining whether remedial actions are required for individual banks. For example, if a bank was projected to remain above its minimum CET1 capital requirements in the stress, but projected to fall below its minimum capital requirements under different definitions of capital, then the PRA might choose to take action.

1.5 Communication and disclosure

A key principle underpinning the concurrent stress-testing framework is that the public nature of the tests makes them better able to support the FPC and PRA's objectives. A transparent framework has three broad potential benefits. First, it can improve policymakers' decisions. Second, it can make the framework, and associated policy, more effective. Finally, it can enhance public accountability.

The Bank has several options for disclosure across the various components of its stress-testing framework (Figure 5). But, as discussed in the October 2013 Discussion Paper, and reflected in feedback to it, transparency has both benefits and potential drawbacks (Goldstein and Sapra (2013)).

In 2014, the Bank chose to disclose a significant amount of information about its first concurrent stress-test scenario. In part, this was in response to feedback on the

(1) The PRA recently updated its Pillar 2 framework. See www.bankofengland.co.uk/pradocuments/publications/ps/2015/ps1715.pdf.

Figure 5 Components of a stylised stress-testing framework



2013 Discussion Paper, which noted the value in providing a coherent narrative to accompany published stressed paths for specified variables. The Bank also disclosed a material volume of information about the impact of the stress on UK banks in aggregate. It published more limited information about the results of individual participating banks. Nevertheless, individual bank impairment charges on mortgage and commercial real estate lending, as well as individual low points

for bank CET1 ratios were included in the 2014 results document. The Bank also set out details of the system-wide hurdle rate, along with an outline of the policy actions taken. Subsequent to publication, the Bank received positive feedback on the level of disclosure from participating banks and external analysts.

In 2015 and over the medium term, the Bank intends to continue to disclose information in order to explain stress-test results. The precise set of information to be disclosed may vary from test to test, as the risks explored by the FPC and PRA via stress testing change. Disclosure of stress-test results is also very likely to evolve further over the medium term, to reflect the forthcoming changes to stress-test hurdle rates described in this approach document.

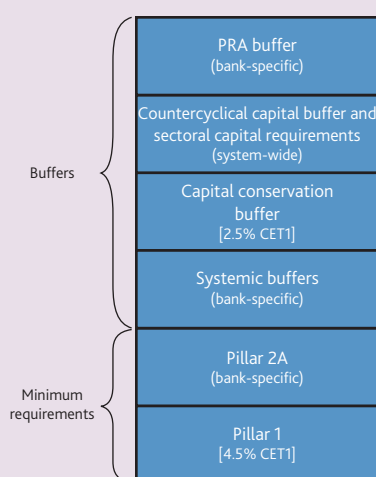
Box 3

Key elements of the capital framework relevant for stress testing

The Bank's concurrent stress tests complement the regulatory capital framework by providing a quantitative, forward-looking assessment of the capital adequacy of the UK banking system and individual institutions within it.

For all banks, building societies and designated investment firms, the PRA determines a minimum regulatory capital level and, on top of that, a buffer expressed in terms of the Basel and EU risk-weighted framework. It comprises three main parts: Pillar 1, Pillar 2A and the CRD IV and PRA buffers (Figure A). The PRA recently updated its approach for setting Pillar 2A and the PRA buffer, which will be implemented from 1 January 2016.⁽¹⁾ This box describes the key elements of the capital framework relevant for stress testing, and is consistent with this revised approach.

Figure A Components of the regulatory capital framework



Minimum requirements: Pillar 1 and Pillar 2A

Pillar 1 constitutes requirements to provide protection against credit, market and operational risk, for which banks follow internationally agreed methods of calculation and calibration. Banks are required to have:

- A minimum of CET1 capital equivalent to 4.5% of risk-weighted assets.⁽²⁾
- A minimum of Tier 1 capital equivalent to 6% of risk-weighted assets.
- A minimum of Tier 1 and Tier 2 capital together equivalent to 8% of risk-weighted assets.

Pillar 2A constitutes an amount of capital set by the PRA that a bank should have at all times, in addition to the capital it must have to comply with Pillar 1 under the Capital Requirements Regulation (CRR), in order to comply with the overall financial adequacy rule.⁽³⁾ A bank's Pillar 2A capital requirement reflects risks that have either not been addressed or have only partially been addressed by Pillar 1 under the CRR. Examples include interest rate risk in the banking book and risks associated with banks' own pension schemes.⁽⁴⁾

Consistent with the Pillar 1 capital proportions, at least 56% of an institution's Pillar 2A capital requirement should be met with CET1 capital, and at least 75% should be met with Tier 1 capital. Pillar 1 and 2A together constitute a bank's Individual Capital Guidance (ICG). ICG represents what the PRA regards as the minimum amount and quality of regulatory capital a bank should maintain at all times, to meet the overall financial adequacy rule in Internal Capital Adequacy Assessment 2.1. This rule is designed to ensure that there is no significant risk that a bank's liabilities cannot be met as they fall due.

