Capital and risk management

	Page
Risk overview	164
Risk culture and appetite	164
Governance, assurance and risk models	169
Capital risk	170
Definition and sources	170
Key developments	170
Determination of capital sufficiency	170
Minimum going concern capital requirements	173
Regulatory changes	176
Capital management	178
Measurement	180
Liquidity and funding risk	187
Definitions and sources	187
Key developments	187
Policy, framework and governance	187
Liquidity risk	189
Funding risk	190
Encumbrance	197
Business risk	199
Reputational risk	199
Conduct and regulatory risk	200
Operational risk	202
Pension risk	205
Credit risk: management basis	207
Definition and sources	207
Key developments	207
Governance	207
Risk appetite, risk measurement and models	209
Risk mitigation	211
Portfolio overview	214
Wholesale credit risk	218
▪ Problem debt management and forbearance	220
▪ Key credit portfolios	224
Personal credit risk	234
▪ Problem debt management and forbearance	234
▪ Personal portfolio overviews	236
▪ Key credit portfolios	239
Credit risk: balance sheet analysis	244
Financial assets	244
Loans, REIL and impairment provisions	248
Securities and AFS reserves	254
Derivatives and valuation reserves	258
Market risk	260
Definition and sources	260
Key developments	260
Governance	262
Traded market risk	262
Non-traded market risk	268

Presentation of information

Except as otherwise indicated by an asterisk (*), information in the Capital and risk management section (pages 163 to 276) is within the scope of the Independent auditor’s report. Unless otherwise indicated, disclosures in this section include disposal groups in relevant exposures and measures. Refer to page 162 for the Analysis of the balance sheet pre and post disposal groups.

Risk overview*

Risk culture and appetite

Risk culture

A strong risk culture is essential if RBS is to achieve its ambition to build a truly customer-focused bank.

RBS has measured and benchmarked its risk culture across all functions and businesses. It has set a risk culture target, making risk simply part of the way that employees work and think.

Such a culture must be built on strong risk capabilities, with robust risk practices and appropriate risk behaviours embedded across the organisation.

To achieve this RBS is focusing on leaders as role models and taking actions to build clarity, develop capability and motivate employees to reach the required standards of risk culture behaviours including:
- Taking personal accountability and proactively managing risk;
- Respecting risk management and the part that it plays in daily work;
- Understanding clearly the risks associated with individual roles;
- Aligning decision-making to RBS's risk appetite;
- Considering risk in all actions and decisions;
- Escalating risks and issues early;
- Taking action to mitigate risks;
- Learning from mistakes and near-misses;
- Challenging others' attitudes, ideas and actions; and
- Reporting and communicating about risks transparently.

To embed and strengthen the required risk culture behaviours, a number of RBS-wide activities have been undertaken.

To support a consistent tone from the top, senior management frequently communicate the importance of the required risk behaviours through various channels, linking them to the achievement of good customer outcomes.

RBS's target risk culture behaviours have been embedded into a statement of "Our Standards", which are clearly aligned to the core values of "serving customers", "working together", "doing the right thing" and "thinking long term". They act as a clear starting point for a strong and effective risk culture, as "Our Standards" are used for performance management, recruitment and selection and development.

In addition to embedding risk culture behaviours into performance management, in 2016 an objective aligned to RBS' risk culture target was set for the Executive Committee and made integral to performance reviews.

RBS's policies require that risk behaviour assessment is incorporated into performance assessment and compensation processes for enhanced governance staff.

To track progress towards RBS's risk culture target a programme of assessment commenced in 2016.

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Risk-based key performance indicators

RBS-wide remuneration policy ensures that the remuneration arrangements for all employees reflect the principles and standards prescribed by the UK Remuneration Code. For further information refer to page 87.

Training

Enabling employees to have the capabilities and confidence to manage risk is core to RBS's learning strategy.

RBS offers a wide range of risk learning, both technical and behavioural, across the risk disciplines. This training can be mandatory, role-specific or for personal development.

Mandatory learning for all staff is focused on keeping employees, customers and RBS safe. This is easily accessed online and is assigned to each person according to their role and business area. The system allows monitoring at all levels to ensure completion.

Code of Conduct

Aligned to RBS's values is the Code of Conduct. The Code provides guidance on expected behaviour and sets out the standards of conduct that support the values. It explains the effect of decisions that are taken and describes the principles that must be followed.

These principles cover conduct-related issues as well as wider business activities. They focus on desired outcomes, with practical guidelines to align the values with commercial strategy and actions. The embedding of these principles facilitates sound decision-making and a clear focus on good customer outcomes. They are also consistent with the people management and remuneration processes and support a positive and strong risk culture through appropriate incentive structures.

A simple decision-making guide (called the "YES check") has been included in the Code of Conduct. It is a simple, intuitive set of five questions, designed to ensure RBS values guide day-to-day decisions:
- Does what I am doing keep our customers and RBS safe and secure?
- Would customers and colleagues say I am acting with integrity?
- Am I happy with how this would be perceived on the outside?
- Is what I am doing meeting the standards of conduct required?
- In five years' time would others see this as a good way to work?

Each of the five questions is a prompt to think about how the situation fits with RBS Group's values. It ensures that employees can think through decisions that do not have a clear answer, and guides their judgements.

Risk overview* continued

If conduct falls short of RBS's required standards, the accountability review process is used to assess how this should be reflected in pay outcomes for those individuals concerned. The Group Performance and Remuneration Committee also considers risk performance and conduct when determining overall bonus pools. The Committee's decisions on pay aim to reinforce the need for good behaviours by all employees.

