

Evaluation of the Bank of England's approach to concurrent stress testing

April 2019



BANK OF ENGLAND





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Independent Evaluation Office, Bank of England

Foreword from the Chair of Court

Since the financial crisis, stress testing has rapidly evolved and grown in importance for central banks and financial regulators. It is recognised globally as a core financial stability tool.⁽¹⁾ The UK is no exception. Concurrent — or simultaneous — stress testing of the banking system was first conducted in 2014 and since then it has become the primary way in which the Bank assesses the health of the banking system collectively and the main institutions within it individually. It is also used as input into the setting of both macro and microprudential capital requirements. This bringing together of macro and microprudential objectives was novel and ambitious when set out by the Bank in 2015, and remains so today.

Given the importance of the exercise for the Bank's financial stability objective, Court commissioned the Independent Evaluation Office (IEO) to assess whether the aims of the current approach have been achieved. The IEO was also asked to consider how well the framework was meeting policymakers' continuing needs, mindful that the Bank intends to update its approach later this year. The IEO's findings are disclosed in this report.

The report shows that concurrent stress testing is delivering value to policymakers, participating firms and the industry more broadly. It serves both FPC and PRC needs by providing insights into risks affecting the system as a whole and a common and comprehensive scenario to compare firms against one another. This allows policymaking to be well integrated and well evidenced, which in turn supports significant credibility and accountability benefits. The openness of the exercise also serves to reinforce confidence in the resilience of the banking system. That has proven particularly useful recently, as the tests have, among other things, allowed the Bank to communicate its views of the resilience of the banking system under various Brexit scenarios.

The IEO's recommendations fall under three themes. The first paves the way for more value to be extracted from this resource-intensive exercise, through suggestions to advance macro and microprudential objectives. The second theme provides insight to guide the Bank in enhancing delivery further, building efficiency and effectiveness. The final theme reflects on the challenges associated with communicating stress test outcomes. Here, the IEO makes recommendations for ensuring that internal, public, and bilateral firm communications all support stress testing objectives to the fullest extent possible. Although, as for any IEO evaluation, the recommendations are directed at the Bank, they should also promote a more efficient and valuable exercise for the firms involved.

At our 8 April 2019 meeting, Court welcomed the Bank's commitment in taking forward these recommendations. We look forward to the Bank's updated approach to stress testing later this year, and will monitor the implementation of these recommendations as part of the IEO's follow-up framework.

Brad Fried, Chair of Court
April 2019

The Bank of England's Independent Evaluation Office can be contacted at independentevaluation@bankofengland.co.uk

(1) See Basel Committee on Banking Supervision (2018).

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Executive summary

In February 2018, the Bank of England's Court of Directors (the Bank's board) commissioned its Independent Evaluation Office (IEO) to conduct an evaluation of the effectiveness of the Bank's approach to concurrent stress testing. Court considered that an IEO evaluation at this juncture was appropriate, particularly as the Bank was planning to review and update its approach to stress testing in 2019. This report sets out our findings and recommendations.

Following external consultation and lessons learned from the first concurrent stress tests in 2014 and 2015, the Bank set out details of a revised approach in 2015.⁽¹⁾ This included the adoption of an explicitly countercyclical annual scenario — known as the annual cyclical scenario (ACS), and an additional scenario, conducted every other year, to probe the resilience of the system to risks not neatly linked to the financial cycle — known as the biennial exploratory scenario (BES).

By specifically embedding countercyclicality into the test, the approach was both novel and world leading. It was also ambitious: in objective — where the framework was designed to advance the Bank's macro and microprudential objectives across several dimensions — serving both the Financial Policy Committee (FPC) and the Prudential Regulatory Committee (PRC); as well as in delivery — where the Bank had the challenge of building processes and infrastructure to generate stress-test results. The IEO was tasked with assessing: how well the aims of the approach have been achieved; how far the agenda had progressed relative to expectations; and the effectiveness of delivery. In light of the update to the approach we also specifically considered how well the framework was meeting policymakers' continued needs.

Our evaluation has found good evidence that the approach successfully delivers on its principal objective: to provide a forward-looking assessment of banks' resilience and, linked to that, an orderly and repeatable process for policy Committees to inform the setting of firm and system-wide capital requirements. Since the framework has been introduced, the stress tests have allowed the Bank to judge transparently and in some cases demonstrate the need for banks to strengthen their capital positions, in a systematic even-handed way without provoking market disruption. They have therefore played an important role in the recovery of the financial sector post crisis. The tests have continued to provide value more recently, for example, helping the Bank judge and communicate the resilience of the banking sector to shocks associated with a disorderly Brexit.⁽²⁾ The framework is also valued by the participating firms and the industry more broadly.

The stress-testing framework is still maturing. And from that vantage point we saw some opportunities for refinement, a view also confirmed in our external outreach. Our recommendations fall into three main themes: advancing macro and microprudential outcomes; delivering the stress tests more effectively; and communicating the outcomes of the stress tests appropriately.

On **advancing macro and microprudential objectives** we found clear evidence of the framework providing value to both sets of policymakers and of its growing importance in the policy-making process. The macrofinancial coherence of the ACS has allowed FPC members to gain insights into risks affecting the system as a whole and make judgements about the countercyclical capital buffer (CCyB), while a common scenario has given the PRC a base to judge and compare how individual firms fare under a severe and relevant stress. By construction, the ACS provides one lens on the risks banks face. And although the evaluation did not uncover evidence of missing risks compatible with the ACS framework, in light of its growing importance we see merit in adapting it further. We recommend that the Bank adopt a more holistic approach to scenario design by leveraging the expertise of supervisors earlier in the process. And we suggest that the Bank considers developing its capability to conduct

(1) See Bank of England (2015).

(2) See Bank of England (2018a).

sensitivity analysis exploring variants of the scenario. This would allow a deeper understanding of risks to banks’ books. As part of this theme, we also recommend that the Bank work through the implications of the countercyclical approach in a downturn.

The Bank has made strides in delivering the concurrent stress tests. Over time, the ACS has become increasingly well operationalised across scenario design, data collection and transmission, and in its capacity to analyse banks’ projections. The Bank has successfully drawn together a wide range of cross-Bank expertise to deliver the tests — a major achievement for such a large exercise. There is further to go to **deliver the stress tests more effectively** as evidenced, for example, by the lack of downtime to reflect on lessons learned and make improvements. Our recommendations here are designed to help further mature the framework. Specifically, we recommend that the Bank: review ACS data requirements with the firms and further embed good practice standards into its data collection processes; update its modelling strategy to reflect a more focused set of priorities over the short and medium term; and undertake further targeted improvements to One-Bank⁽³⁾ working and standardisation of its analysis. The first BES, unsurprisingly, generated lessons including, for example, establishing a clear plan up front for resourcing and running the test exercise, distinct from the ACS. We recommend that those lessons are embedded into future practice.

We also observed that the Bank has responded well to challenges associated with **communicating stress-test outcomes appropriately**. Internal policy papers and external publications are of high quality, commanding confidence from their readership. External publications have also supported both confidence and public accountability objectives. Internally we note that there is iteration during the round between staff and policy makers to expose key judgements and uncertainties. And, although we did not find evidence that such judgements had not ultimately reached the committees prior to sign-off, we see scope for the Bank’s staff to disclose them more systematically in internal policy papers. The case for further systematic disclosure of judgements and uncertainties externally is more finely balanced. Here we recommend that the Bank formalise its external disclosure strategy to guide Committee decisions on these types of issues. The Bank’s private feedback to firms is improving. We recommend that the feedback is enhanced to help firms remediate weaknesses identified during the round.

Figure 1 Table of recommendations

<p>Advancing macro and microprudential objectives</p>	<ul style="list-style-type: none"> • Adopt a more holistic approach during the scenario design phase including earlier supervisory engagement. • Work through the resilience of the stress-testing framework to scenarios in which risks start to crystallise and firms’ balance sheets deteriorate. • Consider further ways to enhance the benefits of stress testing to both Committees (eg sensitivity analysis) and identify where the development focus should lie.
<p>Delivering the ACS and BES more effectively</p>	<ul style="list-style-type: none"> • Revisit the ACS data strategy: review requirements with the firms and embed good practice standards into data collection. • Update the internal modelling strategy to reflect a more targeted set of priorities and assess success based on impact during the round. • Undertake further targeted improvements to One-Bank working and standardising the analytical approach in the analysis phase. • Embed lessons learned from the inaugural BES into standard practice, such as decoupling production cycles with the ACS unless there are clear synergies.
<p>Communicating stress-test outcomes appropriately</p>	<ul style="list-style-type: none"> • Further expose judgements and uncertainties inherent in the stress-test results in internal Committee papers. • Formalise the external disclosure strategy and use that to consider the case for further public exposure of key judgements and uncertainties. • Ensure that sufficient information is provided in feedback to firms to allow them to understand how to remediate any weaknesses identified.

(3) Carney, M (2014) describes the One-Bank strategy.

Our evaluation was primarily conducted between June 2018 and January 2019 by a dedicated project team reporting directly to the Chair of Court.⁽⁴⁾ The IEO team benefited from feedback and challenge from a Bankwide senior-level advisory group (including external members of the Bank's FPC and PRC). Dimitri Demekas (a former Assistant Director of the International Monetary Fund's (IMF) Monetary and Capital Markets Department and currently a Visiting Senior Fellow at the Institute of Global Affairs of the London School of Economics) provided support and independent challenge to the team throughout the evaluation and he has reviewed and endorsed the findings and recommendations in this report. As the Bank has more experience in conducting the ACS (and its predecessors) our evaluation focused principally on that exercise rather than the BES.

The report was approved for publication by the Chair of Court at the April 2019 Court meeting.

(4) The IEO team was: Melissa Davey (IEO Director), Jamie Barber, Renée Horrell and John Power. Adam Day and Joseph Williams provided research assistance and analysis. The analysis and recommendations in this report, together with any errors herein, remain the full responsibility of the IEO, and not the IEO's advisor or members of Bank staff. This report is based on data and information available to the IEO team as of 23 April 2019.