CRD IV and PRA buffers

Under CRD IV, there are three capital buffers that banks are subject to:

- A buffer for systemically important banks, equivalent to up to 3.5% of risk-weighted assets.⁽⁵⁾ These buffers are calibrated to hold systemically important banks to higher capital adequacy standards, recognising the greater importance of such banks to financial stability. Buffers for global systemically important banks will be phased in in increments of 25% from 2016. Buffers for domestically systemically important banks will be implemented from 2019.
- A capital conservation buffer equivalent to 2.5% of risk-weighted assets. The purpose of this buffer, which is usable in a stress, is to ensure that banks build capital during more stable financial conditions that can then be used to absorb losses in a stress. This buffer will be phased in in increments of 25% from January 2016.
- A CCyB, set as a proportion of risk-weighted assets. The purpose of this buffer, which can be used, and may be

(1) Available at www.bankofengland.co.uk/pradocuments/publications/ps/2015/ps1715.pdf.

(2) The definitions of capital are set out in the PRA Rulebook.

(3) Stress testing and scenario analysis are set out in Chapter 12 of the Internal Capital Adequacy Assessment rules and in Chapter 3 of the supervisory statement, 'The Internal Capital Adequacy Assessment Process (ICAAP) and the Supervisory Review and Evaluation Process (SREP)'.

(4) Other examples of risks addressed under Pillar 2A can be found in PS17/15; www.bankofengland.co.uk/pradocuments/publications/ps/2015/ps1715.pdf.

(5) 3.5% is the maximum buffer that can be set for a global systemically important bank (G-SIB). For UK-based G-SIBs, the internationally agreed risk-weighted capital buffers for G-SIBs would currently range when implemented from 1% to 2.5%. For domestically systemically important banks and building societies, the maximum capital buffer that can be set is 3%.

released in a stress, is to offer additional protection against the build-up of systemic risk relating to the financial cycle. The FPC is responsible for setting the CCyB rate in the United Kingdom, which applies to UK exposures. For exposures to countries within the European Economic Area (EEA), CCyB rates are determined by the relevant national regulator. Under reciprocity arrangements in CRD IV, CCyB rates of up to 2.5% are mandatorily applied to UK banks' EEA exposures. Where the national regulator of another EEA country sets a CCyB rate greater than 2.5%, it is not mandatory to reciprocate for the excess above 2.5%, but the FPC expects ordinarily to reciprocate overseas authorities when CCyB rates above 2.5% are judged appropriate.⁽¹⁾ For exposures to countries outside the EEA, the FPC can set CCyB rates for UK banks that are higher than those chosen by the relevant overseas authority when, in its view, the risks to UK financial stability justify such action.

The PRA buffer is an amount of capital that banks should have, in addition to their Pillar 1 and 2A capital requirements, to allow banks to continue to meet the overall financial adequacy rule even in adverse circumstances. Its purpose is to increase banks' resilience to such adverse circumstances, in line with the PRA's risk appetite, so that banks can continue to meet their minimum capital requirements during a stress period. The PRA buffer is intended to provide extra resilience for banks facing material bank-specific risks, such as particular sensitivity to the financial cycle, relative to the sector as a whole.

The PRA carries out a PRA buffer assessment for all banks. This is informed by the concurrent stress-testing results for those banks participating in the exercise, as well as the results of each bank's own stress testing.

Where the PRA assesses an institution's risk management and governance to be significantly weak, it may also set the PRA buffer to cover the risks posed by those weaknesses until they are addressed. This will generally be calibrated in the form of a scalar applied to the amount of CET1 capital required to meet Pillar 1 plus Pillar 2A.

When setting the PRA buffer, the PRA takes account of the extent to which other CRD IV buffers already capture the risks identified in the PRA buffer assessment. Consistent with the requirement to meet CRD IV buffers entirely with CET1 capital, banks will be expected to meet their PRA buffer entirely in the form of CET1 capital.

Leverage ratio

In addition to the risk-weighted capital regime, banks will also be subject to a leverage ratio framework. The Government has provided the FPC with powers to direct the PRA to set UK-specific leverage ratio requirements and buffers.

On 1 July 2015 the FPC directed the PRA to implement a UK leverage ratio framework. The PRA published a consultation paper setting out how the PRA intends to achieve this. The proposed framework will comprise the following components:⁽²⁾⁽³⁾

- A minimum leverage ratio requirement that would apply to all UK banks and building societies with total retail deposits equal to or greater than £50 billion, whether on an individual or consolidated basis, with immediate effect.
- A supplementary leverage ratio buffer for systemically important banks, building societies and PRA-designated investment firms. This will be phased in alongside the capital buffer for global systemically important banks from 2016.
- A countercyclical leverage ratio buffer that would apply to all banks subject to the minimum requirement, with immediate effect. It is set in proportion to the CCyB set by the FPC.

The PRA has proposed to set the minimum leverage ratio requirement at 3% of a bank's total exposures. This requirement would need to be met in full with Tier 1 capital (of which at least 75% would need to be CET1). The PRA proposes to set the systemic and countercyclical leverage ratio buffers at 35% of their risk-weighted capital equivalents to be met entirely with CET1 capital.

(1) See www.bankofengland.co.uk/financialstability/Documents/fpc/policystatement140113.pdf.
 (2) *PRA Consultation Paper CP24/15*, 'Implementing a UK leverage ratio framework', July 2015; www.bankofengland.co.uk/pradocuments/publications/cp/2015/cp2415.pdf.
 (3) More details on the FPC's powers over leverage ratio tools can be found in the Policy Statement; www.bankofengland.co.uk/financialstability/Documents/fpc/policystatement010715ltr.pdf.