Risk appetite

Risk capacity defines the maximum level of risk RBS can assume before breaching constraints determined by regulatory capital and liquidity needs, the operational environment, and from a conduct perspective. Articulating risk capacity is helpful in determining where risk appetite should be set, ensuring there is a buffer between internal risk appetite and RBS's ultimate capacity to absorb losses.

Risk appetite defines the types of risk RBS is willing to accept, within risk capacity, in order to achieve strategic objectives and business plans. It links the goals and priorities to risk management in a way that guides and empowers staff to serve customers well and achieve financial targets.

Risk Appetite Framework

The Risk Appetite Framework bolsters effective risk management by promoting sound risk taking and ensuring emerging risk and risk taking activities are recognised, assessed, escalated and addressed in a timely manner.

The Board approves the Risk Appetite Framework annually.

Strategic risks

Strategic risks are the foundations on which RBS ensures it remains safe and sound while implementing its strategic business objectives. They are:
- Capital adequacy;
- Earnings volatility;
- Funding and liquidity; and
- Stakeholder confidence.

The Board sets risk appetite for strategic risks to help ensure RBS is well placed to meet its priorities and long-term targets even under challenging economic environments.

All other risk appetites for material risks (such as credit risk, market risk and operational risk) should align to strategic risks. Risk appetite for our strategic risks is tested using a variety of stress tests.

Risk appetite statements

Risk appetite is communicated across RBS through risk appetite statements. Each statement provides clarity on the scale and type of activities permitted, in a manner that is easily conveyed to staff. Risk appetite statements consist of qualitative statements of appetite supported by risk limits and triggers that operate as a defence against excessive risk-taking.

The purpose of risk appetite statements is to strengthen understanding of acceptable levels of risk.

Risk appetite statements are established at an RBS-wide level for strategic risks and material risks, and at a franchise, function and legal entity level.

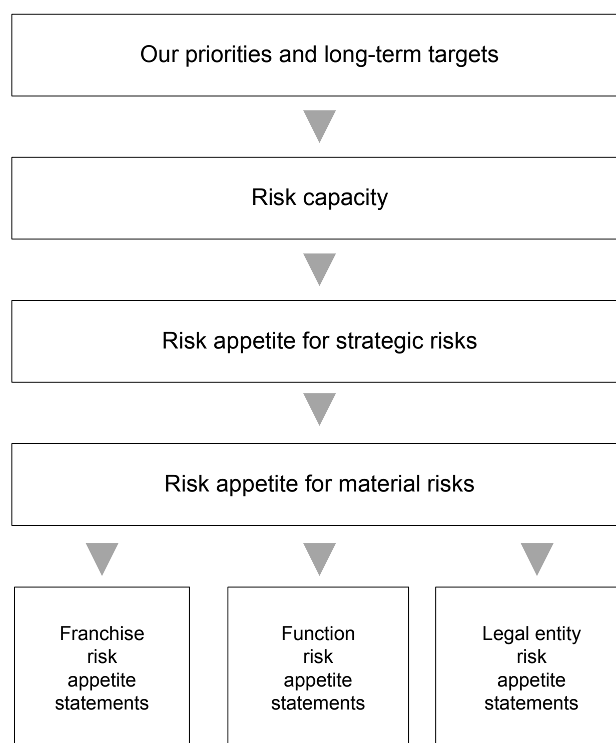
*unaudited

The annual process of establishing risk appetite statements is completed alongside the business and financial planning process to ensure risk appetite remains appropriate given the levels of risk expected over the planning horizon.

The effective communication of risk appetite is essential in embedding appropriate risk-taking into RBS's culture.

RBS frequently reviews its risk profile to ensure it remains within risk appetite and that management focus is brought to bear on all strategic risks, material risks and emerging risk issues. RBS has effective processes in place to report against risk appetite to the RBS Board and senior management.

Establishing risk appetite:

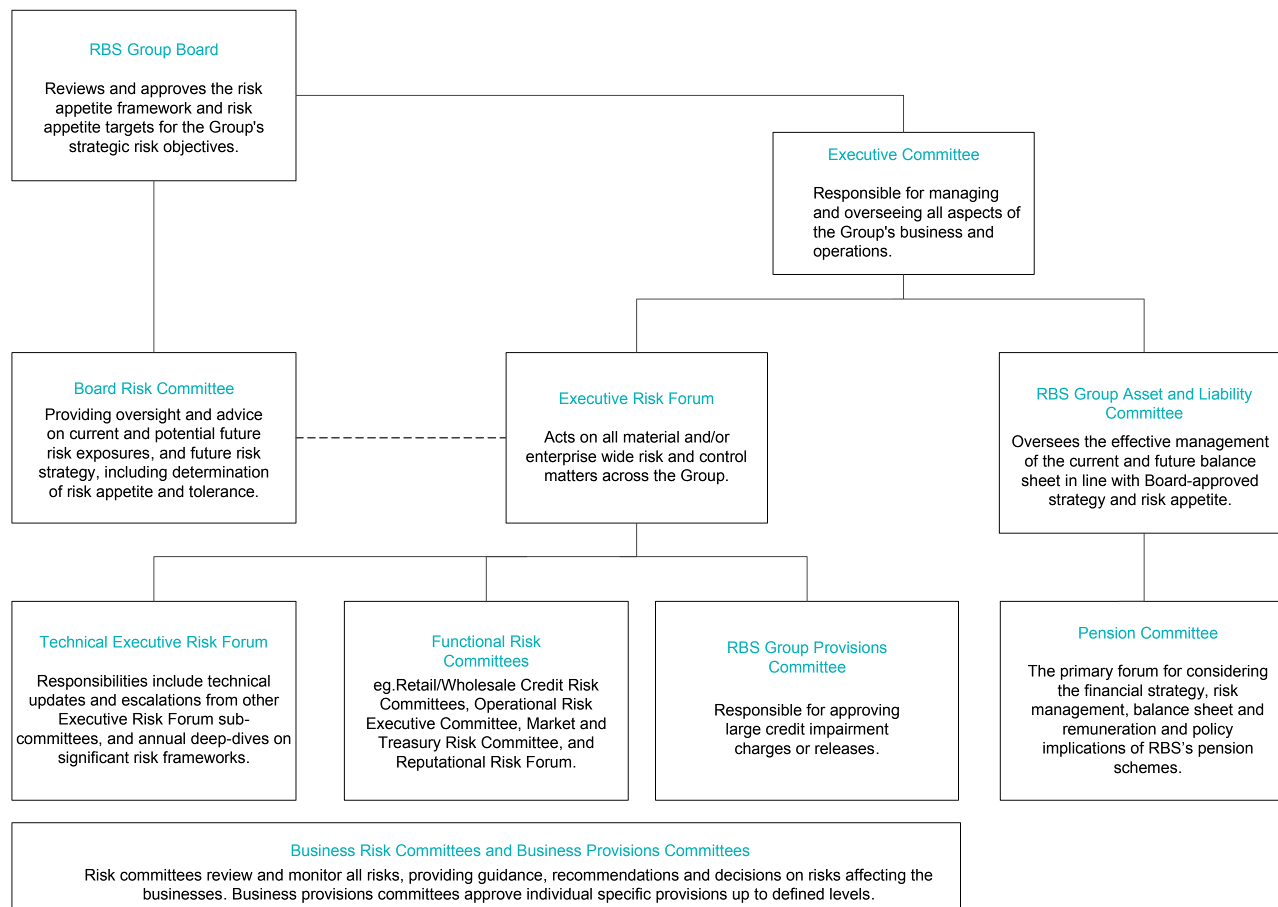


Risk overview* continued

Risk governance

Governance structure

The risk governance structure in 2016 and the main purposes of each of the committees are illustrated below.



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Risk overview* continued

Three lines of defence

The three lines of defence model is used industry-wide for the management of risk. It provides a clear set of principles by which to implement a cohesive operating model, one that provides a framework for the articulation of accountabilities and responsibilities for managing risk across the organisation.

First line of defence - Management and supervision

The first line of defence includes customer franchises, Technology and Operations and support functions such as Human Resources, Communications and Financial Management Information. Responsibilities include:

- Owning, managing and supervising, within a defined risk appetite, the risks which exist in business areas and support functions.
- Ensuring appropriate controls are in place to mitigate risk, balancing control, customer service and competitive advantage.
- Ensuring that the culture of the business supports balanced risk decisions and compliance with policy, laws and regulations.
- Ensuring that the business has effective mechanisms for identifying, reporting and managing risk and controls.

Second line of defence - Oversight and control

The second line of defence in 2016 included RBS Risk Management and Conduct & Regulatory Affairs (refer below for further information), Legal, and the financial control aspects of Finance. Responsibilities include:

- Working with the businesses and functions to develop the risk and control policies, limits and tools for the business to use in order to discharge its responsibilities.
- Overseeing and challenging the management of risks and controls.
- Leading the articulation, design and development of RBS's risk culture and appetite.
- Analysing the aggregate risk profile and ensuring that risks are being managed to the desired level (risk appetite).
- Providing expert advice to the business on risk management.
- Providing senior executives with relevant management information and reports and escalating concerns where appropriate.
- Undertaking risk assurance (refer below for more information).

Third line of defence - Internal Audit

Responsibilities include:

- Designing and delivering a risk-based audit plan to provide assurance on material risks and report on whether RBS is managing its material risks effectively.
- Monitoring, evaluating and reporting on the remediation of material risks across RBS.
- Engaging with management and participating in key governance fora to provide perspectives, insights and challenge so as to influence the building of a sustainable bank.
- Advising the Group Audit Committee and executive management with respect to RBS's material risks and their associated controls.
- Reporting any matters which warrant escalation to the RBS Board, the Board Risk Committee, Group Audit Committee and the Executive Committee as appropriate.
- Providing independent assurance to the FCA, PRA, CBI and other key jurisdictional regulators on both specific risks and control themes.