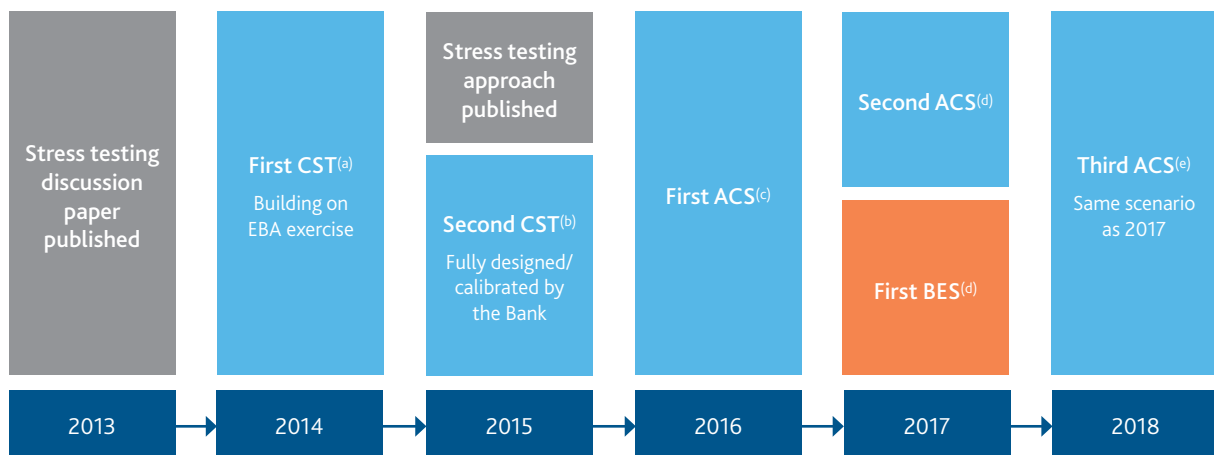
1 Context for the evaluation

Many financial regulatory authorities and central banks conduct stress tests of their banking systems. They examine the potential impact of a hypothetical adverse scenario on the health of the banking system and/or the individual banks within it. These tests allow policymakers to assess banks' resilience and make sure banks have enough capital to withstand shocks and to support the economy if they materialise.

Stress tests have grown in importance since the financial crisis. Recognising that importance, in 2013 the Financial Policy Committee (FPC) recommended that the Bank and Prudential Regulation Authority (PRA) develop proposals for regular stress testing of the UK banking system.⁽⁵⁾ The Bank conducted its first concurrent stress test (CST) in 2014 — where all the participating banks were exposed to the same stress scenario and tested at the same time. In 2015, the Bank published its approach to concurrent stress testing to 2018. This included the adoption of an explicitly countercyclical annual scenario — known as the annual cyclical scenario (ACS). It also included an additional scenario, conducted every other year, to probe the resilience of the system to risks not neatly linked to the financial cycle — known as the biennial exploratory scenario (BES).

The 2015 approach document set out the key features underpinning the CST framework, as well as details on implementation, including the Bank's ambition to build out its own capacity.⁽⁶⁾ The Bank has conducted four stress tests since then (Figure 1.1). In light of that experience, this evaluation assesses how well the aims of the approach have been achieved; how far the agenda had progressed relative to expectations; and the effectiveness of delivery.

Figure 1.1 The evolution of concurrent stress testing at the Bank of England



- (a) The 2014 test was designed to assess the combined impact of (i) the global macroeconomic and market elements of the common, EU-wide stress scenario run by the EBA that year, and (ii) UK macroeconomic elements designed by the Bank. The latter explored the resilience of banks to a housing market shock, an increase in unemployment, contraction in GDP and a sharp rise in Bank Rate.
- (b) The 2015 test incorporated a more severe global slowdown but less severe UK economic shocks than the 2014 test. And, unlike the 2014 test, Bank Rate was assumed to fall and remain low. In addition to the macroeconomic and traded risk elements, the 2015 test incorporated stress projections for additional misconduct fines and other costs over and above the level of banks' provisions.
- (c) The 2016 ACS incorporated a very severe, synchronised UK and global recession, a congruent financial market shock, and a separate misconduct cost stress. The test was broader and more severe than either of the stresses in preceding tests.
- (d) The 2017 ACS incorporated a more severe global scenario than 2016, reflecting the FPC's judgement on the risk environment, while the severity of the UK economic scenario was unchanged. The path for Bank Rate, however, was very different, rising and peaking at 4% compared with a cut to zero in the 2016 test. The first BES examined major UK banks' long-term strategic responses to an extended low growth, low interest rate environment with increasing competitive pressures in retail banking enabled in part by an increase in the use of financial technology.
- (e) The stresses applied to economic and financial market prices and measures of activity were the same as in the 2017 test. This was in order to isolate, as far as possible, the impact of IFRS 9 on the results.

The rest of this section describes the published aims and objectives of the framework (Section 1.1), how the Bank has operationalised it (Section 1.2) and the approach to our evaluation (Section 1.3). Box 1 sets out features of concurrent stress testing in other jurisdictions.

(5) See FPC (2013).

(6) See Bank of England (2015).

1.1 Aims and objectives of the framework

As set out in the published approach, the overarching aim of the framework was to support both the FPC and the PRA in meeting their statutory objectives by providing a quantitative, forward-looking assessment of the resilience of the banking system and of the individual institutions within it. The approach noted that the framework would deliver a broad range of benefits to the FPC and PRA/Prudential Regulatory Committee (PRC)⁽⁷⁾ including:

- An integrated, regular process for decision-making on bank capital adequacy at both the system-wide and individual-institution level. The results would be used as an input to the setting of the macroprudential countercyclical capital buffer (CCyB), as well as the microprudential PRA buffer.
- A strengthened supervisory approach, with a richer evidence base to inform supervisory judgements.
- Improved risk and capital management practices within banks, through, for example, qualitative assessment of banks' stress-testing practices as part of the test.
- Scrutiny: by publishing the scenarios and details of the results, the stress tests would allow the Bank to demonstrate its view of: the resilience of banks; the actions it deemed appropriate to maintain or improve that resilience; and the evidence Parliament and the wider public might need to hold the Bank accountable for its decisions.
- The public nature would provide greater clarity to the market about how decisions are made and enrich market discipline. And transparency would bolster the credibility of the framework, strengthening public and market confidence.

By serving both sets of policymakers and delivering this wide range of benefits, the Bank set itself a high bar with respect to the development of the regime. That was also acknowledged by the IMF in its 2016 Financial Sector Assessment Program (FSAP).⁽⁸⁾

Box 1 sets out some key features of stress-testing frameworks in the United States, European Union and Japan.

1.2 The Bank's approach to operationalising the framework

Framework design

In its 2015 approach document the Bank noted that the severity of the ACS would be linked to policymakers' assessment of the state of the financial cycle (both domestically and abroad), with the severity increasing as risks build, and decreasing when risks abate or crystallise. This explicit and systematic countercyclical approach would allow markets and banks to anticipate the broad shape and severity of the scenario over time. In practice, the ACS has contained three types of stress including: a UK and global macroeconomic stress; a traded risk stress designed to be consistent with the macroeconomic element; and an independent misconduct costs stress. The BES was designed to probe the resilience of the banks to risks that may not neatly be linked to the financial cycle, for example longer-term structural challenges (Box 3). In both cases one important principle behind the design is that the scenarios should vary with policymakers' assessment of risk, rather than changes in their tolerance to risk.

In designing the CST the Bank also made clear that:

- The coverage of the ACS would include all PRA-regulated banks with total retail deposits greater than £50 billion.⁽⁹⁾ There would be more flexibility of coverage in the BES depending on the risk being explored.

(7) The approach document (Bank of England (2015)) referred to the PRA and the PRA Board. This report uses current governance structures for prudential supervision and regulation, which were established in March 2017. This involved the creation of the PRC as the governing body of the PRA as part of the Bank of England. See Bank of England (2017a) for details.

(8) It noted that 'this ambitious project has the potential to make a major contribution to systemic risk mitigation in the UK, but implementation poses important challenges', IMF (2016).

(9) Unless otherwise stated, the term 'bank' or 'firm' is used throughout this document to refer to those banks and building societies participating in the concurrent stress tests.

- Although stress-test projections would continue to be informed by participating banks’ own models and assessment, the Bank would, over time, enhance its own capabilities including modelling system-wide dynamics such as feedback and amplification loops.
- The data collection from the participating banks would be improved over time to help them plan their investment in data infrastructure and internal quality assurance processes.
- The policy decision-making process would support co-ordination between FPC and the PRC. Most notably, following the stress test, should the policy Committees decide to change capital buffers the FPC would move first — adjusting system-wide buffers. The PRC would then consider setting additional buffers for individual banks, taking into account any system-wide buffer already set. Moreover, the ‘hurdle’ rate (the level of capital that banks are expected to maintain under the stress scenario) would align with the regulatory capital framework.
- The Bank’s qualitative review of participants’ stress-testing practices would be an important part of the framework, with shortfalls in expectations influencing the intensity of supervision as well as the setting of capital buffers for individual banks.
- The Bank’s disclosures would support accountability and confidence objectives. But the information set could change from test to test, reflecting the risks being explored and the evolution of the framework.

The 2014 and 2015 tests were broadly conducted to an 11-month timetable from data cut-off to formal publication. In the 2015 approach document the Bank decided to maintain an 11-month timeline for both scenarios. That was in order to support sufficient senior engagement in the participating banks; to give the Bank enough opportunity to scrutinise the results; and to maintain the use of year-end balance sheet data. In practice, the effective timeline has been longer, given that private feedback to banks from the qualitative review occurs early in the following year, as does the communication of the PRA buffer. Moreover, Bank staff start working on scenario design in the year preceding the test. **Figure 1.2** sets out the different phases of the ACS timeline.