2 Implementing the framework

2.1 Coverage

The stress-testing framework outlined in this approach document will apply to those banks whose activities are judged to pose the greatest risks to UK financial stability. Importantly, it will not aim to cover all institutions in the financial system. Doing so would be very costly, to both the Bank and to participating banks, with small marginal benefits from policymakers' perspectives beyond a certain point. This section sets out the institutional perimeter of the framework.

Coverage of the annual cyclical scenario

The annual cyclical scenario will include all major UK banks with total retail deposits equal to, or greater than, £50 billion, on an individual or a consolidated basis, at a firm's financial year-end date.

The Bank considers that the £50 billion retail deposit threshold will identify a group of banks whose size and provision of critical financial services to the UK economy means that their failure could pose material threats to domestic financial stability.

At present, this group comprises Barclays plc, HSBC Holdings Group, Lloyds Banking Group, Nationwide Building Society, Royal Bank of Scotland Group, Santander UK plc and Standard Chartered Bank Group — the same set of banks as included in the 2015 stress test.

Between them, these banks account for over 80% of PRA-regulated banks' lending to the UK real economy. These banks also have a diverse range of business models and operate in a broad range of international markets. Including them in the concurrent stress test should therefore help to inform an assessment of the United Kingdom's vulnerability to risks emanating from other parts of the global financial system.

In the 2013 Discussion Paper, the Bank stated that it would consider the merits of including medium-sized UK banks in the stress-testing framework. At this juncture, the Bank does not intend to include these banks in the concurrent stress tests. This is on the grounds of proportionality, given their lower significance to overall UK financial stability and the balance of costs and benefits.

To the extent that small and medium-sized banks run the annual cyclical scenario as part of their ICAAP, the information

the FPC would receive on the results of these ICAAP reviews would support it in keeping the appropriateness of the UK CCB rate under review. Since small and medium-sized banks are already required to carry out these ICAAP stress tests, this should be a less costly way of extending the framework than requiring them to participate in the concurrent stress test.

Coverage of the biennial exploratory scenario

The coverage of the biennial exploratory scenario is likely to be more flexible than the annual cyclical scenario. Specifically, coverage may be limited to a subset of the banks participating in the annual cyclical scenario, depending on the focus of the scenario being explored. For example, an exploratory scenario focused largely on international risks facing the UK banking system may not involve some of the more domestically focused banks.

The Bank has considered the merits of including the UK investment banking subsidiaries of foreign-owned banks in its stress-testing framework. On one hand, these banks are systemically important for UK financial stability. Interlinkages between foreign investment banks and UK banks are large, particularly in secured funding and derivative markets. There could therefore be benefits to including them in the biennial exploratory scenario, which would bring the Bank of England into line with the practice of some other regulators, for example the Federal Reserve.

On the other hand, capturing only the UK operations of these inherently global banks is unlikely to reflect their full potential to contribute to systemic risk. The UK operations of these banks are inextricably linked to those of their wider groups and are often used to house only a narrow part of the groups' activities, such as their derivatives operations. The financial strength of these entities is reliant on the overall financial strength of the group. A stress test of the UK entity alone is therefore likely to be less informative than a group-level test. In this respect, they differ from the UK retail and commercial banking subsidiaries of foreign-owned banks.

The Bank's supervisory approach to the UK investment banking subsidiaries of foreign-owned banks therefore focuses on working with the home supervisory authorities of their groups to assess the extent to which the parent group can support its UK operations in the event of a stress. Forthcoming standards on total loss-absorbing capacity for global systemically important banks will enhance the

resilience of these parent groups. The Bank also ensures that, in the event that the parent entity were to become distressed, plans are in place to resolve the UK entity. Inclusion in the concurrent stress test would only assess the strength of the UK entity in isolation and would not assist with such resolution planning.

In light of this supervisory approach, the Bank judged that including these banks in the concurrent stress test would not, at present, bring material additional benefits. The Bank believes that a better picture of the risks faced by these inherently global banks can be obtained through co-operation and information sharing with their home regulators, including on group-level stress-test results. The intention not to include these banks is, therefore, predicated on the prospect of adequate and effective international co-operation and information sharing (Box 4), as well as the development of satisfactory resolution and wind-down strategies. The Bank will keep its position under review and stands ready to include these entities if it judges that doing so would be beneficial to the stability of the UK financial system.

The Bank intends to give participants in the biennial exploratory stress tests sufficient notice ahead of their inclusion in the process — six months at a minimum. This should help them to manage the operational issues associated with participation. Should the Bank decide to change its approach to participation in the concurrent stress-testing framework, new participants will be given at least twelve months' notice.

2.2 Frequency of stress tests

As set out in the 2013 Discussion Paper, the stress-testing framework aims to deliver a timely assessment of capital adequacy for individual institutions and the banking system as a whole. The nature and magnitude of the risks to which banks are exposed can vary significantly over time. As a result, long lags between tests are undesirable. The FPC and the PRA need to respond to potential threats to stability in a timely manner and the stress-testing framework will continue to be a key input into their forward-looking judgements.

Set against that premium on timeliness, stress testing at a very high frequency would entail material resource costs, both for banks and regulators. This would also be likely to compromise the quality of the exercise. For example, stress testing might be at risk of becoming an overly mechanical process, squeezing out innovative thinking around emerging risks or in-depth engagement by key decision-makers. And it would reduce the time banks have to explain and justify key judgements taken in their own modelling of the impact of the stress (see Section 1.2).