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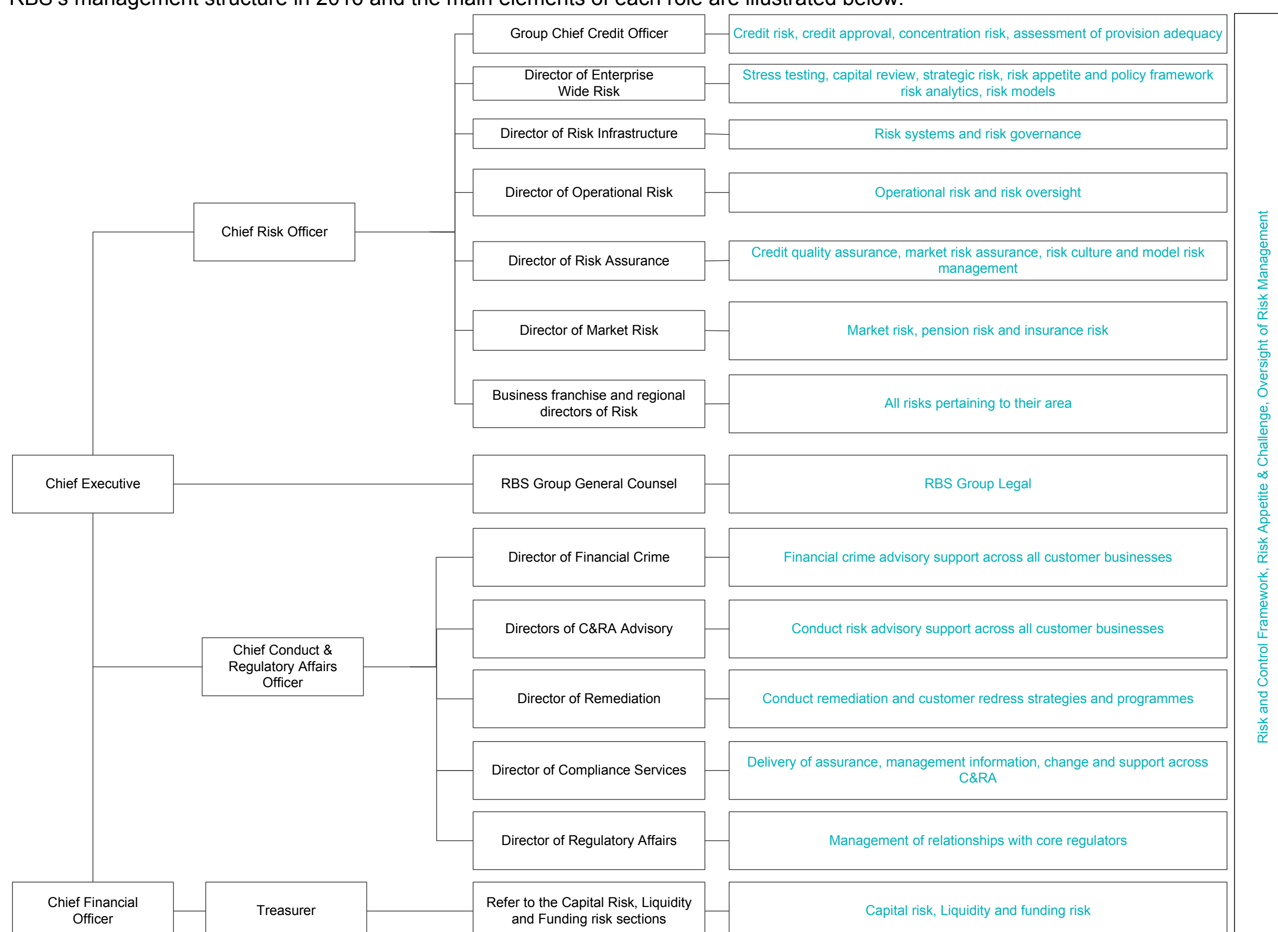
Risk overview* continued

Risk management structure

RBS's management structure in 2016 and the main elements of each role are illustrated below.



Notes:

(1) RBS Risk Management
In 2016, the RBS Chief Risk Officer (CRO) led RBS Risk Management (since 1 January 2017 it has been known as Risk, Conduct & Restructuring). The CRO reported directly to the Chief Executive and had an indirect reporting line to the Chairman of the Board Risk Committee and had a right of access to the Committee's chairman.
RBS Risk Management was a function independent of the franchises, structured by risk discipline to facilitate the effective management of risk.
Risk Management was organised into six functional areas: Credit Risk; Enterprise-Wide Risk; Risk Infrastructure; Operational Risk; Risk Assurance; and Market Risk. There were also directors of risk for each of the franchises and for Services.
The directors of risk functions were responsible for RBS-wide risk appetite and standards within their respective disciplines and reported to the CRO.
CROs were in place for certain jurisdictions and legal entities to meet local regulatory and governance requirements. The key CRO roles reported directly to the RBS CRO.
Risk committees in the customer businesses and key functional risk committees oversaw risk exposures arising from management and business activities and focused on ensuring that they were adequately monitored and controlled.

(2) Conduct & Regulatory Affairs
In 2016, Conduct & Regulatory Affairs (C&RA) was led by the Chief Conduct & Regulatory Affairs Officer, who reported directly to the Chief Executive and had an indirect reporting line to the Board Risk Committee and a right of access to the committee's chairman. C&RA was responsible for providing oversight of conduct risk and regulatory risk at RBS, and did so by setting RBS-wide policy and standards, providing advice to each customer business, and ensuring that the mitigating controls were suitable. C&RA also provided leadership of RBS's relationships with its regulators.
The functional heads (the directors of Financial Crime, Advisory, Remediation, Compliance Services, and Regulatory Affairs) reported to the Chief Conduct & Regulatory Affairs Officer. Each was responsible, where appropriate, for the RBS-wide risk appetite and standards of their respective areas.

(3) Plans to merge parts of the C&RA function with Risk Management were announced in December 2016. The changes, designed to take advantage of synergies across the risk, conduct and regulatory agendas, were effective from 1 January 2017. Regulatory Affairs moved to Corporate Governance & Secretariat, and Remediation and Complaints moved to Services Chief Operating Office.

*unaudited

Risk overview* continued

Risk Assurance

Risk Assurance is an independent second line of defence function which provides assurance to both internal and external stakeholders including the Board, senior management, risk functions, franchises, Internal Audit and regulators. Teams within Risk Assurance perform quality assurance on both credit and market risk activity, review key controls and manage model risk. The remit of each team is summarised below.

Franchise Risk Assurance: These teams focus on credit risk and market risk assurance in the customer-facing franchises. The teams undertake qualitative reviews which assess various aspects of risk as appropriate, including: the quality of risk portfolios; the accuracy of the Basel Input and related probability of default/loss given default classification, the quality of risk management practices, policy compliance and adherence to risk appetite. This includes testing the bank's credit portfolios and market risk exposures to assist in early identification of emerging risks, as well as undertaking targeted reviews to examine specific concerns raised either by these teams or by their stakeholders.

Controls Assurance: This team tests the adequacy and effectiveness of key controls owned and operated by the Risk function (with a particular focus on credit risk and market risk controls). The team's remit includes controls within the scope of Section 404 of the US Sarbanes-Oxley Act 2002. During 2016, the team's scope extended to include testing of controls supporting risk data aggregation reporting to support compliance with Basel Committee on Banking Supervision (BCBS) 239.

