



# UK Consumer Credit Stress Testing

From markets to modelling:  
what financial institutions need to know

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# Executive Summary

**In this paper, we give an overview of the stress testing framework in the UK, describe how recent changes will impact the consumer credit risk landscape and provide a checklist of key things you need to assess consumer risk in your organisation.**

It starts with a brief history of stress testing and then focuses specifically on the UK consumer credit sector, describing its composition and discussing the related risks as repeatedly highlighted by the regulators in 2017.

The next section describes the key elements of a successful consumer stress testing programme-giving an overview of modelling methodologies and how to introduce macroeconomic effects when modelling the probability of defaults and losses, with specific focus on unsecured lending.

Finally, a discussion is presented on what the future may hold for lenders with elevated exposure to consumer credit and what challenges they are likely to face in response to the new requirements.

If you have any questions or need additional stress testing guidance, you can get in touch with our experts by emailing **[risk@jaywing.com](mailto:risk@jaywing.com)**.

# Contents

## **Introduction**

### **1. Stress testing background**

- A brief history
- Scope
- Measuring the stress

### **2. Consumer credit sector**

- The consumer credit sector in the UK
  - » Credit cards
  - » Unsecured personal loans
  - » Motor finance
- Regulators' pronouncements on consumer credit
  - » 2017 PRA Review
  - » Results from BoE CST 2017 and FSR Dec 17
  - » Follow up to PRA Statement on consumer credit published in January 2018

### **3. Key elements of a consumer stress test**

1. Data
2. Modelling methodology
3. Incorporating macroeconomic effects
4. Model validation
5. Model execution
6. Management and Governance

### **4. Expectations for the future**

### **5. Conclusions**

# Introduction

**The aim of a 'stress testing' exercise is to assess the resilience of a financial institution to a macroeconomic shock or a contraction in the financial markets, quantifying the implications of plausible but extreme events on the institution's profits, capital, value or liquidity.**

The practice of running stress testing simulations for internal assessment has been in use at some larger financial institutions since the early 90s—but proper requirements were introduced only with the Basel II accord in 2004. Following the 2008 financial crisis, stress testing became a fundamental element of the regulatory landscape.

One of the major triggers of the 2008 financial crisis was a sudden lack of liquidity in the market as confidence dropped and banks stopped lending to the public and to each other. The extreme contraction in lending and the disastrous domino effect experienced by the financial and banking sector highlighted weaknesses and limitations of the previous stress testing regime. This prompted a series of interventions by regulators across the world and has driven the continuous evolution of stress testing requirements and practices since.

**The extreme contraction in lending and the disastrous domino effect experienced by the financial and banking sector at the time highlighted weaknesses and limitations of the previous stress testing regime.**

Since 2013, UK banks with large exposures defined as more than £50 billion (since 2015) take part in an annual Concurrent Stress Test (CST) run by the Bank of England's (BoE) Prudential Regulation Authority (PRA) with the publication of common scenarios. Smaller institutions are included in the broader process through the Internal Capital Adequacy Assessment Process (ICAAP).

ICAAP is an internal review to evaluate an institution's capital adequacy planning, focusing on all the risks that it faces in its activity, and must be submitted to the PRA annually. ICAAP was originally introduced in 2004 as part of the Basel II guidelines to define Pillar II. Similar to stress testing for larger organisations, it was implemented across the major economies only after the 2008 financial crisis and it has been on a path of continuous improvement since.

Stress testing whether in the form of CST or as part of ICAAP for smaller firms is used by the regulators to judge the appropriate level of capitalisation required in the system, by individual institutions to understand how their business would perform under challenging economic conditions and to estimate the amount of capital required through the economic cycle.

The rapid growth of the UK consumer credit sector in the last five years has been regarded by the BoE as a threat to financial stability.

Although recent figures show a slowdown of the annual growth of consumer credit to 9.3% in February 2018, the sector remains on a trajectory of rapid increase in all main lending segments of credit cards, unsecured personal loans and dealership motor finance.

**The rapid growth of the UK consumer credit sector in the last five years has been regarded by the BoE as a threat to financial stability.**

Concerned by this significant growth, in 2017 the PRA undertook a review of the UK consumer credit market. The attention has been focused on firms with significant exposure to the market, including an assessment of asset quality and underwriting practices. Given benign economic conditions it is believed lenders could have overestimated customers' credit quality and progressively loosened lending standards, extending their offers to higher risk segments of the market. It is feared consumer credit lenders may now be vulnerable to significant losses in the event of an economic downturn.

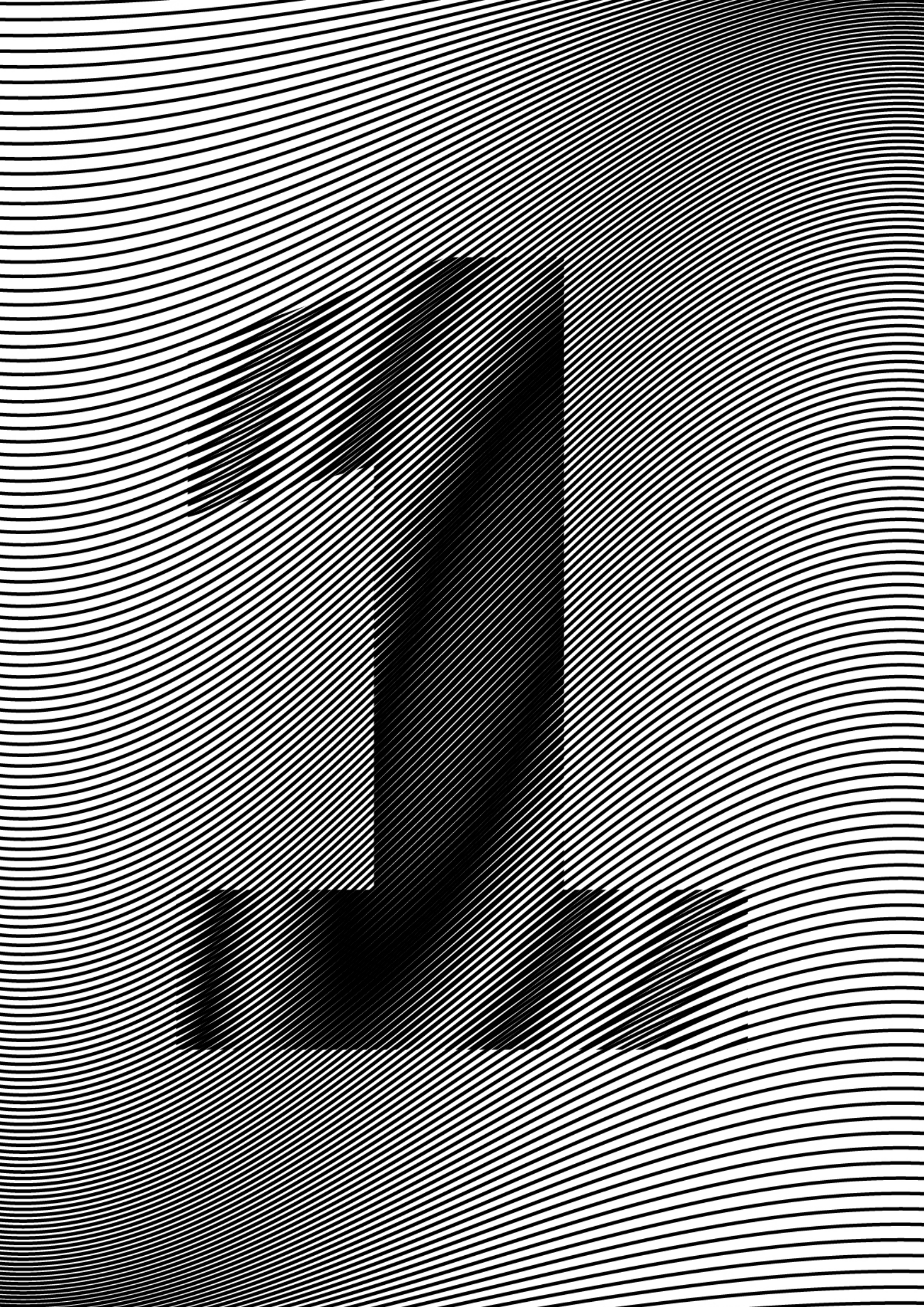
**Stress testing is used by individual institutions to understand how their business would perform under challenging economic conditions and to estimate the amount of capital required through the economic cycle.**

The regulators presented the results of the BoE 2017 CST on the consumer credit sector to the September 2017 Financial Policy Committee and set its view on the expected loss rate in the stress scenario. The final results published at the end of November 2017, despite painting a rosy picture of current UK capitalisation and the resiliency of the banking system to a hypothetical and extreme deterioration in future economic conditions, have confirmed that the consumer credit sector remains as an area of concern for the regulators, with interventions on individual banks' capital buffers expected.