In balancing these different considerations, the Bank intends to run the cyclical scenario annually and the exploratory

scenario biennially. The more systematic and predictable nature of the cyclical scenario means that it is likely to evolve, rather than revolve, as the cycle develops. It is, therefore, likely to be less costly than the exploratory scenario and can be run more frequently. To ensure that the burden on banks remains reasonable and proportionate, the Bank intends to run the exploratory scenario, which is likely to be more costly, every other year.

The main risk associated with running the explanatory scenario biennially is that the FPC will have less scope to explore emerging systemic risks, and the PRA may have less up-to-date information on which to base its judgements on individual banks' capital adequacy. To mitigate this risk, the Bank will expect banks to run updates of earlier exploratory scenarios as part of their ICAAP, where the key features of the scenario are relevant to their business model. The Bank will also expect banks to continue to explore stresses to which they are particularly exposed through their ICAAPs.

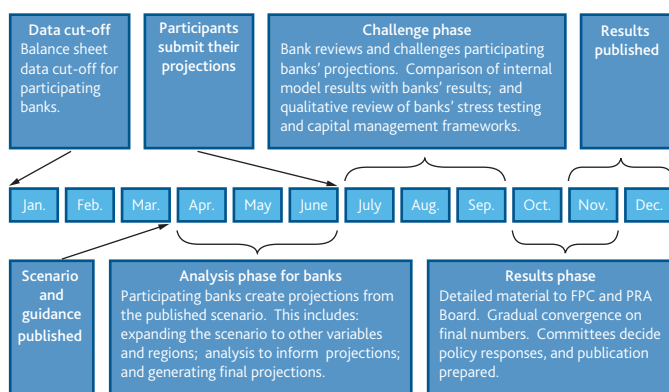
2.3 Timeline for the annual cycle

Many of the considerations around the appropriate frequency of stress testing — in particular, the need to ensure proportionality — also apply to the length of the annual cycle. In balancing those considerations, the Bank intends to maintain an eleven-month cycle for both scenarios, with:

- Participating banks' end-year accounts used as a data cut-off.
- Scenarios and guidance for participants published in March.
- Submissions from banks due in June.
- Results and policy decisions published in Q4.

This timeline is the same as that employed for both the 2014 and 2015 stress tests (**Figure 6**), which itself was informed by feedback to the 2013 Discussion Paper.

The Bank had previously indicated an intention to compress the stress-testing timetable to between six and seven months. But the experience of running the 2014 and 2015 tests revealed several advantages to having a longer timeline. In particular, an eleven-month cycle allows the use of year-end balance sheet data and supports greater senior engagement with stress testing within banks. A longer cycle also provides the Bank with greater opportunity to analyse and challenge banks' projections effectively. Improvements to the stress-testing capability of both the Bank and participating banks may present possibilities to shorten the cycle in the future. The Bank will therefore keep the stress-testing timetable under review.

Figure 6 Timeline for the Bank's stress tests

2.4 Data collection

Banks submit a large volume of data to the Bank as part of the concurrent stress-test process. Quantitative information is collected in a structured way through the Bank's Firm Data Submission Framework (FDSF), as well as via unstructured data requests. Participating banks also submit a large volume of qualitative information.

The data are used for a range of purposes, including as an input to the Bank's in-house models, which in turn facilitate peer comparison and allow the Bank to understand how participating banks have arrived at their own projections. Access to good-quality data is crucial to publishing accurate and credible stress-test results. The Bank has continued to invest in FDSF, which is a critical component of the stress-testing infrastructure.

The Bank recognises the burden that providing stress-testing data places on banks. The Bank is also mindful of the feedback from respondents to the 2013 Discussion Paper and the feedback it receives from banks on an ongoing basis.

The Bank is, therefore, developing a clear medium-term data strategy to improve the way it collects quantitative and qualitative stress-testing data. The Bank expects these improvements to help banks plan their investment in data infrastructure and internal quality assurance processes.

Improving the Bank's approach to collecting stress-testing data

A key feature of the Bank's strategy involves clearly defining a core set of stress-testing data. This will include both quantitative and qualitative information. The aim of defining a core set of stress-testing data is to draw a clear line around information that is critical for the Bank's stress-testing analysis and will be collected as part of every stress test. Changes to this set of core data will only be made following a period of consultation with participating banks. The Bank will also allow more time for banks to test and implement any changes to core data.

Establishing a core set of data will allow the Bank and participating banks to make a long-term investment in the infrastructure required to submit, collect and validate data. As a result, the degree of automation of the data collection and submission process should increase over time. The bar on data quality expected of participating banks will also be raised over time (in line with the Basel Committee on Banking Supervision 'Principles for effective risk data aggregation and risk reporting').⁽¹⁾

The Bank expects the set of core stress-testing data to expand gradually over time. This reflects the relative instability of some data definitions currently, as well as the ongoing evolution of some stress-testing processes. The Bank expects to work closely with banks in order for these data to make the transition to core data over time. The Bank also expects to discontinue requesting any data that it does not intend to classify as core.