Figure 1.2 Timeline for the ACS

	What		Who	
January	Scenario Design		FSSR led drawing on expertise across MA, ID, SRS and UKDT	
February				
March				
April	Analysis phase for banks Expanding scenario to other variables/regions; generating projections and supporting analysis	Internal preparatory analysis Portfolio analysis and expectations setting	The banks	SRS, FSSR, UKDT
May				
June				
July	Internal staff results and analysis phase Comparison of internal model results and analysis with banks’ results; and qualitative review of banks’ stress testing and capital management frameworks		SRS, FSSR, UKDT	
August				
September	Results phase with policy Committees Detailed material to FPC and PRC. Gradual convergence on final numbers. Committees decide policy responses and publication prepared		FSSR led, drawing on analysis from SRS and UKDT	
October				
November				
December	Publication of results alongside FSR			
January	Individual capital buffers set by PRC and feedback to banks		UKDT led	
February				

Box 1

Concurrent stress-testing frameworks in the United States, the European Union and Japan

Many financial authorities internationally conduct concurrent stress testing of their banking systems. This box sets out some features of those conducted by the US Federal Reserve, the European Banking Authority (EBA) and the Bank of Japan (BoJ). There are similarities between them (and with the UK approach). But there are also differences — reflecting their own institutional remits and approaches.

Objectives and high-level features

Although all ultimately serve financial stability, the focus across jurisdictions is different. By examining individual firm level capital adequacy, the Federal Reserve's Comprehensive Capital Analysis Review (CCAR) and the EBA's exercise primarily serve supervisory and microprudential objectives. The exercise conducted by the BoJ is primarily macroprudential in nature, aiming to examine potential risks to financial stability. There are differences in framework design, including the scenarios tested, the analytical process and disclosure.

The CCAR incorporates multiple scenarios and is run annually, providing supervisors with a rich information set on potential individual firm vulnerabilities. The two concurrent scenarios, the 'adverse' and 'severely adverse' scenarios are generally designed to test for different risks, for example increasing or decreasing interest rate profiles. The CCAR also incorporates scenarios designed by the firms to capture risks specific to them. The EBA runs one scenario analysis every two years, designed to ensure an adequate level of severity across all EU countries. The BoJ's 'tail event' scenario, run every six months, assumes a severe economic downturn similar to the Global Financial Crisis. Reflecting its macroprudential nature, the BoJ test incorporates some feedback loops between the financial sector and real economy.

Analytical approach

There are also differences in the analytical processes used in stress-testing regimes. The Federal Reserve uses data from firms in their own supervisory models to project each firm's losses, revenues and capital, with the final results reflecting their in-house calculations. Alongside this quantitative analysis, firms participating in CCAR are subject to a rigorous qualitative evaluation of their capital planning processes, including their stress tests, with potential implications for their supervisory ratings and enforcement actions.

The results of the BoJ tests also reflect their own in-house models, but these are of a more macroprudential nature, projecting losses from the top down, with partial use of granular data. On the other hand, the EBA stress test is bottom up — or company run — and the EBA publish the results submitted by firms, subject to methodological constraints and following a quality assurance process. The results facilitate the Supervisory Review and Evaluation Process, which is carried out by the European Central Bank (ECB) Single Supervisory Mechanism for euro-area banks and the national supervisors.

Disclosure

All three jurisdictions support their stress-testing objectives by disclosing the results. The EBA's is the most granular, publishing up to 17,200 data points per firm. The Federal Reserve also publishes individual firm results, focusing on the headline capital and leverage ratios. The BoJ publishes aggregate results of its stress tests in its Financial System Report, communicating key risks facing the financial sector as a whole.

Evolution

The objectives and design of stress-testing frameworks internationally are evolving over time. A common theme is the exploration of feedback and amplification mechanisms with several jurisdictions conducting research in this area. For example, the ECB has been developing a macroprudential extension to the EBA stress tests for the euro area to explore the dynamic interaction with the real economy and between financial institutions.⁽¹⁾ The Federal Reserve is also conducting research into amplification channels, as well as moving to a more countercyclical approach to scenario setting, and incorporating the stress-test results into its capital framework through the introduction of a Stress Capital Buffer. Meanwhile, the BoJ plans to use its macro stress test to increase its dialogue with firms in order to promote a deeper common understanding of resilience to stress.

(1) See ECB (2017).

Internal organisation

The Bank updated its organisational arrangements for managing the stress tests in 2014 alongside the first concurrent stress test. The running and development of the stress tests require a high degree of cross-Bank working and co-operation (Figure 1.2). The current arrangements and responsibilities are set out below.

- The Stress Testing Strategy Division (STSD) in the Bank's Financial Stability Strategy and Risk Directorate (FSSR) is responsible for the overall delivery of the tests and the development of the framework. The division is composed principally of financial stability experts and economists. In running the stress tests they co-ordinate the Bankwide effort. They specifically take the lead in: producing the scenarios; developing and applying system-wide and macro risk models to the results; presenting the results to the policy Committees; and producing the external publications. Together with other colleagues from FSSR, they use the stress results to advise the FPC on the setting of the CCyB.
- Risk specialists in the PRA (Supervisory Risk Specialists — SRS) work with FSSR to generate the scenarios (eg the traded risk element). They are responsible for data management, including receiving and validating the data from the firms. They use their expertise to analyse the results — using both structured analysis and formal models — across different risk areas. They produce capital adequacy analysis for the FPC and PRC on the back of the tests. They also run the qualitative review and manage/develop many of the systems used internally for stress testing.
- PRA supervisors of the participating banks (UK Deposit Takers Supervision — UKDT) are involved throughout the process, for example providing challenge to the results, liaising with the firms during the analysis phase and together with risk specialists providing feedback to the firms on their performance in the stress tests. They also use the stress-test results to advise the PRC on the setting of the PRA buffer.
- Economists in Monetary Analysis (MA) and the International Directorate (ID) are responsible for producing certain scenario elements and supporting risk analysis, such as profiles for growth and inflation both in the United Kingdom and in the rest of the world.
- Prudential policy specialists are not involved in the day-to-day running of the tests. But they work with stress-testing staff to develop the framework, for example, by aligning hurdle rates with the capital framework.

These arrangements apply specifically to the ACS. The broad set of responsibilities also applies to the BES, with for example, FSSR taking the lead in designing the scenario. The first BES was also supported by a bespoke cross-Bank team. Overall the effort devoted to CST by the relevant business areas is currently estimated to be around 50–60 full-time equivalents on an annual basis.⁽¹⁰⁾

Internally, below the FPC and PRC, structures have been created to manage stress-testing work. This includes oversight of stress-test results and live issues uncovered during the round, as well as management of development work — such as model review and sign off. Those governance structures have a cross-Bank reach and have been refined with experience. For example, stress-test results are reviewed at individual divisional challenge sessions. They are subsequently discussed and agreed at the Stress Test Results Group, which is jointly chaired by the Directors of FSSR and SRS and comprises staff across supervision and financial stability.⁽¹¹⁾ After those decisions there is further upward review and challenge by the Executive Directors of FSSR and UKDT. The results are subsequently presented to and subject to further challenge from the Governors and the FPC/PRC.

(10) Averaging across both 'ACS only' years as well as 'ACS and BES' years. This estimate includes resource from the business areas to run the stress tests and develop them. The estimate is lower than in previous years.

(11) In addition to the co-chairs, a Head of Division from UKDT is a voting member.

1.3 Evaluation approach

In line with previous Independent Evaluation Office (IEO) evaluations we developed a set of criteria against which the effectiveness of the Bank's approach could be judged — namely:

- (i) Effective scenario design;
- (ii) Effective analysis and results processes;
- (iii) Appropriately informs macro and microprudential policy and supervisory outcomes; positive impacts on firms' own capital and risk management practices;
- (iv) Improved public accountability and confidence;
- (v) Efficiency and costs.

We specifically conducted this evaluation at this juncture to help support the Bank's own update of its stress-testing approach. We therefore paid particular attention to how well the framework was meeting policymakers' continued needs and whether changes were warranted. We also considered the perspectives of the participating firms given that tests require substantive input from them. Our evaluation focused principally on the ACS rather than the BES given that the Bank has more experience in running the annual test. We did however case study the first BES (Box 3). Consistent with the IEO's principle of not commenting on live policy, coverage issues were not brought into scope as at the time of the evaluation the Bank had noted it was minded to include ring-fenced sub-groups of existing stress-test participants separately in the annual stress test from 2020.⁽¹²⁾ We did not evaluate other stress tests that the institution runs — such as insurance stress testing; or is developing, such as system-wide stress simulations.⁽¹³⁾ We did, however, take note of where there were important touch points between the concurrent framework and other forms of stress testing such as those that individual banks run as part of their ICAAPs (Section 2.3).⁽¹⁴⁾ Annex 1 sets out further detail of our approach.

(12) That decision was agreed in March 2019. See FPC (2019) for further details.

(13) See, for example, Baranova *et al* (2017).

(14) ICAAPs are firms' Internal Capital Adequacy Assessment Processes, mandated through the PRA's rulebook. The process requires a firm to assess the capital that it considers adequate to cover the risks to which it is or might be exposed, including under stress scenarios. The ICAAP is updated annually or as required upon relevant changes to either the firm or the risk environment in which it operates. See PRA (2018).

2 Evaluation — advancing macro and microprudential objectives

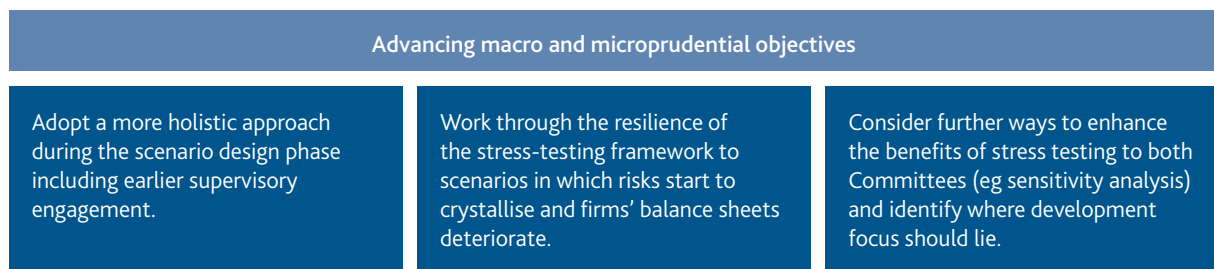
As noted in Section 1.1, the stress-testing framework had ambitious aims to advance both macro and microprudential objectives. This Section considers how well it has achieved those and how it could be enhanced further.