Risk Assurance Committee

The Risk Assurance Committee (RAC) ensures a consistent and fair approach to all aspects of the credit risk, market risk and control assurance review activities. The RAC also monitors and validates the ongoing programme of reviews and tracks the remediation of review actions. The credit and market risk assurance teams also attend relevant committees run by the customer franchises and other risk functions.

Model Risk

Model Risk Governance

Model Risk Governance is responsible for setting policy and providing a governance framework for all of RBS's modelling processes. It is also responsible for defining and monitoring risk appetite in conjunction with model owners and model users, monitoring the model risk profile and reporting on the model population as well as escalating issues to senior management, through the Model Risk Forum, and the respective franchise and function risk committees.

Model Risk Management

Model Risk Management (MRM) performs independent model validation for material models where necessary. It works with individual businesses and functions to set appropriate model standards and monitor adherence to these, ensure that models are developed and implemented appropriately and that their operational environment is fit for purpose.

*unaudited

MRM performs reviews of relevant risk and pricing models in two instances: (i) for new models or amendments to existing models and (ii) as part of its ongoing programme to assess the performance of these models.

A new model is typically introduced when an existing model is deemed no longer fit for purpose or when exposure to a new product requires a new approach to ensure that risks are appropriately quantified. Amendments are usually made when a weakness is identified during use of a model or following analysis either by the model developers or by MRM.

MRM reviews may test and challenge the logic and conceptual soundness of the methodology, or the assumptions underlying a model. Reviews may also test whether or not all appropriate risks have been sufficiently captured as well as checking the accuracy and robustness of calculations.

Based on the review and findings from MRM, the bank's model or risk committees with appropriate delegated authority consider whether a model can be approved for use and whether any conditions need to be imposed, including those relating to the remediation of material issues raised through the review process. Once approved through internal governance, the new or amended model is implemented. Models used for regulatory reporting may additionally require regulatory approval before implementation.

MRM reassesses the appropriateness of approved risk models on a periodic basis according to the approved Periodic Review Policy. Each periodic review begins with an initial assessment. A decision is then made by an internal model governance committee with appropriate delegated authority. Based on the initial assessment, the committee will decide to re-ratify a model based on the initial assessment or to carry out additional work prior to making a decision. In the initial assessment, MRM assesses changes since the last approval along the following dimensions, as appropriate: change in size/composition of the portfolio, market changes, model performance, model changes, status of any outstanding issues and scheduled activities including work carried over from previous reviews.

MRM also monitors the performance of RBS's portfolio of models to ensure that they appropriately capture underlying business rationale.

For specific information relating to market risk models and pricing models, refer to Model Validation in the Market Risk section.

Models used in Risk

RBS uses a variety of models as part of its risk management process and activities. Key examples include the use of model outputs to support risk assessments in the credit approval process, ongoing credit risk management, monitoring and reporting, as well as the calculation of risk-weighted assets. Other examples include the use of models to measure market risk exposures and calculate associated capital requirements, as well as for the valuation of positions. The models used for stress-testing purposes also play a key role in ensuring the bank holds sufficient capital, even in stressed market scenarios.

Capital risk*

Definition and sources

Capital consists of reserves and instruments issued that are available to the Group that have a degree of permanency and are capable of absorbing losses. A number of strict conditions set by regulators must be satisfied to be eligible to count as capital.

Capital risk is the risk that the Group has insufficient capital and other loss absorbing debt instruments to operate effectively including meeting minimum regulatory requirements, operating within Board approved risk appetite and supporting its strategic goals.

Capital management is the process by which the Group manages its capital risk and is a key focus of its risk management activities.

The following disclosures in this section are audited: Capital resources.

Key developments in 2016

13.4% CET1 ratio

- The CET1 ratio decreased by 210 basis points to 13.4% in 2016, reflecting lower CET1 capital partially offset by a reduction in RWAs.
- Litigation and conduct costs of £5.9 billion in 2016 contributed to a significant reduction in the CET1 capital. Management actions to normalise the ownership structure and improve the long-term resilience of RBS also contributed to the reduction. These actions included the final Dividend Access Share payment of £1.2 billion and the impact of the accelerated pension payment of £4.2 billion.
- RWAs decreased by £14.4 billion to £228.2 billion primarily as result of run down of Capital Resolution and the reduction in operational risk (£5.9 billion) partly offset by adverse exchange rate movements (£11.5 billion) as sterling weakened against all major currencies.
- Tier 1 capital benefitted from the successful issuance of £2 billion of Additional Tier 1 (AT1) capital notes in August 2016. Total end-point Capital Requirements Regulation (CRR) compliant AT1 capital now stands at £4.0 billion.

5.1% leverage ratio

- The leverage ratio reduced by 50 basis points to 5.1% at 31 December 2016, primarily reflecting CET1 capital erosion, partially offset by additional AT1 issuance.
- The leverage exposure decreased by £19.2 billion to £683.3 billion at 31 December 2016. Growth in PBB and CPB lending has been more than offset by lower undrawn commitments and derivative potential future exposures (PFE). During 2016, approximately half the interest rate trades cleared through London Clearing House have been settled-to-market each day, rather than being collateralised, reducing PFE by £10.3 billion.
- The UK leverage ratio reflecting the post EU referendum measures announced by the Bank of England in Q3 2016 was estimated at 5.6%.

*unaudited

- RBS's PRA minimum leverage ratio requirement of 3% has been supplemented with an additional GSII leverage ratio buffer of 0.13125%, equivalent to £897 million of CET1 capital.