In addition to the core data, the Bank will continue to make scenario-specific data requests as appropriate. This will vary, depending on the nature of the stress scenario being explored in a particular year. This information will give the Bank the flexibility to gain deeper insights into the way banks have taken account of specific features of the scenario in their projections. It will also allow the Bank to undertake deep dives into parts of banks' balance sheets that are likely to be particularly affected in a given scenario. As provision of core data becomes more automated over time, participants should have more time to provide scenario-specific data.

2.5 Qualitative assessment of banks' risk management and capital planning capabilities

The Bank believes that a key objective of the concurrent stress-testing framework is to support a continued improvement in banks' own risk management and capital planning capabilities (as set out by Tarullo (2014)). Strengthening banks' own stress-testing capabilities over time ensures that they are better placed to assess potential risks to their businesses, both as part of the concurrent stress test and beyond it. This should support the resilience of both individual institutions and the system as a whole.

Regulatory experience of banks' own stress-testing practices

The PRA, and previously the Financial Services Authority (FSA), has required banks to conduct stress tests for a number of years as part of its supervisory approach. Prior to the first concurrent stress test in 2014, banks' stress-testing practices had been improving. But there were several examples of banks falling short of supervisory expectations. Key areas of

(1) Available at www.bis.org/publ/bcbst239.pdf.

weakness included insufficient engagement by banks' Boards and senior management with the stress-testing process, insufficient integration of stress testing with banks' annual business planning process, stress-testing infrastructures that were not suitable for bank-wide stress testing, and difficulties in reconciling risk data with reported balance sheets and risk-weighted assets.

As part of the 2014 stress test, Bank staff undertook a qualitative review of banks' stress testing and capital planning frameworks. The industry-wide findings of that review were summarised in the 2014 stress-test results publication.⁽¹⁾ Overall, there were continued improvements in recent years. Still, the 2014 qualitative review identified considerable variation in capabilities across banks and highlighted a number of areas where stress testing and capital planning frameworks would need to be strengthened further.

The role of the qualitative review

As part of each concurrent stress test, the Bank will conduct a qualitative review. Examples of areas that might be covered by the review include, but are not limited to: the degree of engagement by banks' Boards and senior management, the policies and procedures around model management, banks' own models, the quality of data submissions, governance and controls around banks' stress-testing processes. Over time,

the Bank expects to undertake more detailed reviews on areas that have been identified as particularly weak in previous stress-testing exercises.

The Bank provides detailed feedback to participating banks over the findings of its qualitative review. And it expects to see clear improvements in banks' capabilities over time. The findings from the qualitative review influence the intensity of supervision of individual banks. And they can also have direct capital implications. For example, as set out in the recent Pillar 2 policy statement, the PRA may set a higher PRA buffer as a result of weaknesses in banks' stress-testing processes and the quality of their data, which can reduce confidence in banks' own stress-test results.⁽²⁾ The qualitative review also feeds into the Bank's broader assessment of participating banks' risk management and governance assessments for the purpose of setting the PRA buffer.

To help raise standards over time, the Bank will keep under review the case for providing further published guidance around its expectations in this area at some point in the future. The Bank will also consider the merits of publishing more details around its observations of good and bad practices in the areas of stress testing, risk management and capital planning across the industry.

(1) Available at www.bankofengland.co.uk/financialstability/Documents/fpc/results161214.pdf.

(2) As set out in Section 9 of 'The PRA's methodologies for setting Pillar 2 capital'; www.bankofengland.co.uk/pradocuments/publications/sop/2015/p2methodologies.pdf.

Box 4 International co-ordination around stress testing

Stress testing is becoming a core element of the regulatory toolkit internationally. Supervisory authorities in different jurisdictions are increasingly using stress tests to assess the capital adequacy of the banks that they regulate. And stress tests are also conducted by multilateral institutions, such as the EBA and the IMF. As a result, some banks — especially those with a large international footprint — are subject to multiple stress tests every year that can vary in approach.

Feedback to the 2013 Discussion Paper highlighted the resource costs of multiple stress tests to participating banks. And respondents also set out the benefits of greater co-ordination, for example, by making it easier for participating banks to develop group-wide technological stress-testing solutions.

From a policymaker's perspective, greater international co-ordination around stress testing has both benefits and costs. Greater co-ordination can facilitate more effective supervision of large, cross-border banking groups. And it can enhance the quality of stress tests, by ensuring that national supervisors share expertise on the risks run by banks in their own jurisdiction.

But seeking to co-ordinate stress-testing practices fully can also limit the discretion of national policymakers to explore the risks that they are particularly concerned with. And it could also reduce diversity in stress-testing practices internationally, which might have adverse consequences for system-wide resilience.

The balance of these costs and benefits varies across different elements of a stress-testing framework.

The Bank believes that greater co-ordination around some elements of the infrastructure that supports stress tests would, on balance, be beneficial. For example, agreeing common data definitions and seeking to align data templates, should reduce the cost to banks of supplying information to regulators. And, over time, it should also improve the quality of that information. The Bank has already taken steps in that direction, for example by sharing its own data templates with other regulators and exploring opportunities to align data templates in certain areas.

The Bank also sees significant benefits in greater information exchange over stress-test results between relevant regulators, under the terms of relevant Memoranda of Understanding. The Bank is open to sharing the results of its own stress tests

— and the key judgements that underpin those — with other regulators. And it will continue to engage with relevant national and international authorities to improve information exchange, especially for banks with a large international footprint. As set out in Section 2.1, the Bank's decision not to bring UK investment banking subsidiaries of foreign-owned banks into its concurrent stress-testing framework is predicated on the prospect of receiving adequate stress-test results and associated analysis from other regulatory authorities.