Overall, we find that the Bank has delivered its novel and ambitious approach to concurrent stress testing, and that the tests are highly valued by policymakers. The use of the ACS has provided many benefits. Its macrofinancial coherence has allowed FPC members to gain insights into risks in the system as whole and make judgements about the CCyB. A common scenario has given the PRC a base to judge and compare how individual firms fare under a severe and relevant stress. The process has yielded insight for both macro and microprudential policymakers on salient risks and provided a common and transparent means to inform the setting of capital requirements in the face of those risks. It has been an important part of the policy toolkit helping strengthen the banking sector's resilience in the post-crisis period.

As the Bank reviews its approach to the CST, our recommendations are designed to help the Bank Executive and the Committees consider ways in which concurrent stress testing could provide further insights, without losing the key features that are currently valued. Potential enhancements include developing sensitivity analysis around some key elements of the scenario and earlier supervisory engagement in scenario design. We also note that the qualitative aspects of the stress test, while valuable, have not yet had the same impact or impetus as the quantitative aspects.

The evidence in this section is relevant to our first and third evaluation criteria: scenario design; and informing policy and improvements in firms' own risk management practices. Section 2.1 considers scenario design and Section 2.2 how the stress test feeds through to policy decisions. Section 2.3 sets out possible enhancements for the future in light of our findings. This section focuses principally on the ACS.

Figure 2.1 Recommendations — advancing macro and microprudential objectives



2.1 Designing an effective countercyclical scenario

The Bank's 2015 approach to countercyclical system-wide stress testing was novel and ambitious. Indeed, linking the view of the risk environment to a countercyclical scenario for both the UK and the global economies and, in turn, to both macro and microprudential policy decisions remains at the forefront among central bank peers (see Box 1).

The countercyclical approach implies that the scenario becomes more severe as risks build in the financial sector (Section 1.2). To deliver that, Bank staff have successfully developed techniques that systematically link the FPC's assessment of prevailing financial imbalances — the state of the financial cycle — to the severity of the applied stress across a range of variables both at home and abroad. Although this link is mechanised to some extent,

judgement is also involved. And delivering a scenario that hangs together as a plausible overall story about how the economy and financial sector might behave under stress involves a high degree of co-operation and effort across the Bank's financial stability, monetary policy and international directorates and the PRA before it is jointly agreed by PRC and FPC. Over time, the processes to deliver that have become more efficient and effective.

As the financial cycle has changed little over the past few years, however, the systematic approach has not yet been fully tested. In particular, the approach suggests a relatively modest stress when risks are crystallising, and some external contacts expressed scepticism around whether the Bank would be willing to reduce the severity of the stress in such a case (Section 2.2). The published stress-testing framework makes the countercyclical approach clear. And governance processes support that (for example, with key scenario design decisions being taken during joint FPC/PRC meetings). Nevertheless the feedback suggests that the Bank consider what more could be done to reassure external observers of the approach.

Although the Bank has broadly maintained a systematic approach, it has been pragmatic and flexible to the needs of policymakers. One example of this is the 2017 scenario when the stressed assumption was changed from a cut in Bank Rate as the economy weakened, to a rise, as well as a significant depreciation in sterling. This 'rates up' scenario captured a desire on the part of the PRC to understand the impact of rising interest rates on banks' books. It was also consistent with the conjunctural concerns of the FPC given the possibility that a disorderly Brexit scenario could be associated not only with an economic downturn but also with a falling exchange rate, and rises in inflation and therefore Bank Rate.⁽¹⁵⁾ The November 2017 *Financial Stability Report* could therefore note that the scenario '...encompasses a wide range of UK macroeconomic risks that could be associated with Brexit.'⁽¹⁶⁾ Another example is in 2018, when the Bank maintained the same scenario to the previous year, which helped both the Bank and firms in the transition to report results under the IFRS 9 accounting standards.⁽¹⁷⁾

The ACS captures a broad range of risks that banks face and, although it is system wide, it is able to incorporate elements capturing idiosyncratic risks (for example, ensuring that the scenario adequately tests asset classes or foreign markets where some firms have larger exposures, even if those areas do not pose material systemic risks). Moreover, the regime has adapted to the emergence of new risks and firm-specific issues, even going so far as to incorporate a scenario for used car prices in order to test some firms' exposures to car finance in 2017.

Some external commentators and colleagues internally — particularly on the supervisory side — have noted that the ACS gives them only one lens on the risks banks face. The evaluation, uncovered no evidence of risks compatible with the ACS framework that had been missed.

To further guard against the prospect of missing risks, however, we believe that scenario design could benefit from more input from supervisors — who have in-depth knowledge of their firms' balance sheets and risk profile — early in the process, firmly embedding the openness to emerging risks that we have observed over the review period. That would better identify and challenge key risks and judgements from a firm perspective, giving comfort that both the macro and micro risks were as fully incorporated as possible. Here, *if* such risks were identified, it would be important to identify and distinguish between those that can be accommodated within, and are compatible with, the countercyclical stress test, and those that are better explored through the other tools available to the PRA or through the BES (Box 3).

2.2 Linking policy to stress testing

The ACS is highly valued by policymakers and has become a key input into their policy decisions. The results of the stress test feed into capital adequacy judgements, including the setting of the macroprudential CCyB as well as the microprudential PRA buffer. Bank staff have developed methods to link the results to a view of the system-wide CCyB as a basis for the FPC's decision. That is only one input into the FPC's decision, however. For example, its view of the risk environment may change between the setting of the scenario in Q1, and the results

(15) See for example, Section 5.2 of Bank of England (2018b).

(16) See Bank of England (2017b).

(17) The International Financial Reporting Standard 9 (IFRS 9) is an accounting standard that was introduced on 1 January 2018, with internationally agreed transitional arrangements in place until 2023. Under IFRS 9, banks provide for expected credit losses on all loans. This differs from the previous accounting standard — IAS 39 — under which credit losses were taken only after there was objective evidence of impairment (such as a loan repayment becoming overdue). This results in a larger share of impairments being recognised earlier in the stress test. See Bank of England (2018a).

publication in Q4. Similarly, for the PRC, there is a presumption that a firm's ACS result will be the starting point for setting PRA buffers, but the PRC will also take into account other factors such as changes in the balance sheet since the scenario was determined, as well as assessment of scenarios from the relevant ICAAP.

As well as the capital adequacy decisions themselves, the ACS provides a vehicle for the FPC and PRC to comment in a transparent and consistent way on the resilience of the financial system (Section 4.2). It also provides an input into their broader policy tools and ways of giving early warning signals to banks and markets. For example, in 2017, an in-depth analysis of consumer credit allowed the Committees to provide guidance to firms on the risks they were facing (see Box 4). And in 2018, the Bank assessed the potential impact of leveraged lending (typically loans to non-investment grade firms that are highly indebted or are owned by a private equity sponsor) on UK banks following the FPC's concern about its rapid growth. While the first, and so far only, BES was focused on risks that do not speak to capital adequacy (see Box 3), it too can provide a useful tool for communicating about current and future challenges facing the financial sector.

Policy Committee decision-making processes appear well integrated within the current approach. In the round, necessary tensions between objectives appear well managed — for example, the switch to 'rates up' in the 2017 ACS accommodated both FPC's views about macro risks, as well as the PRC's priors about conjunctural microprudential risks. That demonstrates the importance of taking key decisions during joint meetings of the FPC and PRC. And mechanisms are in place to ensure that any firm-specific capital requirements do not offset changes to the FPC's CCyB. Committee members acknowledged, however, that the framework's resilience to tensions remains untested in a downturn when risks start to crystallise and firms' balance sheets deteriorate. In such a case the countercyclical approach would point to a less severe stress scenario (Section 2.1). As this type of scenario has not been encountered, we recommend that the Committees work through its macro and microprudential policy implications outside a live round, so they are well prepared.

2.3 Enhancing the benefits of the framework for the future

The CST framework has played a key role in improving the financial system's resilience following the financial crisis. It is not only valued by policymakers but also by the firms subject to it and external commentators (see Box 2). As the post-crisis period of structural capital rebuild is coming to an end, we see worth in taking steps to ensure that the benefits of the ACS continue to be maximised. This section outlines some of the ways that could be done in the context of our findings.

We have seen evidence of the growing primacy of the ACS in capital requirement decisions by the FPC and PRC. In this context we heard an appetite to 'test the stress test'. The Bank could meet this appetite by conducting sensitivity analysis exploring variants of the scenario, such as different property price profiles, or interest rate and exchange rate paths to gain a deeper understanding into the vulnerabilities in banks' books. That would provide further analytical input to both sets of policymakers to inform the capital and supervisory decisions they may wish to take on the back of the tests. Sensitivity analysis would allow supervisors to understand firm-specific risks better and help them provide richer feedback to firms after the stress tests (Section 4.3).

It was also suggested to us that CST could 'crowd out' elements of the wider microprudential toolkit, such as the ICAAP regime, or firms' own risk management techniques. Our firm outreach exercise suggested that the resource intensity of the ACS, as well as the desire to 'pass the ACS' ran the risk of crowding out other activities firms might use to explore their own idiosyncratic stress scenarios (see Box 2). Moreover, here we also note that, reflecting the primary role the CST has been given in the Bank's capital framework, firms tend to base their own stress-testing exercises in their ICAAPs on an ACS-type stress, and may not comprehensively test for vulnerabilities specific to their business.

We note that, at a working level, the PRA is tackling this specific issue, sharing best practice scenario analysis with firms following a thematic review. Within the context of concurrent stress testing, we believe that our recommendations could also help meet such challenges. Leveraging further the expertise of supervisors in the design process can help guard against the prospect of missing risks, while sensitivity analysis should help test firm-level vulnerabilities. Further maturing of the stress-testing process and a shorter/less pressurised cycle (Section 3) should also free up resources both in the Bank and in the firms.