Clearly the BoE has been monitoring this area of lending more closely since last year and will continue to do so in the future, with the possibility of further stress testing requirements to be introduced, as a result, for institutions with high exposure to consumer lending.

Economic growth in the UK is currently sustained, but uncertainty surrounding Brexit and the possible impact on economic growth and labour market conditions mean that credit segments exposed to higher risks will be closely monitored.





Section 1

# Stress Testing Background

# A brief history

## **Stress testing for larger organisations**

Early stress testing exercises were firm specific. Individual companies used their own internal models and scenarios to simulate how adverse economic conditions would impact their profits and capital position and the regulators reviewed the results on an individual basis. Following the financial crisis, it became clear how just one financial entity can trigger a domino effect that puts the whole economy in jeopardy. The crisis required significant interventions by central banks and national governments and the need to implement a rigorous and comprehensive stress testing framework has since become a central element of banking regulations.

The European Banking Authority introduced a new EU-wide stress testing framework in 2009, while the US introduced new stress testing regulations in 2012 and then again in 2014, with the Dodd-Frank Act.

In the UK the BoE is now directly accountable to Parliament for the fulfilment of certain financial stability objectives. In 2013, the BoE introduced a new form of stress testing for the UK. One of the most important elements of the new regime was the 'concurrent' framework, where all participating banks must run the exercise simultaneously and apply the same central scenarios, for easier comparability of results. Another major change was a proposed analysis on feedback and amplification mechanisms from a centralised perspective with the BoE being in the perfect position to opine on this point, receiving consistent and comparable outputs from participating banks within the 'concurrent' framework.

Analysing the consequences of an adverse macroeconomic shock on the interrelations between individual institutions is proving a major challenge, although some progress has been made since the publication of the 2013 paper.

## **Analysing the consequences of an adverse macroeconomic shock on the interrelations between individual institutions is proving a major challenge, although some progress has been made since the publication of the 2013 paper.**

In 2015, in response to the feedback received after the first three rounds of stress test under the new regime, the BoE followed up with a second framework defining paper. The 'update' paper introduced an additional type of scenario, the 'exploratory' scenario, to be run every other year, with the intention of analysing the impact of 'different types of risk' not considered in the annual stress scenario. This scenario introduced new rules around the minimum capital requirements and the setting of capital buffers and defined the principle of 'proportionality'. While today the Concurrent Stress Test (CST) is applicable only to institutions with assets in excess of £50 billion, smaller lenders can be included 'by proxy' via the Internal Capital Adequacy Assessment Process (ICAAP). Smaller lenders are not held to the same standards as banks with large exposures, but the CST framework and results have become a sort of hidden benchmark for the wider market.



## **ICAAP**

ICAAP was originally introduced in 2004 as part of the Basel II guidelines to define Pillar II, but it was implemented across the major economies only after the 2008 financial crisis and has been in a state of continuous improvement since its introduction.

ICAAP is an internal review exercise to evaluate an institution's capital adequacy and capital planning, focusing on all its activity including credit, market and operational risks. The results are submitted annually to the PRA, which not only judge the suitability of the risk assessment and the capital planning submitted, but also scrutinise the firm's senior management and board understanding of the major risk exposures and their involvement in the ICAAP process.

Similarly to the CST, the ICAAP assessment comprises an institution's capital planning and stress testing assumptions. In particular for organisations with shorter data history, it is likely that the regulators would benchmark the results obtained against comparable institutions with longer available history.

# Scope

Stress Testing exercises are run to ensure that lenders are sufficiently capitalised and able to continue lending to the economy even in difficult economic times. In 2008, one of the main catalysts of the financial crisis was the drop of confidence in the financial markets and the widespread contraction of lending in the banking sector.

# Measuring surviving the stress

**The PRA must consider the impact of the stress on a firm's capital position. The main measures the PRA considers are:**

- » The firm's surplus capital resources over their Total Capital Requirements (TCR) is the primary measure used when the PRA considers a stress buffer.
- » The CET1 – Common Equity Tier 1 – ratio, measured as the ratio between the bank's CET1 Capital and its Risk-Weighted Assets. A deterioration of economic conditions causes a depletion of core capital and a contemporaneous increase in RWAs, with consequent drop of the ratio.
- » The Leverage Ratio, which is calculated as Tier 1 capital expressed as a percentage of the total exposure (including off-balance sheet exposures but excluding central bank reserves) and represents how leveraged a bank is in relation to its total assets.

## Setting of Capital Buffers

If a firm's capital position falls below TCR or minimums for CET1% or leverage ratio it can be subject to a number of sanctions by the PRA, including restrictions on lending. However, without regulatory intervention, firms have no incentive to hold additional capital because it limits profitability. To address this firms are subject to several other capital buffers that make up Pillar 2B:

- » Macroprudential Buffers; Individual central banks have the power to use macroprudential tools to increase market specific capital requirements. The Financial Policy Committee (FPC) has currently determined a Countercyclical Capital Buffer (CCyB) of 1% of a firm's RWAs
- » CRD IV Buffers; additional capital buffers for systemically important firms and a Capital Conservation Buffer (CCB) for all other firms. The CCB will be set at 2.5% of RWAs from 1/1/19 (currently 1.875%)
- » PRA Buffers; additional buffers set following stress testing performed during ICAAP and for perceived deficiencies in a firm's Risk Management and Governance (RM&G).

A solid stress testing or ICAAP framework and a good understanding of the risk carried in the balance sheet are necessary to manage a PRA Buffer. In a competitive environment, a reasonable buffer is essential to maintain profitability and returns on capital.