In terms of modelling and methodologies, the arguments are more nuanced. The Bank sees significant benefits in engaging with, and learning from, other regulatory authorities' approaches to modelling, especially as some areas of stress-test modelling remain in their early stages. On the other hand, the Bank's overall approach to stress testing seeks to ensure that a range of analytical perspectives inform stress-test results. Overall, the Bank sees merit in national authorities retaining a diverse set of methodologies and analytical approaches, rather than seeking to harmonise methodologies internationally.

In other areas, the benefits of greater international co-ordination are less compelling. One such area is scenario design. In a similar way that regulators seek to explore risks that are specific to individual banks, there is merit in exploring risks that are specific to a particular banking system. Seeking to co-ordinate the design of scenarios internationally could limit policymakers' ability to explore the risks that they judge pose the greatest threat to stability. The Bank will, however, continue to use other authorities' expertise when calibrating stress scenarios.

Another area where the Bank sees greater benefits from retaining national discretion is on the setting of the hurdle rate framework — which, in turn, relates to the policy actions taken in response to the stress tests. These policy actions are a matter of judgement for national policymakers, reflecting their individual mandates and remits.

Overall, the use of stress tests by national and multinational authorities is growing. But stress-testing approaches vary internationally. A number of authorities — including the Bank — are still developing or adapting their own frameworks, as experience with regulatory stress testing grows. The Bank will continue engaging with relevant authorities internationally to consider how the various initiatives around stress testing can be co-ordinated to minimise any unnecessary burden for banks. And it will seek to learn from the experience of others as it develops its own framework over time.

3 The road to 2018 and beyond

3.1 Timeline for next steps

This section outlines the Bank's broad operational plan for concurrent stress testing over the period to 2018.

2015: The Bank plans to publish the results of the 2015 stress test on 1 December 2015. As in 2014, these results will include a description of any associated policy actions taken at the individual-institution and system-wide levels.

2016: The Bank will run its annual cyclical stress test for the first time. The Bank will release the annual cyclical stress-test scenario in March 2016 and will only be making essential changes to its stress-testing data requests for the 2016 test. Results will be published in Q4. The EBA will also run its stress test of the European banking sector. To manage the resource burden placed on banks, there will be no biennial exploratory scenario in 2016 (**Table A**).

Table A Forthcoming stress tests

	Cyclical scenario	Exploratory scenario
2016	✓	✗
2017	✓	✓
2018	✓	✗

2017: The Bank intends to run its annual cyclical stress test and its biennial exploratory scenario side by side. Institutions required to participate in these exercises will be informed during 2016. Scenarios will be released by the end of Q1 and results will be published in Q4. The Bank intends to move to a new common data platform in 2017.

2018: The Bank intends to run its annual cyclical stress test only. Scenarios will be released by the end of Q1 and results will be published in Q4.

3.2 Future developments affecting the evolution of the stress-testing framework

This approach document outlines the development of the Bank's stress-testing framework over the next three years. Beyond that, the framework will continue to evolve to reflect other regulatory developments. Two important examples are structural reform to the banking sector, and the introduction of minimum requirements for own funds and eligible liabilities (MREL).

Structural reform to the banking sector resulting from regulation around ring-fencing is due to come into effect in 2019. This is likely to have an impact on the Bank's approach to stress testing, which at present focuses on the consolidated groups of the major UK banks. The Bank intends to provide updates on its approach to reflect prospective structural change as appropriate.

The Bank, as the UK resolution authority, is also responsible for setting MREL. The purpose of MREL is to ensure that banks have sufficient capacity to absorb losses in a resolution. MREL will apply to all UK banks, building societies and PRA-designated investment firms from 2016 onwards. The Bank plans to set out how it will treat MREL requirements in the concurrent stress test in due course.

The Bank is currently investigating the possibility of stress testing broader aspects of the financial system. Other important financial institutions, such as central counterparties (CCPs) may be brought into the scope of that programme. Box 5 discusses this issue in more detail.

Box 5

Stress testing the wider financial system

The use of stress testing as a tool has grown substantially since the crisis, both in the United Kingdom and in other countries. In the United Kingdom, the Bank has used stress tests to assess the resilience of the banking sector, the general insurance sector and the life insurance sector. Consideration is also being given to supervisory stress tests of other sectors, such as CCPs. In the European Union, stress tests have been used to assess the resilience of the banking sector and the insurance sector. The European Insurance and Occupational Pensions Authority (EIOPA) have also launched a stress test of Institutions for Occupational Retirement Provision (IORPs) in 2015.⁽¹⁾ The results of these stress tests have been key inputs into policy decisions for the institutions covered and the importance of these frameworks for macroprudential policy is growing.

The Bank believes that there is merit in seeking to develop tools for stress testing the UK financial system as a whole. This would be consistent with the FPC's responsibility to identify, monitor and take action in relation to financial stability risk across the UK financial system, including risks arising from beyond the core banking sector. Unlike the banking system stress test, its focus would not be on testing the resilience of individual firms. Rather, it would be to examine how the financial system behaves, and what this implies for systemic risk and the possibility of disruptions in the provision of financial services to the real economy.