There could also be merit in placing greater emphasis on the Bank's 'qualitative review' of firms' own risk management and capital planning capabilities. When setting out its 2015 approach, the Bank stated that participants were expected to demonstrate sustained improvements in those capabilities over time, and that the qualitative review could be used to inform capital buffers if firms fell short of expectations. We note that this qualitative review has developed less quickly than the quantitative element and, to date, has played a relatively small role in the exercise, compared, for example with similar US Federal Reserve exercises in the past (see Box 1). As stress testing matures, and further process efficiencies are exploited (Section 3) pivoting some more resource towards the analysis of the qualitative rather than quantitative side could provide a virtuous circle of improvements. In order to achieve that, the Bank may also need to revisit the feedback it provides to firms involved in the CST (Section 4.3).

Finally, the CST does not aspire to be a comprehensive assessment of system-wide vulnerabilities. For example, a key underlying feature of the Bank's approach is to make sure that banks have enough capital to withstand shocks and to support the real economy if a stress materialises. The ACS is therefore designed to test whether banks can continue to lend to the real economy during the stress. In operation, this means that banks are not allowed to meet the hurdle rate by reducing lending beyond a certain point in their stressed projections. Given that feature, some of the feedback and amplification loops that have operated in past financial crises as credit supply has tightened, weighing on household and business spending, are explicitly not allowed to operate.

In addition, the financial system is broader than the major banks and in the IMF FSAP report the Bank was encouraged to consider a broader examination of system wide stress testing, beyond the banking sector.⁽¹⁸⁾ The remit of our evaluation was the CST, but as the Bank puts together its revised approach, it may wish to consider the resources devoted to these issues alongside the future development of the CST.

Overall, as a first step we suggest the Committees discuss options for further enhancing the benefits of the ACS, within the context of the broader supervisory and macroprudential toolkit/agenda as part of the Bank's work on the updated approach document. That discussion should provide an opportunity to highlight and reinforce the broad insights that have already come from the concurrent stress-testing regime. And it should also serve to clarify the complementary role the BES plays as the ACS is enhanced (see Box 3).

(18) See IMF (2016).

Box 2

Feedback from external stakeholders on the Bank's concurrent stress testing

We spoke with the seven banks and building societies subject to the regime (at both executive and, separately, non-executive level), and a number of industry consultants, commentators and academics. We discussed a range of topics covering our evaluation criteria.

For the participating banks and building societies our key findings included:

- **Concurrent stress testing has provided value to them in a number of different ways.** They acknowledged that stress testing had contributed to the strengthening of the financial system post crisis and valued the assurance a credible stress test can provide to the market. Moreover, some firms noted that the discipline of the ACS had enhanced their own stress-testing capabilities. Some noted that stressed risks are considered in their own risk management and business practices in a manner that was not the case pre-crisis.
- **There were concerns, however, around the future value of annual stress tests relative to the costs.** Despite investment, concurrent stress testing remains resource-heavy for the participating firms. That, combined with firms' desire to 'pass the ACS', in our view, raises the risk of it potentially crowding out other forms of risk management (such as their own stress testing in the ICAAP process). Some noted the prospect of diminishing returns from the current approach as structural capital rebuild was coming to an end, thereby risking the ACS becoming a 'compliance exercise'.
- **ACS scenario design is well understood.** Firms noted that over time the scenario has become easier to operationalise, and is well communicated by the Bank. But some expressed scepticism around whether the Bank would reduce severity when a stress was crystallising. Having the same scenario in the 2018 ACS as the 2017 ACS had helped the switch to IFRS 9.
- **Aggregates of data and size of data templates are a concern.** Almost all firms questioned the volume of data requirements, with some explaining that the Bank asks for cuts of data that are not used internally. Data requests have increased over time, in particular unstructured requests, compounding the perception that the ACS is a compliance exercise for firms. Some firms welcomed the improvements in the stability of the data templates in recent exercises, although almost all expressed a preference for fewer data requirements.
- **Views on the feedback firms receive were mixed, but messages from across the Bank were considered to be well joined-up.** Firms praised the Bank's stress-testing publications, noting that the public nature of the results helps to reinforce confidence in the UK banking sector. On private feedback, some firms thought it had improved over time, but the clarity of messaging was in their view insufficient for them to understand and act on their weaknesses.
- **Most were keen for a shorter end-to-end timetable or for the ACS to be run less frequently.** That reflected concerns that the current approach is not conducive for feedback to be reflected on and changes implemented, as well as the prospect of diminishing returns settling in.
- **Firms valued the concept of the BES and were optimistic for future exercises.** The exercise encouraged firms to explore their own risks and involved a high level of senior engagement throughout. But they expressed some reservations about the implementation of the first BES — in particular the data requirements. Firms were keen for further upfront clarity on the purpose and the focus of the BES in order to help them prepare.

Like the firms, other commentators and experts were generally positive about the value concurrent stress testing provides — again in different ways. Depending on their expertise/area of interest they reinforced some of the messages and views from the firms (eg on data requirements and lack of downtime). Most praised the Bank's stress-testing communications noting that the market has gained insight both on where the risks are, as well as the financial authorities' reaction to them. Some, particularly market commentators, were keen for further information on drivers behind individual results. Other stakeholders expressed scepticism about the overall approach of the CST flagging for example that risks were moving out of the larger banks into the rest of the financial system, as well as concerns around gaming and the limitations of using a single scenario in the ACS to set capital requirements.

3 Evaluation – delivering the ACS and the BES more effectively

Section 2 reflects on how well the regime has advanced high-level macro and microprudential objectives and possible strategic innovations and reforms. This section considers how the Bank has delivered on its articulated approach: the processes and infrastructure it has built to generate stress-test results.

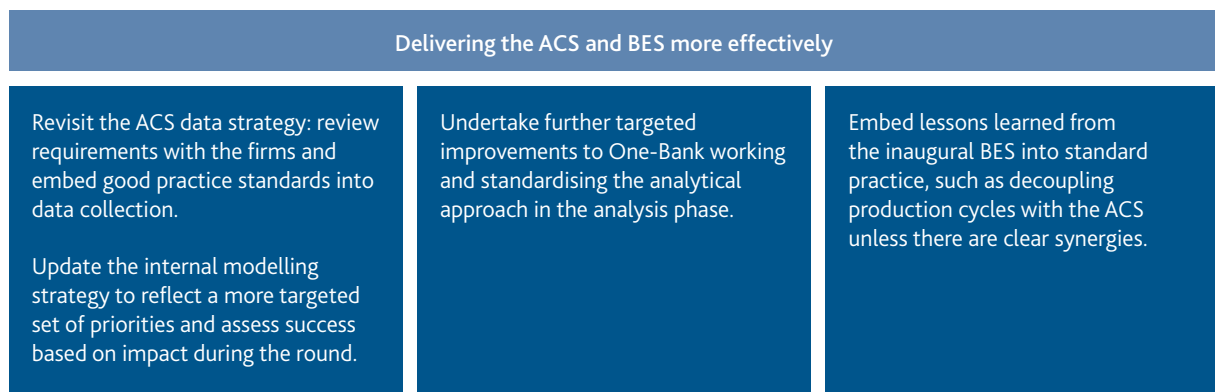
Overall, the Bank has made substantive progress in delivering concurrent stress testing across scenario design, data collection and transmission, and in its capacity to analyse banks’ projections. We saw good evidence of the Bank exploiting its own considerable analytical expertise throughout the process as well as improving engagement with firms.

Unsurprisingly, the approach is still maturing. There is further to go in building out the supporting stress-test infrastructure, and delivering more efficient ACS and BES production cycles. Moreover, we observed a strong desire both in the Bank and in the firms to have more time to reflect on lessons learned and effect change — speaking therefore to a shorter timeline.

Our recommendations are designed to help advance the process of maturation. They speak to: revisiting the Bank’s data strategy (Section 3.1); updating the Bank’s modelling strategy (Section 3.2); and improving the ACS production cycle (Section 3.3). Most of this section relates to ACS delivery in light of experience. Box 3 provides a case study of the first BES.

The evidence in this section is relevant to our first and second evaluation criteria: the effectiveness of scenario design and the analysis/results process. It also speaks to our fifth criterion on efficiency and costs.

Figure 3.1 Recommendations — delivering the ACS and BES more effectively



3.1 Data

Banks submit a large volume of data to the Bank as part of CST — around 9–10 million data points in total for the seven banks per stress test/year. These are submitted in ‘structured’ templates (in a well-specified and defined format). In addition, banks answer around 300 qualitative and scenario-specific questions, through ‘unstructured’ requests (where the format for response may not be prescriptive).

The information the banks supply forms the backbone of the stress-test projections. The data therefore need to be robust, accessible and appropriate to the task at hand.

In its 2015 approach document, recognising the burden that stress testing places on banks, the Bank outlined a medium-term strategy to improve the way it collects information from the firms. This included, for example, the definition of a core data set including the information that is critical for every round. Internally it also set out an ambition to improve its own infrastructure to receive and manage the data, leveraging off central plans to improve Bankwide data architecture.

In our evaluation we therefore considered several issues: the perceived quality, credibility and appropriateness of the data collected; the progress in delivering strategy; and the processes for governing change. We paid particular attention to how well firms' expectations were being managed.

Our key observations include:

- The firms' and the Bank's efforts have led to an improvement in data quality over time as reflected for example in reduced resubmission rates over our review period. The Bank's internal processes of data cleansing and reconciliation have become more automated and efficient.
- The introduction of the Bank's Stress Test Data Framework has, gradually, improved both the stability of structured data requirements and their alignment with other regulatory returns such as Common Reporting (COREP) and Financial Reporting (FINREP). This stabilisation has been aided by bespoke governance arrangements with clear sign off and challenge processes needed for changes to be made to structured and unstructured data requests.
- The transmission process, both between the firms and the Bank and within the Bank, is also improving. For example some of the structured core data templates are now being transmitted using XBRL (eXtensive Business Reporting Language), which is a common business reporting standard.
- Given the confidentiality of the information, strict controls exist to manage the flow of data across the organisation. In 2018, a new system was introduced to allow approved Bank users to access the results from the firms.