## An important risk management tool

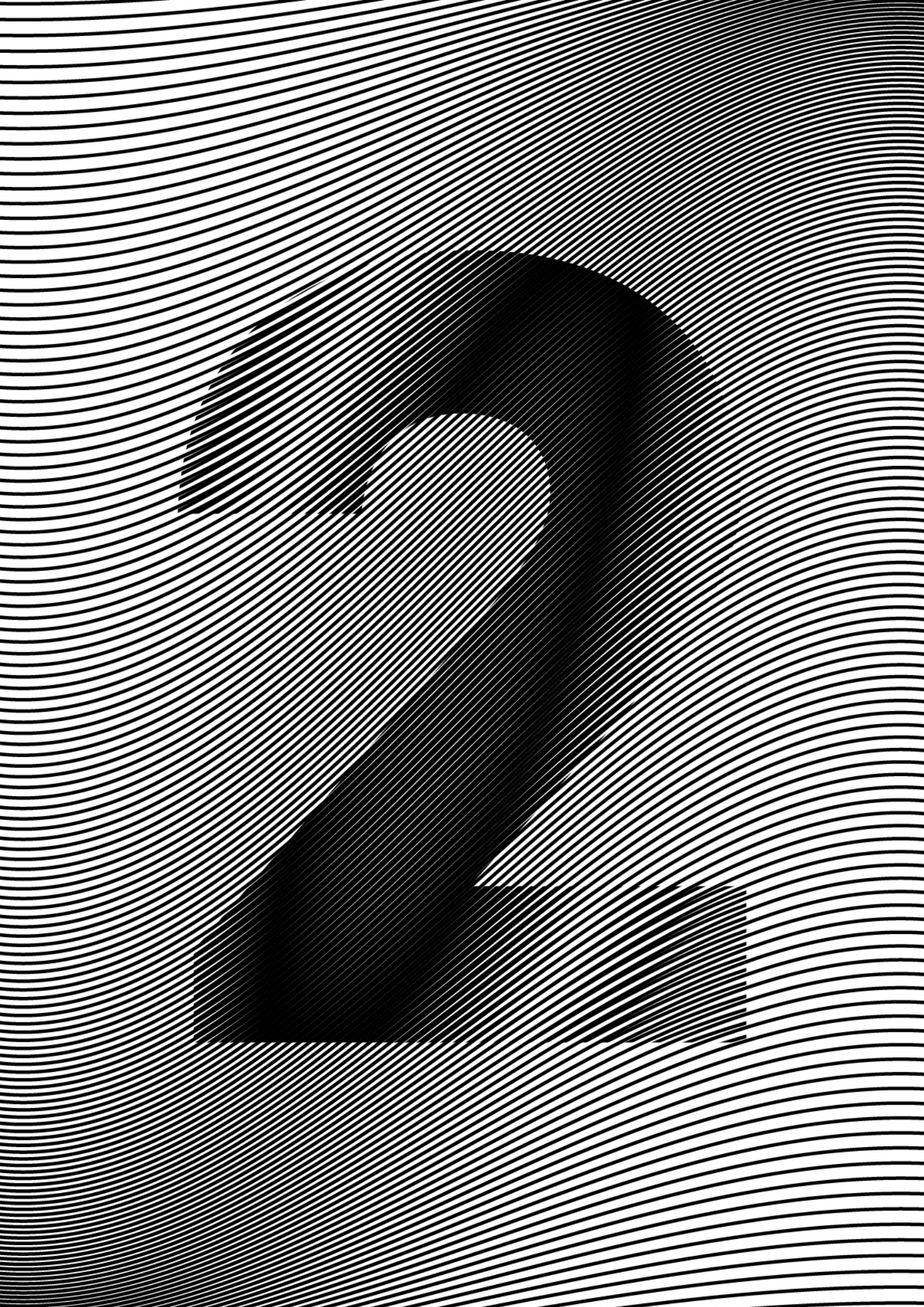
Stress testing structures can be used as a risk management tool and to inform a firm's strategic and capital planning as well as the setting of its risk appetite framework.

## Scenarios

As part of the annual CST, the BoE publishes base and stressed macroeconomic scenarios. Following the 2015 update paper on the UK Stress Testing framework, every other year the BoE also publishes an additional exploratory scenario.

- » The Annual Cyclical Scenario (ACS) covers the evolution of the main macroeconomic variables and financial market indicators in the following three years. It is countercyclical as the severity of the stress increases if risks are building up and decreases if risks are contained. The participating banks are expected to calculate the impact of these scenarios on their profitability and capital position over the forecasting horizon.
- » The Biennial Exploratory Scenario (BES) is run every other year to test the resilience of the system to possible threats to financial stability which may not be directly linked to the financial cycle.

For example, in the first BES test run in 2017, the BoE asked participating banks to disclose business plans and strategy changes that they would put in place to face specific emerging risks. This included persistent low interest rates, a further slowdown in global trade and productivity growth and an increase in competition pressure, mainly coming from emerging fintech.



Section 2

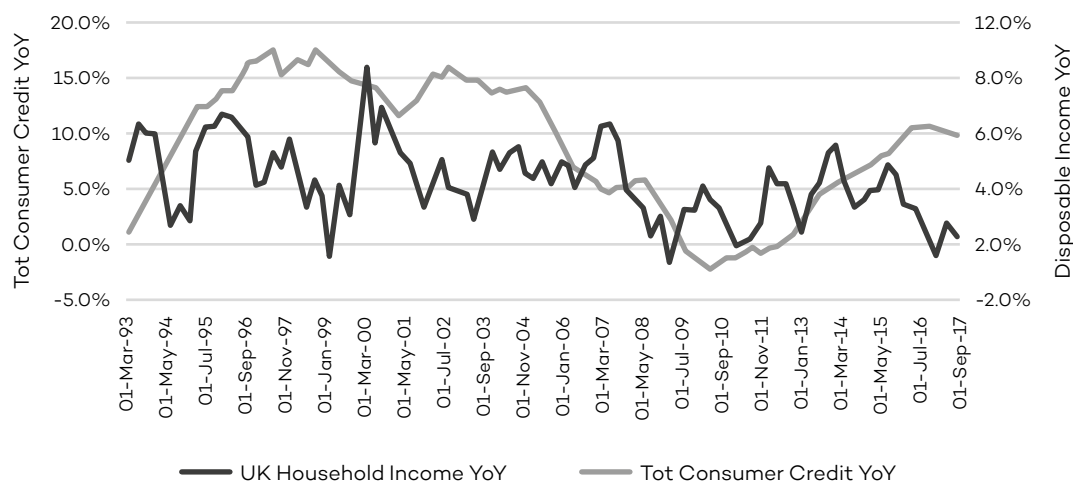
# Consumer Credit Sector



# The consumer credit sector in the UK

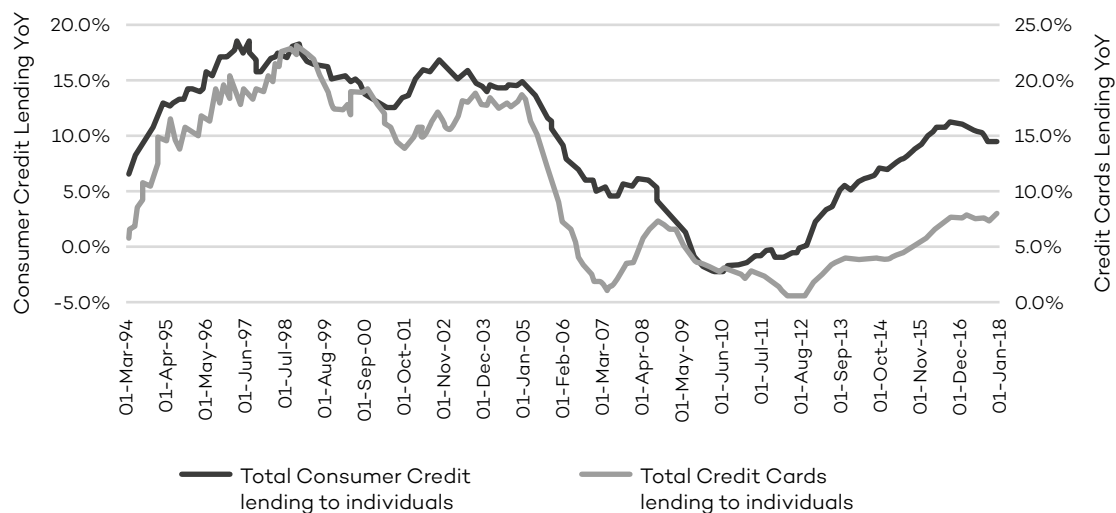
## Sustained consumer credit growth since 2013

In the UK the consumer credit sector accounts for less than 10% of the stock of total lending to individuals. However, in 2017 the regulators began to increase their scrutiny of the sector, as borrowing in the form of credit cards, personal loans and motor finance was growing faster than nominal household income:



UK consumer credit growth and nominal household disposable income growth

In the first quarter of 2018 overall consumer credit has fallen for the first time since 2011, but not all forms of borrowing have lost pace. In February 2018, credit card lending jumped to the highest level since before the financial crisis:



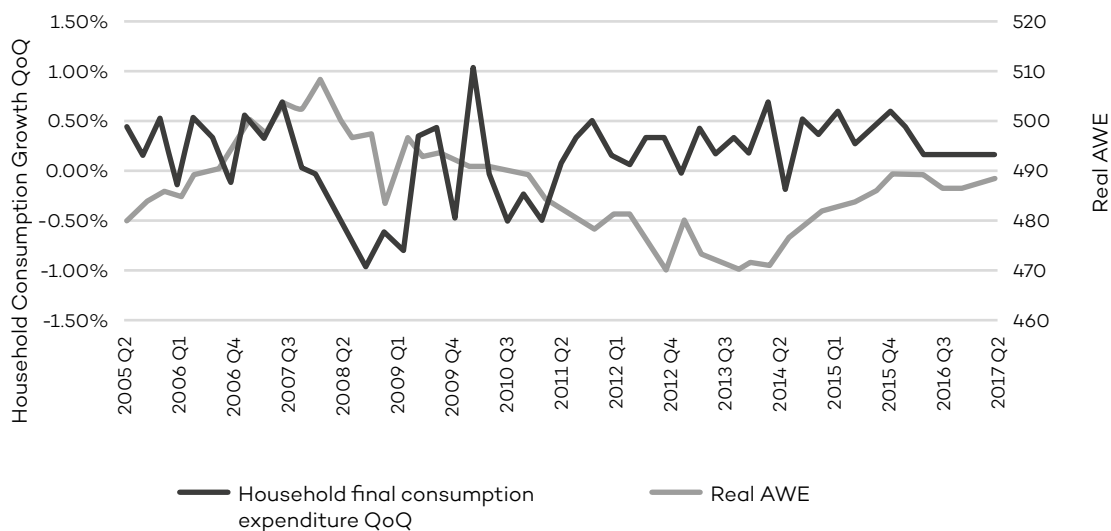
UK consumer lending to individuals

Consumer credit growth is more contained than it was in the ten years leading to the 2008 crisis, but although the level of consumer credit is not high relative to household income compared to historical values, it has been growing quickly since 2013:



Ratio consumer credit vs nominal household disposable income

Breaking down the individual components, credit card lending grew by 9% in 2017, personal loans by 7% and vehicle finance by 15%. At a time when real wages have shrunk to pre-2008 levels, borrowing through unsecured products has sustained UK consumption growth:



UK consumption growth vs real average weekly earnings

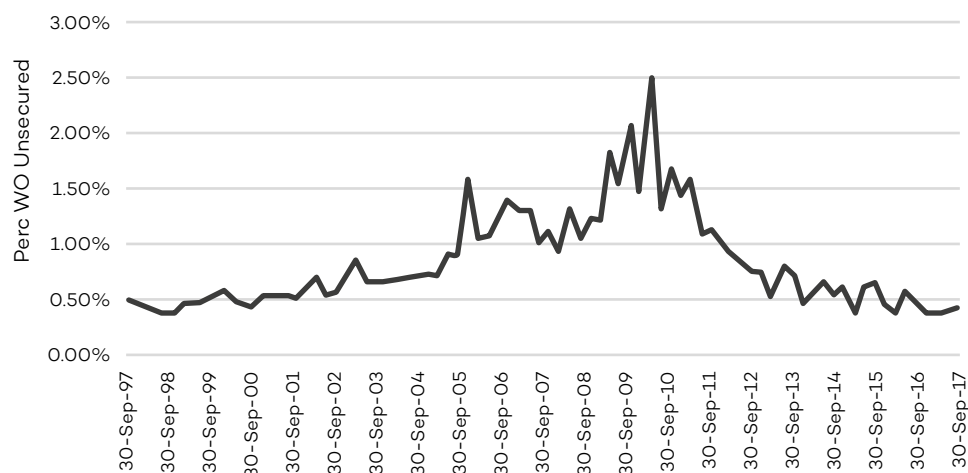
## Risks of uncontrolled growth

Despite the relatively low volumes on total lending in the last year the BoE has expressed on several occasions their concerns over an uncontrolled growth in consumer credit, as losses in the sector tend to rise significantly in an economic downturn.

By nature, this type of lending is not secured on any collateral preventing lenders from using the value of a secured asset to contain losses. Losses on consumer credit are likely to increase more in relation to secured credit under deteriorating economic conditions or an increase in interest rates. This is because creditors tend to default on credit card or unsecured personal loan obligations rather than miss mortgage payments and risk losing their property.

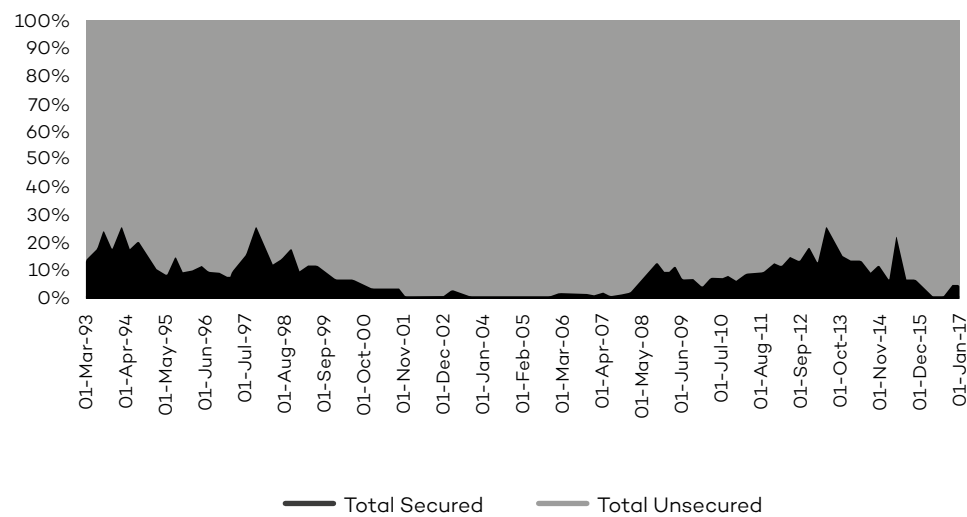
Defaults on consumer debt have fallen in recent years given more conservative lending practices after the 2008 financial crisis, coupled with sustained employment growth and consistently low interest rates.

The write-off rate on unsecured lending is currently one fifth of the peak level experienced during the 2008 recession and at very low levels historically:

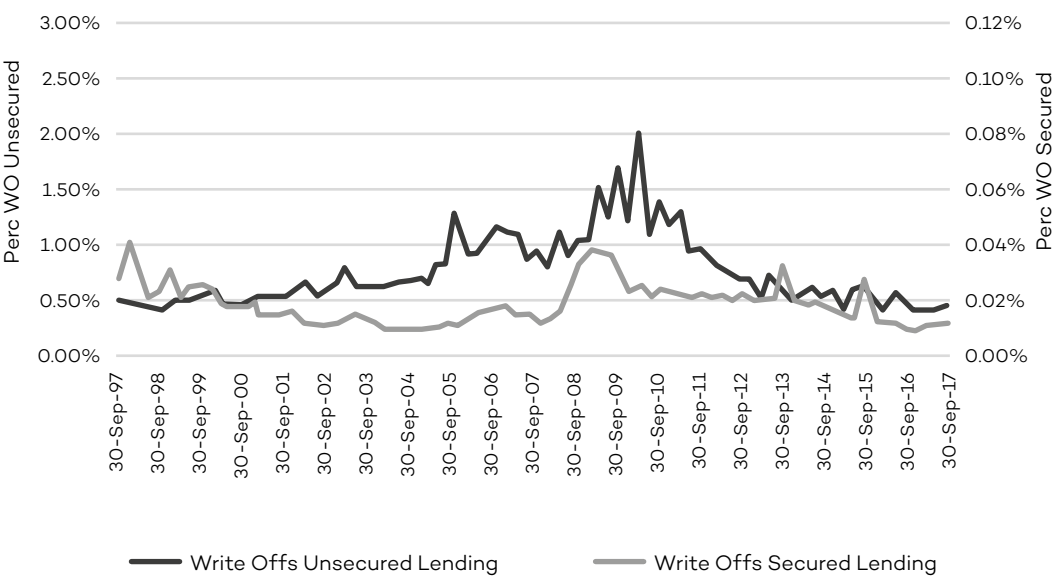


*UK unsecured lending write-off rate*

Recessions have a significant impact on consumer credit. Historically, UK banks' total writeoffs on unsecured lending have been almost ten times higher than on secured:



UK proportion of write offs – secured vs unsecured



Write offs as a proportion of Product Exposure

### **Underestimation of risks due to current benign economic conditions**

Across all unsecured products, it seems that lenders have been loosening their credit scoring criteria to achieve challenging growth targets, mistakenly interpreting the positive economic environment as a sign of improved underlying credit quality.