The rest of this box outlines the objectives of establishing such a framework, what it could look like in practice and the steps the Bank plans to take to make the framework a reality.

Purpose of stress testing the wider financial system

The UK financial system is large, complex and interconnected. It is exposed to a wide range of risks that are both domestic and international in nature. When these risks crystallise, they can rapidly spread across the financial system. Interlinkages between different parts of the system can serve to amplify stresses, as demonstrated by the recent financial crisis.

Analysis of interlinkages between different parts of the financial system already takes place across the Bank. Applying stress-testing techniques has the potential to make that analysis more forward looking, systematic and coherent.

Quantitative, forward-looking analysis of how agents in the financial system could behave in a particular scenario or a set of scenarios could contribute to an improved understanding of how stresses can propagate through the financial system and thus create systemic risk. It could also provide more

information about the distribution of risk across the system. This could be particularly important for financial stability, given the growth in the role of the non-bank financial sector in managing financial assets and credit provision in recent years.

Types of interlinkages a system-wide stress test could explore

A stress test of the wider financial system could explore both direct links (via financial contracts) and indirect links (via agents' behaviour) that have the potential to create negative externalities.

Financial transactions create direct links between financial institutions. Derivatives are one example of such transactions. The intra-financial system exposures that they create can be complex and opaque, with the potential to threaten financial stability. For example, derivatives referencing real estate assets exacerbated the initial shock of the 2008–09 financial crisis and contributed to a rise in uncertainty about the distribution of risks across the system.

Direct links between different parts of the financial system also create dependencies, which can increase vulnerabilities in a stress. One example of such a dependency is the reliance of the core banking sector on funding from other parts of the financial system. In the recent crisis, stresses to other parts of the financial system affected their willingness, or ability, to provide funding and exacerbated the liquidity squeeze on the core banking sector.

The behaviour of agents in a stress may also create macro-financial externalities. So, even in the absence of direct links, such behaviour could propagate shocks across the financial system. The IMF, for example, has highlighted benchmarking by investment funds as one such behaviour.⁽²⁾ Evaluation relative to average performance, reinforced by investors' ability to exit funds quickly, can incentivise fund managers to mimic the behaviour of peers. This behaviour, known as 'herding' can create incentives for fund managers to sell assets in a stress, which may have the potential to create negative externalities for other areas of the financial system.

Potential scope of a stress test of the wider system

Given the purpose of a stress test of the wider financial system and the types of interlinkages the Bank wants to explore, examples of the sectors that could be covered, in addition to the core banking sector, include:

- **Asset management firms and investment funds.** These firms provide credit to the real economy and the financial

(1) See <https://eiopa.europa.eu/Pages/News/EIOPA-launches-pensions-stress-test-and-quantitative-assessment-on-solvency-for-occupational-pension-funds.aspx>.

(2) See Chapter 3 of the IMF's April 2015 *Global Financial Stability Report*; www.imf.org/External/Pubs/FT/GFSR/2015/01/pdf/text.pdf.

system, including through holdings of corporate bonds, bank debt and government debt. They also play an important role in securities lending, repo and derivative markets. Their strategy for managing liquidity in stressed conditions could have important consequences for the overall level of market liquidity.

- **Hedge funds.** Hedge funds frequently trade in financial markets and thereby support secondary market liquidity and price discovery. They are also interconnected to banks via repo transactions, margin loans and through derivatives contracts.
- **Foreign investment banks.** They play an important role in UK and global financial markets and have large connections to the core UK banking sector. A change in their behaviour, for example, an abrupt and disorderly wind-down of their trading books, would likely have a significant impact across the UK financial system.
- **Insurance companies and pension funds (ICPFs).** Collectively, they are important investors in a range of financial instruments. A change in their willingness or ability to hold these assets could exacerbate the fall in the price of these assets in a stress scenario. This, in turn, would have an impact on the value of these assets held by other parts of the financial system.
- **Central counterparties (CCPs).** Their importance has grown significantly since the crisis, in part by design. Greater use of collateral to mitigate exposures gives rise to the potential for procyclicality of margin requirements in a stress scenario. This could exacerbate liquidity pressures in some financial sectors.

Developing the Bank's capability for a stress test of the wider financial system

A stress test of the wider financial system would require substantially enhancing the Bank's capabilities in a number of areas, in particular modelling and data. Doing so requires long-term investment and, crucially, research.

Models of interactions between some parts of the financial system exist in the literature and some have been developed by the Bank. However, these types of models are in their infancy and are not readily adaptable for use in a forward-looking stress-testing context. Having well-founded models will be vital to undertake this type of analysis and to achieve the Bank's long-term aim of using this analysis to inform policy.

A big part of the Bank's efforts will therefore be focused on developing its internal modelling capability. The Bank has already taken the first step in this direction by incorporating

this area into its research agenda. The Bank will also be actively considering which existing models may be adapted for use in this context.

However, models need good data and there are big gaps in the data on interlinkages between different parts of the financial system and common exposures across the financial system. The lack of data makes it difficult to build up a point-in-time picture of the interlinkages between different parts of the financial system and calibrate quantitative models. The Bank will therefore be considering the data needs for this project and how they can be fulfilled. Some existing Bank data initiatives, such as the Flow of Funds project should complement this.⁽¹⁾

A full understanding of the impact of a stress scenario on the UK financial system requires not just good models and data for the United Kingdom, but an understanding of the behaviour of agents across the global financial system. In order to build up such an understanding, and in line with the feedback received by the Bank following the October 2013 Discussion Paper, the Bank plans to co-operate with regulators across other jurisdictions to consider ways of extending this framework to include other financial systems.