There is much further to go on these fronts:

- Around 70% of the structured templates are yet to be transferred to XBRL. And substantive iteration between the Bank and the participating firms is required during the analysis phase to understand the supplied data and refine them further.
- Although firms have invested in their systems to support CST and their own risk management, they fed back that the data requirements appeared excessive to the task at hand and were continually growing — particularly the volume of unstructured requests. That view was also held by some, though not all, colleagues internally. Indeed some expressed a preference for further granularity, motivated in part at least to help answer policy Committee questions later in the round.
- Internal progress on developing supporting technology had fallen short of original expectations as stress testing formed part of One Bank Data Architecture, a programme that turned out to be more complex than expected.⁽¹⁹⁾ The Bank has revised its stress-testing development plans and is targeting a delivery date of 2021 for new infrastructure in data storage and analytics. It has adopted a more agile approach to delivery faced with the constraints of simultaneously running the stress tests and effecting change.
- Despite progress on transmission some colleagues, particularly supervisors thought that the wealth of stress-testing data could be better exploited to help with wider responsibilities.

Looking ahead, we suggest that the Bank revisits its ACS data strategy. In our view the Bank could undertake periodic holistic reviews of requirements, consulting industry as is common practice in other areas where the Bank

(19) See page 7 of NAO (2017).

manages data, with a view to avoiding material change as much as possible in the interim. Given the nature of stress testing, the Bank will never be able to fully anticipate or commit to a precise dataset that will be appropriate for all exercises. This means that unstructured requirements are always likely to vary reflecting the features of the specific scenario. Moreover, changes in the regulatory environment, such as the recent introduction of IFRS 9, can affect analytical requirements. But we believe that with the benefit of experience, as well as a re-articulation of its own modelling requirements (Section 3.2), the Bank should be in a better position to set out the information it needs to successfully deliver the stress tests. As part of this we suggest that the Bank stock takes its unstructured data requests with a view to identify those that should become part of the regular set and purge those that are no longer needed.

3.2 Modelling strategy

The Bank uses the data supplied by firms, as well as information from other sources to cross-check and validate firms' own view of their performance under stress and challenge/amend them where appropriate both at the individual firm level and the system-wide level. The toolkit for this part of the exercise consists of both formal models and structured analysis and assessment of the available evidence.

As part of the 2015 approach, the Bank adopted an ambitious agenda to build out its toolkit. This included priorities to: develop more in-house models to validate/challenge firm results (including at the detailed loan level); explore sensitivities and uncertainties in results; and explore system-wide dynamics, such as feedback and amplification loops. In this context the Bank also outlined a medium-term intention to give its own in-house models more weight relative to the firms' in producing stress-test results for some parts of the balance sheet.

We saw good evidence of the infrastructure being built out and maintained. The Bank has a suite of models that have been used to explore key risk areas during the round (including for example mortgage credit, commercial real estate, wholesale credit and pensions). It has also developed models to understand how certain shocks can be amplified through the system. We also saw evidence of the use of those models. For example in 2017, the sector-wide owner-occupied mortgage impairment model, based on detailed distributional microdata, helped validate the impact of the switch to 'rates up' on banks' books.

Strong governance processes have been developed to quality assure models and sanction them for use. Those have a cross-Bank reach and continue to be refined in light of experience and the standards the Bank requires of firms' own model management.

We also observed that:

- In some key risk areas formal models lag in development and structured analysis of the data (including spreadsheet-based tools) and expert judgement are used instead to challenge firms' projections. Various factors lie behind this: resource, technology and data constraints; as well judgement on the utility of future development of formal models compared with other priorities.
- Model maintenance can account for a significant proportion of modelling resources.

We also identified that gaps and analytical challenges uncovered during the CST round could be more consistently linked back to the development strategy.

Looking ahead, we see scope for updating the internal modelling (and wider) analytical strategy. In our view, two considerations should help guide the approach. First, using key analytical gaps and uncertainties uncovered during the round to help identify a targeted set of top-down (rolling) priorities for modelling and analytical development. And second, to identify a more focused medium-term strategy for formal model development and where the Bank should invest its scarce resource. One principle could be to invest in areas where the Bank has a clear comparative advantage over the participating firms.

As the 2015 modelling strategy was implemented, we observed that progress tended to be monitored by the allocation and successful deployment of resources to model development. In our view, as more models go live and

experience is gained the Bank may wish to shift its assessment of model performance away from inputs and towards their impact during the round: how they have helped staff and policymakers make judgements, and what their value added was relative to those of the firms. That would help with future prioritisation efforts.

3.3 Further observations on delivery

The Bank has made strides in operationalising and delivering the annual stress test. Unsurprisingly, however, the delivery process is still maturing. In that regard we observed that both staff and the participating firms have a keen desire for the ACS cycle to run more quickly, motivated in part by lack of sufficient downtime to better reflect on lessons learned and effect change. This section considers areas where further evolution could help the framework mature. Box 3 considers lessons learned from the first BES.

(i) One-Bank working

During the evaluation we saw positive examples of improving cross-Bank processes. For example, scenarios are now constructed more efficiently compared with earlier years. We also saw positive examples of effective exploitation of cross-Bank expertise as identified by the 2017 work on consumer credit. More broadly, the process has successfully drawn together risk specialists, macroeconomists, financial stability experts, supervisors and prudential policy experts working towards common goals. In our view, this represents a major achievement.

We saw three areas for potential improvement from an already high base that would reduce residual frictions observed in the evaluation.

- First, enhancing further the utility of the exercise for the supervisory community — while respecting confidentiality — making it easier, for example, for them to access the data (Section 2.1 and 3.1). This is important as supervisors are ultimately responsible for feeding back the results of the stress tests and helping effect change with the firms.
- Second, enhancing the mechanisms supporting close and early co-operation between the teams working on stress-testing framework design and capital policy.
- Third, at the policy stages considering further ways to enhance how feedback is transmitted between the Committees and the specialist staff producing the analysis. That would be with a view towards improving staff's ability to anticipate/react to policy Committee members' needs as well as ensuring that information flows are focused.

(ii) Driving further effectiveness in the results and analysis phase

As part of our evaluation, we examined the staff level results and analysis phase, including observing meetings in the 2018 round. The Bank's ability to deliver is good and on an improving trend. Formal structures have been established and refined with experience to manage the production process and approve the results before they reach policy Committees. Those have a cross-Bank reach and provide review and challenge. Staff have also established an 'ex ante' expectations phase formally setting out their priors before the assessment of firm level results. This has supported scrutiny and challenge during the review process and helped staff prioritise areas of focus (Section 1.2).

As for further improvements, we believe the Bank could enhance its efforts to standardise the analytical approach across teams with an intent towards improving efficiency — for example by adopting a stronger emphasis on materiality in decision making.

Further standardisation can run the risk of group think and reduce experts' capacity to apply their judgement. In our view therefore, any change in approach should ensure that independent challenge continues to be built in at each stage of the review process. And, that (consistent with the themes set out in Section 4), at each stage of the process, key uncertainties and sensitivities are appropriately exposed. As it has done for model governance, the Bank could usefully document the approach, including making clear the delegated authorities that apply during the analysis and results phase.

The implementation of these recommendations as well as those from earlier in this section should, in our view, help mature concurrent stress testing. They should, over time, contribute to a shorter and less pressurised cycle. The Bank is making some progress on this front — for example, the time taken to run the staff-level results and analysis phase has fallen by about a month compared with early years. In order to elicit further process efficiencies the Bank could conduct a more formal review of some of the more 'production process' aspects — drawing for example on commercial best practice.

Box 3

The biennial exploratory scenario

As part of our evaluation we reviewed the BES — focusing on the delivery of the inaugural exercise in 2017. Because this was the first such exercise, it was inevitable that it would generate lessons for the future. The Bank is operationalising and taking forward these lessons for the next BES, to be launched in October 2019.

The BES aims to explore latent or emerging risks to financial stability or individual banks that may not be neatly linked to the financial cycle. The 2015 approach highlighted the types of risks it could capture. These included: different cross-correlations in variables to those seen in the ACS; the implications of a single event or structural break; vulnerabilities associated with particular business lines or portfolios of assets held by banks; and challenges from structural changes.

The 2015 approach document made clear that the BES should not be used to change the Bank's risk tolerance, but the results could nevertheless be used to determine '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 Bank's first BES examined major UK banks' long-term strategic responses to an extended low growth, low interest rate environment with increasing competitive pressures in retail banking enabled in part by an increase in the use of financial technology (FinTech). In other words it tackled a significant longer-term structural challenge. The scenario publication noted that the exercise would not focus on capital adequacy, but rather how banks would meet regulatory requirements and build sustainable business models in such an environment.

The BES was delivered to the same timetable as the ACS, broadly drawing on existing processes and data templates but with a bespoke cross-Bank team steering the exercise through. Like the ACS the delivery phase involved iteration with the firms on their responses, although ultimately the results were not adjusted.⁽¹⁾ The policy Committees considered the firms' responses as part of the round and the published sector-wide results alongside the ACS.

The exercise uncovered that, in the aggregate, banks projected that they could adapt to the scenario without major strategic change or taking on more risk — for example by cutting costs. This provided a means for the policy Committees to critique those projections, communicate their views of the risks and open a dialogue with the banks.

Discussion with staff, policy makers and the participating firms reveals that the BES was valuable. For example, internally, one important outcome is that it has provided further momentum to progress the Bank's future of finance initiative and its FinTech mission.⁽²⁾ And some firms fed back that it had provoked greater strategic thinking about business model risk.

(1) The Bank only adjusted results submitted by participating banks to make any necessary corrections. Unlike the ACS the results did not reflect the Bank's judgement. See Bank of England (2017c).

(2) See the Bank's website for more details of this initiative www.bankofengland.co.uk/research/future-finance.