### **Perceived reduction in risks leads to lower capital buffers and lower income**

As lenders perceive a reduction in risk for consumer credit exposures they use lower risk weights on capital calculations, leading to smaller capital buffers and ultimately to lower levels of capitalisation than appropriate for the whole banking system.

It is also likely that the perceived positive economic situation is causing lenders to underestimate the impact of a stress scenario on consumer credit losses, while persistent low interest rates are likely to be affecting product pricing and driving a contraction in the derived net interest rate income for lenders.

### **The combination of lower capital buffers and lower income significantly affect lenders' capacity to absorb losses in case of a sudden change in macroeconomic conditions.**

Zero interest rate balance transfer credit card deals, longer term or higher value unsecured personal loans, and consumer motor finance (especially in the form of Personal Contract Purchase (PCP), have seen the biggest increases and so attracted attention from the regulators.

## Credit cards

Credit card borrowing has grown significantly in the last five years, sustained by new technology, the widespread adoption of contactless payments and the continuous rise in online shopping.

The main concern of the BoE in relation to the credit cards market regards the proliferation in recent years of balance transfers contracts on a zero percent interest rate.

Balance transfers are contracts which allow the subscriber to transfer an existing credit card exposure onto a new credit card product. Some lenders offer these types of contract on a zero percent interest rate for up to 40 months. The interest rate free period has progressively become longer over time, almost doubling in the last five years.

Normally a fee is paid to transfer the money, generally expressed as a proportion of the exposure, but these deals are increasingly popular as customers can clear existing debt and start fresh with a new interest free contract, converting their overdue exposure to a sort of medium term loan. These arrangements may be one of the factors that have kept losses contained in the consumer credit market so far.

In cases of default the loss rate experienced on credit cards is high and could be particularly severe on zero rate balance transfers, which may have been taken by overstretched customers moving from deal to deal. These customers could struggle to repay their debt if the economy deteriorated or the interest rate started to increase, and such deals were no longer available.

## Unsecured personal loans

Unsecured personal loans (UPLs) are another highly popular form of lending as they offer the flexibility to obtain limited amounts for quick purchases, without the rigorous credit checks and additional diligence needed for secured financing.

Recently, UPLs have been granted on progressively longer terms and higher amounts, raising concerns for the regulators that some of the characteristics typical of secured lending are being transferred to this traditionally medium-term form of financing, without the value of the collateral acting as a guarantee against losses.

At the same time interest rates on UPLs have been reducing at a very fast rate, creating less cushion to absorb potential losses in an economic downturn, another major element of concern for the regulators.

As no previous experience is available in the unsecured space of similar terms, it is difficult to measure and forecast accurately the risk that these products carry in an economic downturn.

## Motor finance

The motor finance industry has seen a significant rate of increase in the UK in the last few years, the fastest expansion among consumer credit products. One of the most popular forms of borrowing in this space is represented by Personal Contract Purchase (PCP). Such contracts now account for 80% of the dealership consumer vehicle finance market. The rest of is concentrated in hire purchase contracts and personal contract hires.

In a PCP a customer pays a deposit and then monthly instalments calculated by the lender based on the expected value of the vehicle at the end of the contract, established at the time of origination and called Guaranteed Future Value (GFV). At the end date the customer can choose to make a final balloon payment and keep the vehicle, or they can decide to give it back to the financing company or intermediary. Typically, if at the end of the contract the market value of the vehicle is higher than the GFV value the borrower will make the balloon payment, sell the vehicle immediately and use the difference to start a new PCP contract with a new vehicle.

Conversely, if at the end date the market value of the vehicle is lower than the GFV the borrower will not have any interest in making the balloon payment to keep a vehicle that could be bought at a cheaper price in the market and is likely to close the contract giving back the vehicle to the dealer. In an adverse economic scenario with a great influx of used vehicles coming to the market at the end of their PCP contracts, motor dealers and financial companies involved in these types of deals would find themselves at loss, holding a surplus of vehicles in an illiquid market.

Lenders are exposed to 'residual value' risk and it would take only small changes to circumstances to create a slowdown in the dealership market such as higher unemployment or a shrinkage in disposable income to trigger a general price reduction.



# Regulators' pronouncements on consumer credit

**In the background, conscious of the rapid growth and building up of risks, the regulators have intervened on several occasions throughout 2017 and 2018.**

In 2017 the PRA undertook a review of the consumer credit industry, asking firms with material exposure to consumer credit to respond to the PRA Statement published in July 2017, focusing on a series of issues and challenges identified by the regulator in the sector.

In January 2018 the PRA published a follow up to the July 2017 Statement, based on the results received from PRA regulated firms with significant consumer credit holdings.

The BoE also assessed the losses on consumer credit lending in the CST 2017 stress scenario, as part of the results published in November 2017.

Based on all the information received and the findings of ongoing monitoring activity, the FPC and PRA will inform appropriate policies to ensure the capitalisation of the banking system and protect its stability.

# 2017

## PRA review

**In 2017 the PRA undertook a review of the consumer credit industry, which led to the publication of a statement in July 2017, defining a series of expectations and recommendations for financial institutions with considerable consumer credit exposures. These firms were asked to provide to the PRA a formal response to the statement, focusing on the specific issues applicable to their activity.**

The main concern of the PRA is that a continuous and sustained growth in consumer credit in all segments of zero rate balance transfer credit cards deals, unsecured loans and PCP motor finance could have a significant negative impact on household financial positions, especially if interest rates start to increase.

### **Consumers are taking on too much debt...**

Household consumption is growing fast and the main risk is that consumers are taking on too much debt and may be unable to meet their credit obligations if the economy deteriorates, with the inevitable job losses. An increase in inflation and weak currency could lead to an increase in interest rates, with households becoming unable to meet all their monthly commitments and preferring to default on their unsecured debt first.

**...and financial institutions may not be assessing the related risks appropriately.**

Any firm with material exposure in consumer credit was required to respond to the PRA and provide evidence that these emerging risks have been considered and plans have been put in place to mitigate them. In particular, lenders were asked to:

- **Assess the credit cards, personal loans and motor dealership finance segments carefully, especially in the 2017 CST stress scenario, explaining their plans in case of worsening economic conditions or increasing interest rates.**

As the annual stress test assesses banks' business and capital resilience to economic and financial shocks it represents an ideal framework for the regulators to investigate the possible impact of such shocks on individual sectors, first judging the effect on individual banks and then combining the results to analyse the impact on the consumer credit sector overall.

The PRA has reiterated that when assessing the affordability of new applicants for unsecured products, lenders should consider total applicant exposures and consider if in an economic downturn they would still be able to meet their consumer credit payments obligations after paying their mortgage or rent.

Additionally, firms were asked to consider adding 'prudent addons' to applicants approved at the margin, to protect themselves from the effects of an economic downturn on customers of only acceptable credit quality.

- **Prove that they have not been loosening their credit policies over time, misled by the positive economic landscape of recent years and that they have realistic expectations on the effect that an economic slowdown may have on their balance sheets.**

As part of the review undertaken, the regulators have identified the risk that firms may have underestimated the interest rate margin risk coming from unexpected changes in customer behaviour. For example, in an economic downturn customers may struggle to reduce their credit card outstanding balance over time or have a higher outstanding amount than expected after the end of the zero-interest rate promotional period, impacting lenders' future net interest income. If their assumptions have been too optimistic, firms will be facing losses when deciding product structure and pricing.