(1) For more details see www.bankofengland.co.uk/statistics/Documents/articles/2015/4jun.pdf.

References

- Bank of England (2013)**, 'A framework for stress testing the UK banking system: a Discussion Paper', available at www.bankofengland.co.uk/financialstability/fsc/Documents/discussionpaper1013.pdf.
- Bank of England (2014a)**, 'The Financial Policy Committee's powers to supplement capital requirements: a Policy Statement', available at www.bankofengland.co.uk/financialstability/Documents/fpc/policystatement140113.pdf.
- Bank of England (2014b)**, 'Summary of feedback received on the stress testing Discussion Paper', available at www.bankofengland.co.uk/financialstability/fsc/Documents/discussionpaper1013feedback.pdf.
- Bank of England (2014c)**, 'Stress testing the UK banking system: 2014 results', available at www.bankofengland.co.uk/financialstability/Documents/fpc/results161214.pdf.
- Bank of England (2015a)**, 'The Internal Capital Adequacy Assessment Process (ICAAP) and the Supervisory Review and Evaluation Process (SREP)', *Prudential Regulation Authority Supervisory Statement SS31/15*, available at www.bankofengland.co.uk/prd/Documents/publications/ss/2015/ss3115update.pdf.
- Bank of England (2015b)**, 'Assessing capital adequacy under Pillar 2', *Prudential Regulation Authority Policy Statement PS17/15*, available at www.bankofengland.co.uk/prd/Documents/publications/ps/2015/ps1715.pdf.
- Bank of England (2015c)**, 'The PRA's methodologies for setting Pillar 2 capital', *Prudential Regulation Authority Statement of Policy*, available at www.bankofengland.co.uk/prd/Documents/publications/sop/2015/p2methodologies.pdf.
- Bank of England (2015d)**, 'Assessing capital adequacy under Pillar 2', *Prudential Regulation Authority Consultation Paper CP1/15*, available at www.bankofengland.co.uk/prd/Documents/publications/cp/2015/pillar2/cp115.pdf.
- Bank of England (2015e)**, 'Implementing a UK leverage ratio framework', *Prudential Regulation Authority Consultation Paper CP24/15*, available at www.bankofengland.co.uk/prd/Documents/publications/cp/2015/cp2415.pdf.
- Bank of England (2015f)**, 'The Financial Policy Committee's powers over leverage ratio tools: a draft Policy Statement', available at www.bankofengland.co.uk/financialstability/Documents/fpc/policystatement040215lrt.pdf.
- Basel Committee on Banking Supervision (2013)**, 'Principles for effective risk data aggregation and risk reporting', available at www.bis.org/publ/bcbs239.pdf.
- Bernanke, B (2013)**, 'Stress testing banks: what have we learned?', available at www.federalreserve.gov/newsevents/speech/bernanke20130408a.pdf.
- Demekas, D G (2015)**, 'Designing effective macroprudential stress tests: progress so far and the way forward', *IMF Working Paper No. WP/15/146*, available at www.imf.org/external/pubs/ft/wp/2015/wp15146.pdf.
- Goldstein, I and Sapra, H (2013)**, 'Should banks' stress test results be disclosed? An analysis of the costs and benefits', *Foundations and Trends in Finance*, Vol. 8, pages 1–54.
- Hirtle, B and Lehnert, A (2014)**, 'Supervisory stress tests', *Federal Reserve Bank of New York Staff Reports No. 696*, available at www.newyorkfed.org/research/staff_reports/sr696.pdf.
- International Monetary Fund (2012)**, 'Macrofinancial stress testing — principles and practices', available at www.imf.org/external/np/pp/eng/2012/082212.pdf.
- International Monetary Fund (2015)**, *Global Financial Stability Report*, April 2015, available at www.imf.org/External/Pubs/FT/GFSR/2015/01/pdf/text.pdf.
- Tarullo, D K (2014)**, 'Stress testing after five years', available at www.federalreserve.gov/newsevents/speech/tarullo20140625a.htm.

Glossary

CCoB – capital conservation buffer.
CCyB – countercyclical capital buffer.
CCPs – central counterparties.
CET1 – common equity Tier 1.
CRD IV – Capital Requirements Directive IV.
CRR – Capital Requirements Regulation.
EBA – European Banking Authority.
EEA – European Economic Area.
EIOPA – European Insurance and Occupational Pensions Authority.
FDSF – Firm Data Submission Framework.
FPC – Financial Policy Committee.
FSA – Financial Services Authority.
FSB – Financial Stability Board.
G-SIBs – global systemically important banks.
ICAAP – Internal Capital Adequacy Assessment Process.
ICG – Individual Capital Guidance.
ICPFs – insurance companies and pension funds.
IMF – International Monetary Fund.
IORPs – Institutions for Occupational Retirement Provision.
MREL – minimum requirements for own funds and eligible liabilities.
PRA – Prudential Regulation Authority.
RFBs – ring-fenced banks.
RWAs – risk-weighted assets.
SCRs – sectoral capital requirements.