The first exercise highlighted the importance of:

- Being clear upfront about the topics and questions to be addressed in the BES. The 2017 BES attempted to cover a range of structural issues, including FinTech and persistently low rates. It may have benefited from a narrower focus.
- Thinking early in the process about potential policy responses and working through the implications for the design and disclosure — for example, identifying whether the Bank will adjust projections, or adopt a staged approach to review and challenge them. That would help manage expectations between policy Committees and the firms and allow for better system-wide analysis.
- A clearer up-front plan for resourcing and producing the BES. The 2017 exercise levered off existing ACS processes and data templates – motivated in part by timing constraints and the absence of 'off the shelf' alternatives. This reduced the capacity of some firms to address bigger strategic questions highlighted by the exercise.
- Decoupling the timetable between the ACS and BES. Many firms noted that they had insufficient bandwidth to produce both the ACS and BES concurrently and risked the delivery of a lower quality product.
- Providing firms with more detailed feedback on the individual results of the exercise — beyond the strategic narrative contained in the publications.

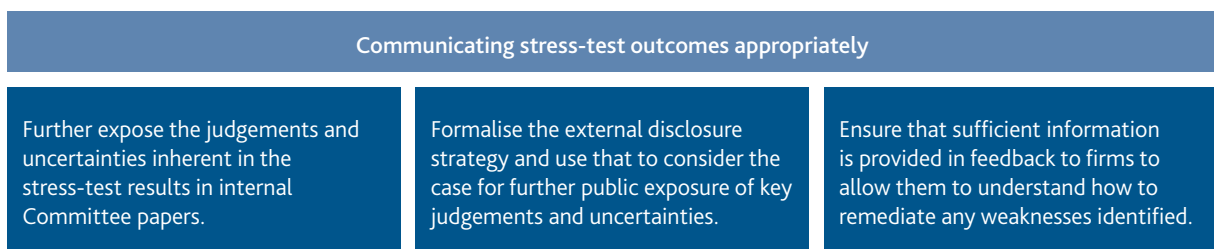
4 Evaluation — communicating stress-test outcomes appropriately

This section considers communication issues. Stress tests are a challenging communications exercise. Internally communications need to bring together enough information for policy makers to understand and scrutinise the analysis and confidently make policy decisions. Externally, the Bank’s public communications need to meet several objectives, which have the potential to compete: strengthening market discipline; instilling confidence in the banking system; and allowing for market and public scrutiny. The Bank also needs to provide enough private feedback to firms to support continuous improvements in their risk management and capital planning but without risking the integrity of future tests.⁽²⁰⁾

Overall, we find that the Bank has responded well to these challenges and is on an improving trend. Internal policy papers and the external publications are of high quality, commanding confidence from their readers. They have supported well-informed policy decisions and allowed policymakers to justify their actions publicly, so helping meet confidence and public accountability goals. The Bank’s private feedback to firms has been improving, with increasingly coherent messages. More broadly, during the evaluation we saw positive examples of the stress tests serving to improve firms’ understanding of their own risks.

In our view there is scope to further enhance the value of communications and articulate the strategy. Internally, we see a good case for further systematic exposure of judgements and uncertainties in policy papers (Section 4.1). The Bank could better formalise its external disclosure strategy to help policymakers navigate the disclosure decisions they need to make during the round (Section 4.2). And we believe that the Bank could enhance the feedback it provides to firms to help them remediate weaknesses identified (Section 4.3). The evidence in this section relates to our third and fourth evaluation criteria on how the stress tests inform policy and supervisory outcomes, and whether they improve public accountability and confidence in the system. This section focuses on the ACS experience. Some of the lessons may also be relevant for future BES exercises.

Figure 4.1 Recommendations — communicating stress-test outcomes appropriately



4.1 Internal communications during the stress-test round

Before the stress-test results are signed off there is collaboration, and structured review and challenge across different business areas (Section 3.3) and a number of FPC and PRC meetings. There are joint meetings to identify key issues requiring further work in the early stages and to sign-off the results at the end. In addition, the FPC discusses and challenges macroprudential trends, such as projected sector-wide impairments rates. Separately, the PRC meets to discuss and challenge firm-specific results and the outcomes of the qualitative review. The papers and briefing needed to provide the Committees with enough information to understand and scrutinise the results and to support their policy decisions are considerable. Committee time is scarce, putting an onus on concise communication. We therefore reviewed the internal papers and gathered feedback from Committee members to assess whether the right information was reaching them at the right times to support their roles.

(20) Full disclosure of stress-test methods risks firms ‘gaming’ the system — that is minimising estimated stress-test losses by optimising their portfolio characteristics based on the parameters of the model/stress-test methods and taking risks in areas not well captured by the stress. See Tarullo (2016).

We observe that the papers sent to Committees during this phase have increasingly brought together a clear coherent account of the results drawing on cross-Bank expertise. These explain the drivers behind the stress-test results, their evolution compared with previous years, and the policy outcomes they might suggest. In line with the Bank's strategic plan, Vision 2020, the papers need to be concise with clear recommendations. Overall, they command confidence from policymakers.

We also observed that Committees regularly ask for more information on key judgements, uncertainties and sensitivities in the results. That includes adjustments staff make to firms' results, such as changes to projected impairment rates. It also includes system-wide assumptions that the staff and firms use when making judgements, such as the assumed degree of pass-through of changes in Bank Rate. It is understandable that Committees will ask for additional information. Moreover some less-material judgements should be taken below the Committee level, with good working level challenge (Section 3.3). Indeed, sign off on all judgements runs the risk of burying the most important issues. And during our evaluation we did not find evidence that a key judgement had not reached the Committees prior to sign-off.

We think more could be done to ensure the systematic exposure of key judgements, uncertainties and sensitivities to the Committees. In order not to sacrifice brevity in the main papers, one option could be to maintain a record of key judgements, as is the case for the MPC forecast, for annual review by the FPC and PRC. That would better enable Committee members to provide focused challenge, without blurring the key messages. It would also help newer members familiarise themselves with the judgements more efficiently. Writing down delegated authorities for decision making below the Committee level, as suggested in Section 3.3, would also assist in meeting this recommendation.

4.2 External disclosure

In its external publications the Bank discloses information about: the approach to stress testing, including the design of any one scenario; the stress-test results; and policy outcomes or remedial actions. Results disclosure can support accountability by helping the Bank explain its policy actions. It can also build confidence in the system by reinforcing the credibility of the framework and the policy decisions that it informs. But there are also potential tensions between those disclosure objectives. For example, disclosure can strengthen market discipline by improving market participants' understanding of banks' vulnerabilities, but it could also diminish market participants' incentives to collect and process information independently. And although transparency over the Bank's assumptions and models supports accountability, it could also discourage firms from exploring different approaches or incentivise them to reduce only modelled, rather than actual, risk.

We reviewed publications, conducted international comparisons and gathered views from external users to evaluate whether the disclosure delivers enhanced accountability and confidence as intended. We found that the publications have become increasingly clear and focused on the key messages. They explain how the results inform policymakers' assessment of the system's resilience and justify the actions taken. That has provided a means for policy Committees to demonstrate accountability for their decisions and helped support confidence objectives. Our outreach suggests that, in the main, users and commentators are positive about the publications, including their clarity and utility (see Box 2). Box 1 briefly describes the disclosure arrangements in other jurisdictions.

We also observed that, as anticipated in the 2015 approach document, disclosure has evolved over time. This evolution has reflected deliberate choices given the topics explored in the test. For example, given the global elements of the scenario in 2015, international impairments were added to the data disclosure. The extent to which key judgements and uncertainties are exposed in the results publications also varies, in part according to the prevailing circumstances of the test. For example, Box 4 explains that following the FPC and PRC's deep-dive on consumer credit, the rationale behind the Bank's judgements on consumer credit impairment rates was disclosed. But we also generally observed over our review period that as the stress-test results have shown improving resilience, the uncertainties around that central view have become less prominent in the publications.

The Committees spend time discussing and agreeing disclosure options during each stress-testing round. Given the potentially conflicting objectives of stress testing disclosure and that once disclosure is added it is difficult to later remove, we believe that such decisions should be aided by a pre-agreed strategy (encompassing a set of clarificatory principles on trade-offs). This would help ensure that, if faced by changing Committee personnel or a changing risk environment, the stress-test publications continue to serve policy objectives according to a well-informed analysis of the benefits and risks.

We also recommend that the Committees use that strategy specifically to consider the case for more systematic disclosure of key judgements and uncertainties underlying the stress-test results. The case to do so is finely balanced. On the one hand, as was the case for the consumer credit judgements in 2017 (see Box 4), it could support market discipline by giving a richer picture of the assumptions upon which the tests are based and it could enhance the accountability benefits of the exercise by equipping outside observers with further information to scrutinise the results. On the other hand, it could also risk over-reaction to news between publications.

4.3 Private feedback to firms

A key aim of CST is to support continued improvement in banks' own risk management and capital planning. To achieve this, as part of CST, the Bank undertakes a qualitative review of banks' own stress tests. This looks at the extent to which firms' results require adjusting and thematically reviews the supporting infrastructure, such as firms' models, data or governance processes. This element of the stress test is still under development and has been improving through time. Feedback is provided to firms, originally only verbally, and since the 2016 exercise supplemented by letters. We reviewed the letters from the 2017 test and gathered feedback from firms to assess whether the framework is equipping them with the information they need to deliver improvements over time.

We found some positive examples of the Bank using its feedback to improve firm understanding of their risks. For example, where relevant, the 2017 letters explained how the FPC and PRC's consumer credit judgement had affected firms' results, in line with the public communication.

Although some firms recognised that this part of the framework was improving, most believed that feedback was still insufficient to allow them to understand and remediate all weaknesses in their approach. This is understandable, up to a point, in part because the Bank is cautious in providing firms with too much detail on adjustments. This reflects factors such as: constraints in sharing private information received from other authorities; the risk that the firms use information to reduce measured, rather than actual, risk of losses; and the risk that further openness creates room for protracted negotiation. Feedback is therefore generally high level. And we observed that there is some inconsistency between letters to different firms in the level of detail and themes covered. The timing of the feedback, at the end of the stress-testing cycle may also be sub-optimal as firms have little time for remediation between receiving feedback and beginning the next test.