## **Applicability outside the firms involved in the Annual CST**

The PRA has also stated that it will work with firms not captured by the CST stress test, but with relatively high consumer credit exposures, to review their resilience against the stress scenario. It is likely that this stance will continue in the future and there will be an increase in stress testing requirements for lenders with a high concentration of consumer lending, based on a principle of proportionality.

The bigger banks participating in the CST, whilst being expected to pay further attention to their consumer exposures, are likely to already have appropriate structures in place to monitor their portfolios and execute stress testing exercises. But smaller lenders need to up their game, as consumer credit will remain high on the regulators' agenda next year and specific focus will be placed on the ICAAP submissions of those firms with significant concentrations of consumer credit exposures.

## **Projected Losses in consumer credit under ACS 2017 scenario**

Banks participating in the CST represent about 70% of the stock of consumer credit, which would place their total loss in the sector at £21 billion in the first three years of stress. The overall impairment rate for the participating banks would be 20% over the first three years of the stress scenario, considerably higher than in previous stress test exercises (it was 13% in the 2016 CST). The credit cards market would experience the biggest hit, losing 26% of its total exposure, while personal loans would experience three-year impairment rates of 14% and all categories falling under 'other unsecured lending' overdrafts, motor finance and store credit-could see an impairment rate as high as 17% over three years.

## **Additional buffers to protect the system against consumer credit sector impairment**

UK buffers will be calibrated in such a way to be able to absorb a 20% loss rate on consumer credit, as well as all the other effects of the extremely severe annual cyclical scenario. The PRA will be setting additional capital buffers for individual banks, adding extra room for all institutions with significant exposure to consumer credit products if necessary.

## **Higher projected losses in consumer credit than in the mortgage lending sector**

Relative to the mortgage sector, losses in the stress scenario would be considerably higher. 40% of the total UK impairment incurred by the participating banks in the five year horizon would be on consumer credit, despite the sector accounting for only 7% of UK loans starting balances. For comparison, mortgages count for two thirds of UK exposures but are expected to register an impairment rate of 1.7% over the same period.

# Results from BoE CST 2017 and FSR Dec 17

The BoE CST 2017 results published in December 2017 judged the UK banking system to be strongly capitalised as, for the first time since the first CST stress test in 2014, no bank has been asked to take actions to reinforce its capital position.

All banks have been deemed capable to absorb their credit losses through the use of their capital buffers and maintain their Capital Adequacy ratios at the peak of the stress.

However, the consumer credit sector has been highlighted as the main area of concern, confirming the doubt expressed in the July 2017 PRA review and the FPC and PRC pronouncements published in September 2017.

# **Follow up to PRA statement on consumer credit published in January 2018**



In January 2018 the PRA published the results of the consumer credit market review conducted in 2017, based on the responses obtained from PRA regulated firms with material exposure to consumer credit. Despite generally positive results, risks in the sector remain elevated and continued vigilance is required.

The PRA communicated the findings while setting up points for firms to action, expressing particular concern around weaknesses in management information and governance and focusing on some aspects of consumer lending products that had been highlighted as specific areas to monitor.

### **Weaknesses in management information and governance**

The PRA pointed out how in some firms the Board Risk Committees (BRCs) do not receive sufficiently standardised Management Information (MI) on consumer credit to be able to recognise early indicators of portfolio deterioration. To support effective oversight, BRCs should receive appropriate performance metrics that the BRC Chair can summarise and present to the main Board as a tool to inform their decisions on the firm's risk appetite.

The PRA will conduct a follow-up review in late 2018 of the adequacy of consumer credit risk monitoring MI provided to Board Risk Committees and Board.

### **Medium-term economic downturn risk**

More recently some firms have slightly tightened underwriting standards and some have taken steps to show how they would react in case of an economic downturn, such as using data from recession time to recalibrate their models or applying a 'prudent add-on' at the cut-off point for new business.

The PRA has declared that they will continue to assess the resilience of firms' consumer exposure to a stressed macroeconomic environment as part of the CST stress test and through firms' ICAAPs.

### **Continuous refinement of affordability assessments**

Firms should capture a borrower's total debt in new application decisioning and ongoing risk management and also include a potential housing payment increase when assessing affordability.

### **Consider impact on credit cards' valuation of income volatility**

The PRA's review included an assessment of firm's assumptions for future income recognition on credit cards, especially 0% balance transfer cards. The PRA also wanted to understand how firm's account for the volatility in income due to possible changes in customer behaviour, such as customers paying back their outstanding balance quicker than expected.

Assumptions on expected life, retention rates and additional spend on balance transfer cards introduce great subjectivity in products' valuations and it was not always apparent to the PRA how this uncertainty had been considered within the firms' risk management process.

The PRA expect to see more clarity by the Boards and their understanding of income volatility due to changes in customer behaviour and encouraged firms to consider the contribution of credit card portfolios to interest rate risk as part of their ICAAP.

### **Unsecured personal loans performance to be monitored regularly**

Although firms have assured the regulator that they have been cautious in underwriting higher loan balances or longer loan terms the PRA are recommending that firms track the size and performance of these segments with regular reporting.

### **Conservative Guaranteed Future Value (GFV) in motor finance, but shortcomings in considering impact on vehicles' prices of changes in market conditions**

While GFV setting appears prudent, firms' stress tests tended to assume a more contained reduction in used car prices than considered appropriate by the regulator. Additionally, they seemed to underestimate the impact on prices of potential market structural changes such as the large prevalence of PCP deals and the possible future restriction to the use of diesel vehicles due to concerns over their environmental impact.



## Section 3

# Key Elements of a Consumer Stress Testing Programme

There are many different components to a successful consumer stress testing programme and some will be specific to consumer credit products, especially regarding the choice of the appropriate modelling methodologies and the incorporation of macroeconomic effects.

# 1

## Data management and infrastructure creation

### **Importance of data infrastructure**

Good data is the backbone of a successful stress testing exercise.

Data is a fundamental part of the modelling process, but often it is poorly collected and organised, especially in relatively young organisations which have not had time to invest in their data infrastructure or more established organisations that have not fully recognised its true importance.

### **Data quality validation**

Once data is available, its quality needs to be validated before moving to the modelling phase.

Important validation steps include:

- Assessment of data suitability
- Analysis of missing values, outliers or 'abnormal' periods
- Analysis of basic descriptive statistics and distributions
- Reconciliation with existing MI packs if possible
- Documentation

# 2

## Modelling methodology

**It is fundamental to choose the appropriate modelling methodology to quantify the drivers of losses.**

Measures of interest to be used as a target variable depend on the product, but it can be expressed in general terms as the Expected Loss deriving from the exposure. Different approaches can be applied to identify appropriate drivers of the probability of losses and to quantify the values of losses in case of default. Typically, the choice depends on the asset type, on the nature of the exposure, the guarantees or collateral in place and the different macroeconomic variables that are likely to be significant drivers of loss.

A fundamental factor influencing the model choice is the amount of data available. Portfolios with large amounts of data available can benefit from more sophisticated modelling techniques while younger portfolios with less data available will need to be modelled applying more pragmatic approaches, typically using proxy series or comparable data.

To model losses within a lending book, three components need to be estimated-Probability of Default, Exposure At Default and Loss Given Default. These are the metrics defined under Internal Ratings Based Mechanism (IRB) but are generally adopted by standardised banks.

### **PD models**

The event of default occurs when an obligor fails to meet its financial obligations. PD models estimate the likelihood of default in a certain time horizon.

The choice of the PD model methodology depends on the sector in which the lender operates and the specific characteristics of the individual asset classes.

### **Choice of the modelling technique depends on data availability**

Where a large amount of data is available, decomposition methodologies can be applied to identify all the main drivers influencing an asset class probability of default. A well-known methodology in the credit risk industry is the “EMV Decomposition”, which aims to explain the movements of a portfolio arrears or defaults through its decomposition in Vintage (V), Maturity (M) and Macroeconomic effects (E).