MREL and MDA

- RBS issued £4.2 billion of MREL-eligible senior debt, in line with the £3 - £5 billion senior debt issuance target for 2016.
- RBS successfully completed a cash tender for £2.3 billion senior debt securities, including those considered non-MREL compliant, as part of ongoing transition to a holding company capital and term funding model, in line with regulatory requirements.
- The current estimated headroom over the fully phased MDA trigger in 2019 is 2.9%, based on our target CET1 ratio of 13.0% and MDA requirement of 10.1%. This remains subject to change.

Determination of capital sufficiency

In determining whether the Group holds sufficient capital and other loss absorbing debt instruments, the Group assesses the amount and type of capital under a number of different bases:

Going concern vs. gone concern view

Going concern

This determination of capital sufficiency is made on the basis that there is sufficient capital to absorb losses and remain a viable going concern.

The Group is considered a going concern if it can operate in the foreseeable future to carry out its objectives and commitments without the need or intention on the part of management to liquidate.

Gone concern

This determination of capital sufficiency is made on the basis that there is sufficient capital and other loss absorbing instruments to enable an orderly resolution in the event of failure. Gone concern would apply if the Group had been deemed to fail by the Bank of England (BoE). Technically, the Group would have to fail or be likely to fail the BoE's threshold conditions for authorisation in a way that justifies the withdrawal of that authorisation and it must not be reasonably likely that action will be taken that will result in the Group no longer failing or likely to fail.

Spot vs. forward looking view

Spot view

This determination of capital sufficiency is made on the basis of prevailing actual positions and exposures.

Forward-looking view

This determination of capital sufficiency is made on the basis of positions, balance and exposures under a forward looking view of the balance sheet in line with the Group's planning horizons and parameters. This analysis examines both base and stress views.

Capital risk* continued

Regulatory vs. risk appetite view

Regulatory requirements

This determination of capital sufficiency is an assessment of whether the Group has sufficient capital and other loss absorbing debt instruments to meet the requirements of prudential regulation.

Regulation may be set by rule-making bodies in the UK and at European level. Individual legal entities within the Group may be subject to requirements set by local regulators in jurisdictions outside of the UK and the EU.

Rule-making bodies may set regulation according to standards agreed at international level, such as those published by the Basel Committee on Banking Supervision (BCBS).

Risk appetite

This determination of capital sufficiency is an assessment of whether the Group has sufficient capital and other loss absorbing debt instruments to meet risk appetite limits.

This Group's risk appetite framework establishes quantitative and qualitative targets and limits within which the Group operates to achieve its strategic objectives.

This framework includes risk appetite in relation to the amount and quality of the Group's capital on both a risk and balance sheet measurement basis. This includes setting management buffers on top of regulatory minima such that the Group operates with sufficient cushioning against those minimum regulatory requirements.

Capital risk is one of the Group's top strategic risk appetite constituents as it is a stand-alone risk and is both influenced by, and influences, other key risks.

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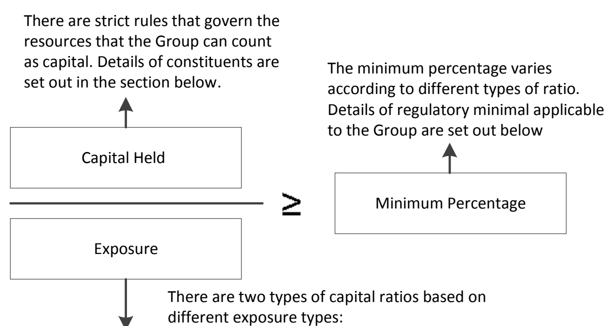
Capital sufficiency: going concern view

The regulatory requirement for going concern capital typically takes the form of a ratio of capital compared to a defined exposure amount having to exceed a minimum percentage:



Ratio	Exposure type	Description
Capital adequacy ratio	Risk-weighted assets	Assesses capital held against both size and inherent riskiness of on and off-balance sheet exposures
Leverage ratio	Leverage exposure	Assesses capital held against the size of on and off-balance sheet exposures (largely based on accounting value with some adjustments)

Constituents of capital held

The determination of what instruments and financial resources are eligible to be counted as capital is laid down by applicable regulation.

Capital is categorised by applicable regulation under two tiers (Tier 1 and Tier 2) according to the ability to absorb losses, degree of permanency and the ranking of absorbing losses. There are three broad categories of capital across these two tiers:

- CET1 capital. CET1 capital must be perpetual and capable of unrestricted and immediate use to cover risks or losses as soon as these occur. This includes ordinary shares issued and retained earnings. CET1 capital absorbs losses before other types of capital and any loss absorbing instruments.
- AT1 capital. This is the second form of loss absorbing capital and must be capable of absorbing losses on a going concern basis. These instruments are either written down or converted into CET1 capital when a pre-specified CET1 ratio is reached. Coupons on AT1 issuances are discretionary and may be cancelled at the discretion of the issuer at any time. AT1 capital may not be called, redeemed or repurchased for five years from issuance.
- Tier 2 capital. Tier 2 capital is the Group's supplementary capital and provides loss absorption on a gone concern basis. Tier 2 capital absorbs losses after Tier 1 capital. It typically consists of subordinated debt securities with a minimum maturity of five years.

Capital risk* continued

In addition to capital, other specific loss absorbing instruments, including senior notes issued by RBSG, may be used to cover certain gone concern capital requirements which, in the EU, is referred to as minimum requirement for own funds and eligible liabilities (MREL).

In order for liabilities to be eligible for MREL a number of conditions must be met including the BoE being able to apply its stabilisation powers to them, including the use of bail-in provisions.

Capital adequacy ratios

The Group has to hold a minimum amount and quality of capital to satisfy capital adequacy ratio regulatory requirements.