The Bank is already increasing its focus on this element of the framework, aiming to provide more thematic root cause analysis of issues with firms' results, such as differences in modelling approach. We see scope to continue to improve along these lines, and to do so consistently across firms. Using the letters to highlight themes rather than providing an accounting breakdown of adjustments should avoid some of the risks of transparency while equipping firms with the information they need to remediate issues. Based on the effectiveness of the qualitative review in the United States (see Box 1), a further push may require an increased resource focus on this part of the framework (Section 2.3), and may benefit from further development of models and analytical tools (Section 3.2).

The Bank could also explore other ways to help firms improve their stress-testing approach. Some firms would welcome earlier sight of the emerging themes of the qualitative review through less formal communication channels. The Bank could also consider drawing on the practice in the United States of publishing best practice stress-testing methods or hosting forums to communicate expected standards and facilitate discussion between firms.⁽²¹⁾

(21) See for example, Federal Reserve (2013) and Federal Reserve Bank of Boston (2017).

We note that in the November 2018 *Financial Stability Report*, the PRC indicated that it 'is minded to include reference to qualitative review outcomes in next year's publication of bank specific assessments'.⁽²²⁾ This would place even greater importance on ensuring that firms are consistently equipped with the time and information needed to drive improvements.

(22) See Bank of England (2018a).

Box 4

Consumer credit judgements in the 2017 stress test

Following a period of rapid growth in consumer credit portfolios, the consumer credit element of the Bank's 2017 ACS was accelerated and given heightened focus. This provides a useful case study across our evaluation themes.

The more timely and rigorous assessment of consumer credit undertaken during the 2017 stress test **enhanced the value of the test for both macro and microprudential objectives**. As stated in the relevant FPC record, 'By accelerating this assessment, the FPC was aiming to support timely corrective action and a more prudent assessment of risk in an environment of rapid consumer credit growth'.⁽¹⁾ And the PRC was able to use the stressed loss projections to ensure that individual firms were resilient to any emerging risks, through the existing mechanisms for calculating the PRA buffer.

From a challenging starting point, the consumer credit project was **delivered effectively**. Consumer credit was an example of a sector in which the Bank had few formal models, especially for considering impairments during a period of economic downturn and rising interest rates. There was also uncertainty around the extent of improvement in credit quality since the financial crisis. The project team therefore needed to draw on a range of evidence and analytical tools to develop their conclusions for the Committees. This included evidence from credit scores, levels and distribution of debt relative to income and historical relationships between loan losses and macroeconomic factors. It also drew on a PRA review of regulated firms' asset quality and underwriting practices. Cross-Bank co-operation helped deliver this high priority project in a nimble manner. The project brought together experts from across four areas of the Bank. A Steering Group helped to ensure that the work remained focused on the policy objectives and cross-Bank challenge sessions ensured there was appropriate review of the analysis from a range of stakeholders.

The consumer credit results in the 2017 stress test were also **communicated appropriately**, adding to the value drawn from the exercise for the Committees, external observers and firms. A key judgement was the extent to which the recent improvement in consumer credit performance had been driven by underlying improvement in credit quality, rather than the macroeconomic environment. Staff papers to PRC and FPC focused on this judgement, presenting the sensitivity of the stress-test results to different assumptions about credit quality. The Record of the FPC meeting on 20 September 2017 and the 2017 stress-test results communicated the Committees' judgement on credit quality, presenting the range of evidence underlying it. This supported the accountability objectives of the test, for example allowing for open and in-depth discussion at the Treasury Select Committee. And it enhanced the confidence effects of the tests, with the Committees able to demonstrate the system's resilience to this emerging risk and their policy responses. Where relevant it was also included in the firm feedback.

(1) See FPC (2017).

Annex Background to the evaluation: remit, scope and methods

In February 2018, the Bank of England's Court of Directors (the Bank's board) commissioned its IEO to conduct an evaluation of the effectiveness of the Bank's approach to concurrent stress testing. Court considered that an IEO evaluation at this juncture was appropriate, particularly as the Bank was planning to review and update its approach to stress testing in 2019.

The purpose of the evaluation has been to determine: how well the aims of the approach have been achieved; how far the agenda has progressed relative to expectations — mindful that the approach was both novel and ambitious; and the effectiveness of delivery. We paid particular attention to how well the framework was meeting policymakers' continuing needs, as well as the perspectives of the participating firms given their integral role in the tests.

In line with the approach taken in previous reports, we developed a set of criteria based upon key research questions describing what 'good' should look like and against which the effectiveness of the Bank's approach could be judged. Specifically these were:

Evaluation criteria	Research questions
(i) Effective scenario design	Is the scenario setting process comprehensive, delivering plausible outcomes — and in line with the published strategy? Is the scenario setting process efficient and well governed?
(ii) Effective analysis and results processes	Has the Bank delivered high-quality analytical approaches to deliver its stress-test results? Has it effectively operationalised its published strategy (use of models, implementation of data strategy etc)?
(iii) Appropriately informs macro and microprudential policy; positive impacts on firms' own capital and risk management practices	Has the Bank put in place adequate arrangements to ensure that the stress test appropriately informs policy and supervisory outcomes? Are they effective?
(iv) Improved public accountability and confidence in the system	Does the framework deliver on public accountability and confidence in its intended manner?
(v) Efficiency and costs	Do the elements of the framework hang together efficiently? Are the costs of delivering the tests well understood?

These criteria are sufficiently broad to encompass both the ACS and BES. Most of our focus was on the ACS given that the Bank has relatively more experience of that type of stress testing. But we also conducted a case study on the delivery of the first BES.

Consistent with the IEO's principle of not commenting on live policy, the evaluation did not focus on the 2018 test and policy questions being actively considered by the business were out of scope.⁽¹⁾ We did not evaluate other stress tests that the institution runs — such as insurance stress testing — or is developing — such as system-wide stress testing. We did, however, take note of important touch points between the concurrent framework and other forms of stress testing such as those individual banks run as part of their ICAAPs (Section 2.3).

(1) We observed some meetings in the 2018 staff-level results and analysis phase where we focused on process issues. We also conducted interviews with staff while the stress tests were being run.

To inform our findings, the team received full and unrestricted access to relevant internal documents, committee papers and staff for interview. A survey was completed by selected individuals with a role in stress testing. A full description of the IEO's methods is set out below:

Input	Details
Desk-based review	Thematic analysis of internal and external policy and strategy documents including: scenario design and analysis; stress-test results; modelling strategy; publication and disclosure strategy etc.
Interviews and survey	Approximately 90 interviews with staff in FSSR, SRS, UKDT and their key internal stakeholders, and 130 responses to an IEO survey. ⁽²⁾ Separate meetings and feedback from PRC and FPC members. In-depth interviews with the participating firms (at both executive and separately non-executive director level); a roundtable with external commentators, economists and analysts; and individual interviews with other notable commentators.
Meeting observation	Working-level results meetings in the 2018 round.
Case studies	Including for example, the decision to switch assumption from falling interest rates to rising rates in the 2017 scenario ('rates up'); consumer and wholesale credit adjustments in 2017; the 2017 BES.
Peer comparisons	Basic international comparisons with the United States, the European Union and Japan.

The evaluation was primarily conducted between June 2018 and January 2019.

The evaluation benefited from input and challenge from Dimitri Demekas, an IEO-appointed external advisor. Mr Demekas was formerly an Assistant Director of the IMF's Monetary and Capital Markets Department and is currently a Visiting Senior Fellow at the Institute of Global Affairs of the London School of Economics.⁽³⁾ Mr Demekas has also reviewed and endorsed the findings in this report.

The IEO team was also aided by a Bankwide Senior Advisory Group, which included internal senior representation from Financial Stability and Prudential Regulation, Legal Directorate as well as external members of the FPC and PRC.⁽⁴⁾ The group met on a monthly basis and provided comment and challenge throughout the project.

Consistent with previous IEO evaluations, the team's work was run at arm's length from the business areas and reported directly to the Chair of the Bank's Court of Directors. As such, recommendations and analysis contained in this report are the sole responsibility of the IEO. The report is based on data and information available to the IEO as of 23 April 2019.

(2) The IEO survey received a response rate of 35%.

(3) As with all IEO evaluations, external advisors were offered remuneration at the Bank's standard daily rate for senior external advisors.

(4) Membership consisted of: Nicola Anderson (Director, Financial Stability Strategy and Risk), Sandy Boss (external member of the Prudential Regulation Committee), Alex Brazier (Executive Director, Financial Stability Strategy and Risk), Charlotte Gerken (Director, Cross-cutting Policy, previously Director, Supervisory Risk Specialists), Simon Hall (Head of Division, Banking Policy), Ashley Kibblewhite (Head of Division, Risk Analytics Liquidity & Capital), Donald Kohn (external member of the Financial Policy Committee), Jane Leach (Senior Advisor, Regulatory Operations), Jack McKeown (Head of Division, Stress Testing Strategy Division), Rob Price (Director, Legal Directorate) and James Proudman (Executive Director of UK Deposit Takers Supervision).

Glossary

ACS – annual cyclical scenario.
BES – biennial exploratory scenario.
BoJ – Bank of Japan.
CCAR – Comprehensive Capital Analysis Review.
CCyB – countercyclical capital buffer.
COREP – Common Reporting.
CST – concurrent stress test.
EBA – European Banking Authority.
ECB – European Central Bank.
FINREP – Financial Reporting.
FinTech – financial technology.
FPC – Financial Policy Committee.
FSAP – Financial Sector Assessment Program.
FSSR – Financial Stability Strategy and Risk.
IAS 39 – International Accounting Standards 39.
ICAAP – Internal Capital Adequacy Assessment Processes.
IEO – Independent Evaluation Office.
IFRS 9 – International Financial Reporting Standard 9.
ID – International Directorate.
IMF – International Monetary Fund.
MA – Monetary Analysis.
MPC – Monetary Policy Committee.
PRA – Prudential Regulation Authority.
PRC – Prudential Regulation Committee.
SRS – Supervisory Risk Specialists.
STSD – Stress Testing Strategy Division.
UKDT – UK Deposit Takers Supervision.
XBRL – eXtensive Business Reporting Language.

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