Different statistical techniques can be applied to perform the decomposition, with the same objective of producing three curves, explaining different aspects of product arrears dynamics:

- The Vintage curve represents the relative risk over time of cohorts or business taken at different dates, which vary depending on the credit policies in use, the different acquisition risk quality and resulting portfolio composition.
- The Maturation curve represents the product lifecycle and describes the typical evolution of losses which naturally occur for each product over time, independently on the credit policies at acquisition or the macroeconomic environment.
- The Exogenous effect represents the ‘residual’ series and, crucially in the stress modelling context, can be used to model the impact of the economy.

Additional elements can be factored in the decomposition, to include other aspects that could be significant determinants in the prediction of losses, such as the product risk distribution or a measure to describe the pattern of default emergence between the observation date and each future point in time.

For portfolios with less data available, credit grading or slotting approaches can be applied. They vary widely across the industry but essentially, they are expert systems which attempt to use underwriter expertise as a proxy for default information to create a consistent credit grading framework and update it as new information becomes available.

### **Different factors for different products**

In terms of asset class in the consumer credit sector, different PD approaches can be applied to model the fixed term element of personal loans or instalment-based motor dealership contracts compared to the approaches adopted to cater for the revolving nature of credit cards.

Different drivers are appropriate, for example for a personal loan origination date may be a significant driver to describe the probability of default, whereas in the case of a credit card product, other stages of the product lifecycle may be more significant. This could include dates in which credit limit increases have been granted or credit limit decreases applied (changing the contract exposure), or with particular reference to balance transfer deals, the date of the balance transfer or the end of the free interest rate period.

Additional elements can be included to model the probability of default for a personal loan, like the loan term or residual term, which do not apply to a credit card product.



## EAD models

Exposure At Default models differ depending on product type.

- For products with a predefined repayment schedule such as personal loans, the EAD is easily measurable as the expected balance at each hypothetical default point, normally adding interest for a certain number of months to take into account the length of time that would pass between the first arrear event and the default event. A similar approach can be applied to motor finance contracts.
- For products without a specific repayment schedule, like credit cards, the EAD at each hypothetical future default point tends to be more difficult to predict, particularly for customer segments with lower credit card activity and limit utilisations. An estimation needs to be made of the proportion of remaining credit limit likely to be used between the observation date and each future forecast point. The modelling of the residual exposure could also include an economically driven component.

## LGD models

In case of default a portfolio secured on an asset, for example, a mortgage secured on the value of the property has much higher chances of recovery than a credit card or an unsecured loan. The value of the property, can limit the losses if there is a liquid market for the asset to be sold.

Within the consumer credit sector, lending is 'unsecured' by nature and in case of default the speed and amount of recovery of value will typically depend on the efficiency of the collection department.

There are two elements to the calculation of LGD for unsecured products, the Probability of Charge Off and the Loss Given Charge Off:

- The Probability of Charge Off (PCO) depends largely on the risk segment with higher risk segments generally incurring a higher PCO. Other drivers of a higher PCO include higher value or longer term unsecured personal loans, zero rate balance transfer credit cards and PCP on the higher risk segments of the consumer vehicle market.
- The Loss Given Charge Off depends on Recovery rates:
  - » For unsecured loans and credit cards, recovery rates are affected by the economic environment and can be severely impacted under an increase in unemployment or interest rates or a drop in disposable income. The relationship can be estimated by applying econometric models, with different levels of sophistication.
  - » In the motor dealership sector, if the borrower stops making the agreed payments on a PCP contract, the loss suffered by the lender depends on the situation in the used consumer vehicle market and it can be severe if the residual value of the vehicle is much lower than initially planned for. Equally, a loss producing situation for the lender materialises even if the borrower does not default during the life of the contract but decides not to make the last payment and gives back the vehicle to the lender, in case of deteriorating conditions in the used vehicle market.

Specific loss models for the used vehicle sector can be built to measure the relationship between used vehicle prices and the economy as well as to try and quantify the amount of losses that a dealership could face in an economic downturn.

The modelling methodology adopted must constantly evolve based on experience and feedback from the regulators.

# 3 Incorporate macroeconomic effects and scenario creation

**Incorporating macroeconomic effects is a fundamental part of stress testing modelling as the main objective is to quantify the impact of the economy on portfolio losses.**

Economic effects are measured historically incorporating macroeconomic variables in PD, LGD and EAD models and the different economic scenarios are then applied using the estimated relationships to produce base and stressed forecasts.

Typically, economic effects are embedded in the estimation of PD models and in measuring losses within LGD models, but in some circumstances, particularly on revolving exposures, economic impacts can be identified also in the estimation of exposure at default.

## PD Models

- In PD models, economic effect can be directly embedded into the portfolio arrears or default decomposition or econometric models can be built on the 'exogenous' series (representing the economic effect) obtained applying the EMV methodology.

Some factors are common to any type of stress testing exercise and influence any asset class such as labour market indicators (unemployment, average earnings), economic growth variables (GDP, consumer spending) and interest rates, while some factors are specific to individual sectors. Regarding the consumer credit sector affordability measures for example, debt exposure vs disposable income are likely to be very significant measures and to present a stronger direct relationship to the loss variable of interest.

An increase in unemployment or a contraction in GDP would impact a consumer credit product, but a stronger and quicker impact would likely be caused by a drop in disposable income, for example, especially if accompanied by a disproportionate increase in exposure, with both elements causing a worsening of the average affordability ratio. The choice of the most significant variable in every context will be guided both by statistical significance and portfolio knowledge.

## LGD Models

- In LGD models interest rate changes and general economic conditions are likely to be significant in measuring losses on credit cards and personal loans, while in motor finance the main element of interest in measuring losses is given by the expected value of vehicles in the used cars market. Significant macroeconomic drivers differ depending on the individual product characteristics but at the same time cannot be seen in isolation, as they all contribute to shaping the general sentiment and influencing consumer behaviour, directly or through indirect channels.

Despite this, based on the analysis of historical statistical relationships, it is possible to identify which drivers play the biggest role in explaining the losses of a particular asset class.

However, the future may be very different from the past. The magnitude of the impact could vary as the economic landscape evolves and the relationship between macroeconomic variables could change considerably. With interest rates close to zero, an increase in rates would likely have a bigger impact on affordability and losses than an interest rates rise in the late 80s or early 90s, when the BoE interest rate was at double digits and interventions between 50 and 150 basis points were the norm.

For this reason, it is important to always use expert judgement on portfolio trends forecasts or other specific knowledge about the portfolio or the wider business plan and future strategies.

## Macroeconomic scenarios

Macroeconomic scenarios can be historical or simulated to test extreme movements or recreate situations that have never occurred previously. For regulatory stress testing, only economic variables for which scenarios are supplied should be considered.

# 4

## Model validation and oversight

**Model validation is employed to validate the model by deploying it on a sample outside the build be that either a 'hold out sample' or on a different timeframe.**

Different measures of performance are available to judge the results, depending on the modelling context and the objectives.

In a time series model, which is typically the framework where stress testing models are built, it is standard practice to leave part of the data available on the side (if possible) during the estimation phase to test the ability of the model to predict the target variable on new data 'unknown' to the estimation sample.

Plots of actual vs expected in the same sample used for the estimation are an easy tool to judge model fit, together with some statistics that summarise the strength of the relationship between observed and predicted outcomes both in the estimation and validation sample (R Squared).

If time is not an issue, challenger models can be considered and the final model chosen between different options based on validation results.

### **Involve subject matter experts in model validation**

As part of the validation phase it is fundamental to engage subject matter experts to incorporate their knowledge in the selection process.

### **Perform sensitivity analysis as part of validation**

When estimating a loss model and testing the effect of macroeconomic variables as part of the validation exercise, it is appropriate to perform a sensitivity analysis of the possible range of model outputs to the possible range of values assumed by the macroeconomic drivers. The impact of macroeconomic variables on the forecasts for extreme scenarios is one of the elements which affects model choice and may suggest that one variable should be preferred to another.