Risk-weighted assets

Capital adequacy ratios compare the amount of capital held to RWAs. RWAs are a measure of the Group's assets and off-balance sheet positions that capture both the size and risks inherent in those positions.

For regulatory purposes, RWAs are grouped into four categories:

Risk	Description
Credit	Risk of loss from a borrower failing to repay amounts due by the due date
Counterparty credit	Risk of loss from a counterparty not meeting its contractual obligations Also included is the risk of loss from changes in the fair value of derivative instruments
Market	Risk of loss arising from fluctuations in market prices
Operational	Risk of loss from inadequate or failed internal processes, people and systems or from external events

Minimum percentage

Regulation defines a minimum percentage of capital compared to RWAs. The percentage comprises of system-wide requirements that apply to all banks and a component where the percentage is specific to the Group. This is summarised as follows:

Type	Name	Description
System-wide	Pillar 1	Standard minimum percentages applicable to all banks
Bank-specific	Pillar 2A	Captures risks that apply to individual banks that are either not adequately captured or not captured at all under Pillar 1
	PRA buffer	Captures forward looking risks and potential losses under a severe stress scenario

*unaudited

These minimum requirements are explained in more detail on the next page. These ratios apply in full from 1 January 2019. Before this date there are transitional rules in place that mean that the minimum capital requirements that the Group has to comply with are lower although the Group, in line with other UK banks, has been reporting on a fully implemented basis since 2014.

Pillar 1 requirements

The Group is subject to system wide minimum capital adequacy ratio requirements that apply to all banks under applicable regulation. There are two broad categories of capital requirements:

Category	Description
Minimum capital adequacy ratio	Represents the minimum amount of capital that all banks must hold at all times
Capital buffers	Comprises of: • Capital required to be held by banks that may be used in periods of stress • Capital held by banks that are deemed to be systemically important

Pillar 2 requirements

In addition to the minimum Pillar 1 requirements that apply to all banks, the Group may be required to hold additional capital if specified by its regulators. This is captured under the Pillar 2 framework and consists of two components:

- Pillar 2A: covers risks to the Group that are not captured or not fully captured under Pillar 1. For example, pension risk is not captured in Pillar 1 therefore capital that may need to be held against this risk is assessed under Pillar 2A.
- PRA buffer: covers risks that the Group may become exposed to across a forward-looking planning horizon (for example due to changes to the economic environment).

The PRA buffer is a capital buffer that is designed to ensure that the Group can continue to meet minimum requirements (Pillar 1 and Pillar 2A) during a stressed period. The PRA buffer is required to be held if Pillar 1 capital buffers are determined to be insufficient.

The assessment of Pillar 2 requirements is an output from the Group's internal capital adequacy assessment process that is described in more detail on page 179. Pillar 2 also utilises the output of the Group's stress testing exercises which is described in more detail on pages 178 and 179.

Future changes to regulation

Throughout 2015 and 2016, UK, EU and international standard and rule-making bodies have issued proposals and final standards on revising the level and measurement of capital adequacy ratios including the measurement of RWAs. This may affect the level of RWAs and the capital that the Group is required to hold in the future years. Further details of prudential regulatory changes that may impact the Group's capital adequacy ratio are set out on page 177.

Capital risk* continued

Leverage ratios

The Group has to hold a minimum amount and quality of capital to satisfy the leverage ratio regulatory requirements. Unlike capital adequacy ratios, leverage ratio requirements do not consider the riskiness of the Group's positions.

The leverage exposure is broadly aligned to the accounting value of the Group's on and off-balance sheet exposures but subject to certain adjustments for trading positions, repurchase agreements and off balance sheet exposures.

In common with capital adequacy ratios, the leverage ratio requirement for the Group consists of a minimum requirement and a leverage ratio buffer. Details of the Group's leverage ratio requirements are set out below.

The leverage ratio requirements that the Group must meet may be subject to change from developing regulation. Further details are set out on page 177.

Minimum percentage for going concern capital requirements under applicable regulation

Capital adequacy ratios

The Group is subject to minimum requirements in relation to the amount of capital it must hold in relation to its RWAs. The table below summarises the minimum ratios of capital to RWAs that the Group is expected to have to meet once all currently adopted regulation is fully implemented by 1 January 2019. These ratios apply at the consolidated group level. Different minimum capital requirements may apply to individual legal entities or sub-groups.

Minimum requirements	Type	CET1	Total Tier 1	Total capital
System wide	Pillar 1 minimum requirements	4.50%	6.00%	8.00%
	Capital conservation buffer	2.50%	2.50%	2.50%
	UK countercyclical capital buffer (1)	0.00%	0.00%	0.00%
	G-SIB buffer (2)	1.00%	1.00%	1.00%
Bank specific	Pillar 2A(4)	2.10%	2.90%	3.80%
Total (excluding PRA buffer)(5)		10.10%	12.40%	15.30%