# 5

## Model execution

### **Interaction between business units**

Stress testing involves all risk areas in an institution. It does not concern only credit risk, but liquidity risk, market risk and operational risk. It requires the coordination of different areas, some of which have traditionally operated separately such as risk, treasury, corporate and financial planning.

There needs to be continuous feedback between model results, application of overlays based on judgment from subject matter experts across business units and reconciliation with model outputs from other departments, typically between credit and finance.

### **The importance of planning**

Having an efficient programme management in place is fundamental for a successful stress testing execution.

Regulators have highlighted on several occasions how specific resources should be dedicated to stress testing and have reiterated this point in relation to the additional analytical effort required to assess the risks emerging in the consumer credit sector.

# 6 Management and Governance

**It is imperative that a firm's senior leadership team influence every aspect of the stress testing process. The results are an essential element of any ICAAP and are important in identifying, assessing and managing key risk drivers in any balance sheet. The influence and control exerted by senior leaders in relation to stress testing and wider capital management is placed under heavy scrutiny by regulators.**

A lack of understanding of the stress testing process demonstrates a disconnect between modelling and decision making. Critical decisions about a firm are made without fully understanding risk and the impact on capital and liquidity. Indeed, the regulator may impose additional Pillar 2B capital buffers in the form of a Risk Management and Governance (RM&G) buffer if it believes the firm is exposed to significant weaknesses either through risk identification and predictability, or through lack of central challenge and senior leader's engagement with the entire stress testing process.

Engagement must be facilitated through a robust governance framework. This ensures all pertinent information is captured and delivered to senior decision makers in a manner that can support decision making. When performed effectively, governance is also the ideal mechanism to demonstrate the management's understanding of risk, and their involvement at every stage of the process.

Model governance and model risk management deficiencies have been a recurring theme in past regulator commentaries following CST exercises. Regulators expect that rigorous model validation is in place, but also that it has been documented thoroughly, to increase transparency and comparability across banks.

Stress testing modelling is still largely perceived as a one-off exercise. The regulators intend the process and approach to become a credit risk tool embedded in a firm's usual business activity. The economic and financial landscapes are continuously evolving but there is no reason to assume that stress testing and ICAAP models should be rebuilt every year if a portfolio has not changed substantially.

A formal monitoring approach can assess the performance of each model on an ongoing basis. Firms that use the IRB approach are already required to have formal monitoring of rating systems and models as a condition of IRB permission. An established framework can be adapted to incorporate stress testing.



Section 4

# Expectations for the Future

**What  
to expect  
in the  
future**



**In the 2017 CST results, the BoE judged the UK banking system to be strongly capitalised and resilient to a hypothetical and extreme deterioration in economic conditions. However, within the results, attention was brought to the ‘pockets of risk’ materialising in the consumer credit sector.**

- **Consumer credit under the radar in 2018 with a possible increase in stress testing requirements**

In the coming months, regulatory scrutiny will remain high on lenders concentrated in consumer credit. Through SREP, regulator expectations will increase, as will the assessment of stress testing principles, process and results in this area following ICAAP. Firms need to show that they have a good understanding of their portfolio risks and can quantify the impact of an adverse economy on their balance sheet.

- **Higher standards expected on ICAAP**

While stress testing and consumer stress testing have been part of the regulatory landscape for more than a decade, greater sophistication demonstrated by large firms during CST, and guidelines developed by governing bodies have contributed to higher expectations from the regulators:

- » As more CST exercises are performed, modelling methodologies advance, increasing regulator expectations about how financial institutions’ understand the impact of macroeconomic and financial market changes on their activity, profits and capital position.
- » Process, policies and results presented through ICAAP will be under an increasing level of scrutiny from the regulators.
- » Particular attention will be paid to senior management and board members’ involvement and understanding of stress testing and ICAAP requirements and their implications for capital planning.

- **Stress testing as Business as Usual (BAU) and risk management tool**

Stress Testing should not be an isolated, annual exercise. It should become an integrated, BAU function used to determine the impact of the ever-changing macroeconomic landscape. The results should shape medium and long term strategic and capital planning.



## Section 5

# Conclusion

# Final thoughts

**Stress testing and ICAAP have been fundamental elements of the regulatory landscape since the 2008 financial crisis and the requirements from the regulators will keep evolving over time, as the macroeconomic and financial landscape evolves.**

Consumer credit is currently an area of particular concern for the BoE given the sustained growth of credit cards, personal loans and motor finance and the significant impact that a recession would have in these lending segments.

The regulator has highlighted concerns on several occasions in the second half of 2017. The main fear is that despite the recent consumer credit slowdown, the current low loss rates and relatively contained exposure recent benign economic conditions may lead lenders to an underestimation of risk and even to loosen their lending criteria even further in the pursuit of challenging growth targets.

The regulator will keep monitoring the sector in the coming months and may even increase stress testing and ICAAP requirements in the future, depending on size, for organisations with significant exposure to this market.

The price that smaller organisations will pay for limited portfolio understanding or a poor assessment of capital adequacy in a stress scenario are the imposition of additional capital buffers, which are expensive and limit business growth.

To avoid this, organisations should consider:

- **The importance of an appropriate stress testing/ICAAP framework, depending on size**

Given the increase in stress testing and ICAAP requirements and the higher standards, it is fundamental for every UK financial institution to have an appropriate framework in place.

In particular, smaller lenders with a high concentration of consumer credit should reassess their current stress testing approach or ICAAP framework to judge their suitability to respond to the new challenge and quantify their ability to withstand adverse scenarios. Higher standards are likely to put pressure on smaller banks in terms of general setup, and resources needed.

- **Focus on modelling and incorporation of macroeconomic effects**

Increasing challenges are likely to emerge in the modelling space as more data become available and the experience of the regulators evolves, given previous years' results.

Specific challenges apply to consumer credit products modelling. Even with limited data, comparable publicly available data series can be used as a starting point to define the behavioural life of an asset and quantify the relationship between the economy and the asset performance.

- **Importance of planning and appropriate resource allocation**

Financial institutions need to engage in careful planning and define clearly all the events that must happen for a successful stress testing/ICAAP delivery, carefully considering the interactions between the different business units and the need to involve senior management throughout the process.

The PRA has highlighted several times the need for financial institutions to assign adequate resource to stress testing.

# About Jaywing

**Jaywing's team of risk and data science specialists is now more than 70 strong and we have almost 20 years' experience helping many of the UK's lenders with data and analytics projects in risk and marketing.**

Through our industry-leading expertise and trusted partnership approach, Jaywing has held many long-standing (10 years+), large-scale relationships with some of the UK's leading financial services organisations. We have a wealth of experience in the financial services sector, working within both consumer and commercial portfolios, and our team of experts have developed industry leading ways of using data, analytics and systems to help our clients to manage credit and fraud risk to meet the ever-increasing regulatory demands.

Our expertise encompasses: banking regulation such as IFRS 9, Stress Testing, Capital Management and IRB; and risk strategy including operational decisions, pricing and collections optimisation. We have recently added Artificial Intelligence to our skillsets and have a suite of machine learning and AI products to add to our existing risk product suite.

We have supported over 25 lenders in the UK with risk projects including Lloyds Banking Group, Royal Bank of Scotland, Nationwide, Secure Trust Bank, Shawbrook Bank, Paragon Bank and Coventry, Skipton, West Bromwich, Newcastle and Nottingham Building Societies.



# About the author

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Senior Consultant at Jaywing

**Sonia has over 13 years' experience in analytics, working across a variety of fields, including; macroeconomic analysis (for scenario analysis and asset allocation) and multiple aspects of credit risk (scorecard build, Capital and Impairment, stress testing and IFRS 9).**

Since joining Jaywing in 2015, Sonia has managed a number of stress testing and IFRS 9 projects. Sonia is not just a statistical technical specialist, she also understands the full infrastructure framework and technical implementation issues of strategic modelling work. She has worked across both finance and marketing sectors, developing and implementing decision science solutions.

Sonia has an MSc in Economics and Finance. She is often asked by UK Finance to run stress testing training sessions for its risk members.





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