Notes:
(1) The countercyclical capital buffer (CCyB) applied to UK designated assets is set by the Financial Policy Committee (FPC). The UK CCyB may be set between 0% and 2.5% and is linked to the state of the UK economy. On 5 July 2016, the FPC reduced the UK CCyB from 0.5% to 0%. Foreign exposures may be subject to different CCyBs depending on the CCyB rate set in the jurisdiction of the foreign exposure. The net CCyB for the Group is non-zero but rounds to 0.00%.
(2) Globally systemically important banks (G-SIBs), as designated by the Financial Stability Board (FSB), are subject to an additional capital buffer of between 1% and 3.5%. Based on the most recent determination of the FSB, the Group is subject to an additional capital requirement of 1.0%
(3) The Group will be subject to a systemic risk buffer (SRB) of between 0% and 3%. The SRB will apply from 1 January 2019 and will apply at the ring-fenced bank sub-group level rather than at the consolidated group level. The SRB may require the Group to hold a minimum amount of capital at the consolidated group level beyond the levels set out in the table above.
(4) Additional capital requirements under Pillar 2A may be specified by the PRA as a ratio or as an absolute value. The table sets out an implied ratio to cover the full value of Pillar 2A requirements.
(5) The Group may be subject to a PRA buffer requirement as set by the PRA. The PRA buffer consists of two components:
- A risk management and governance buffer that is set as a scalar of the Pillar 1 and Pillar 2A requirements. The scalar could range between 10% and 40%.
- A buffer relating to the results of the BoE concurrent stress testing results.
The PRA requires that the level of this buffer is not publicly disclosed.
(6) The capital conservation buffer, the countercyclical capital buffer, the G-SIB buffer and systemic risk buffer (where applicable) make up the combined buffer. If the Group fails to meet the combined buffer requirement, it is subject to restrictions on distributions on CET1 instruments, discretionary coupons on AT1 instruments and on payment of variable remuneration or discretionary pension benefits. These restrictions are calculated by reference to the Group's Maximum Distributable Amount (MDA). The MDA trigger is below the PRA buffer and MDA restrictions are not automatically triggered if the Group fails to meet its PRA buffer. The MDA is calculated as the amount of interim or year-end profits not yet incorporated into CET1 capital multiplied by a factor ranging from 0 to 0.6 depending on the size of the CET1 shortfall against the combined buffer.

Leverage ratios

The table below summarises the minimum ratios of capital to leverage exposure under the PRA UK leverage framework that the Group must meet. In November 2016, the European Commission published a proposal for the adoption of a legally binding 3% of Tier 1 capital minimum leverage ratio with consideration of a leverage buffer ratio for G-SIBs once a final international agreement had been reached. Different minimum requirements may apply to individual legal entities or sub-groups.

Type	CET1	Total Tier 1
Minimum ratio	2.25%	3.00%
UK countercyclical leverage ratio buffer (1)	0.00%	0.00%
Additional leverage ratio buffer (2)	0.35%	0.35%
Total	2.60%	3.35%

Notes:
(1) The countercyclical leverage ratio buffer is set at 35% of the Group's CCyB. As noted above this buffer may be set between 0% and 2.5% and the FPC has currently set the UK CCyB at 0%. The applicable ratio for foreign exposures may be different.
(2) As set out in the FPC's SRB framework, published in May 2016, the FPC intends to direct the PRA to apply an additional leverage ratio buffer to UK G-SIBs set at 35% of the G-SIB buffer rate. As noted above, based on the most recent determination of the FSB, the G-SIB buffer rate for the Group is 1.0%.

*unaudited

Capital risk* continued

Capital sufficiency: going concern forward looking view

The Group examines its going concern capital requirements on a forward looking basis through assessing the resilience of capital adequacy and leverage ratios under hypothetical future states of the world, including as part of its annual budgeting process.

A range of future states of the world are examined. In particular:

- The Group will assess capital requirements based on a forecast of the Group's future business performance under its expectations of economic and market conditions over the forecast period
- The Group will assess capital requirements based on a forecast of the Group's future business performance under adverse economic and market conditions over the forecast period. A range of scenarios of different severity may be examined

The examination of capital requirements under the base economic and market conditions allows the Group to demonstrate how the projected business performance allows it to meet all internal and regulatory capital requirements as they arise over the plan horizon. For example, the Group will assess its ability issue to loss absorbing debt instruments in sufficient quantity to meet regulatory timelines. The cost of issuance will be factored into business performance metrics.

The examination of capital requirements under adverse economic and market conditions is assessed through stress testing. Stress testing is used to quantify, evaluate and understand the potential impact of the financial strength of the Group, including its capital position, given specified changes to risk factors. This is described in more detail on page 178.

The results of stress tests are not only used widely across the Group but also by the Group's regulators to set bank-specific capital buffers through the PRA buffer.

The Group participates in a number of regulatory stress tests implemented by regulatory authorities to test industry-wide vulnerabilities under crystallising global and domestic systemic risks. In 2016, the Group participated in two regulatory stress tests. Details of these stress tests are set out on the following page.

*unaudited

Capital risk* continued

Regulatory stress tests

In 2016, the Group participated in two regulatory stress tests set by the EBA and BoE. These scenarios are hypothetical in nature and do not represent a forecast of the Group's future business or profitability. The results of the regulatory stress tests are carefully assessed by the Group and form part of the wider risk management of the Group.

	EBA Stress Test	BoE Stress Test
Scenario	• Designed to evaluate impact over three years of an adverse macro financial scenario that examines four systemic risks identified by the European Systemic Risk Board as representing the most material threats to the stability of the EU financial sector. • A static balance sheet assumption was made across the period of stress and therefore mitigating actions such as balance sheet reduction, business growth and cost savings are not factored into the stress outcomes.	• Designed to assess the resilience of major UK banks to tail risk events. The severity of the test is related to policymakers' assessments of risk levels across markets and regions. • The 2016 stress test examined the impact over five years of a synchronised global downturn across the UK and global economies. The stress test also assessed a stressed level of misconduct costs.
↓ Results ↓	• The 2016 EBA stress test did not contain a pass/fail threshold • On a fully loaded basis, the Group's CET1 ratio under the adverse scenario was projected to be 8.1% as at 31 December 2018. The low point CET1 ratio of 7.8% occurs in 2017. • The Group's modelled leverage ratio under the adverse scenario is projected as 3.6% on a fully loaded Basel 3 basis and 4.2% under the PRA transitional definition for leverage ratio as at 31 December 2018. The low point occurs in 2017 with a stress leverage ratio of 3.5% on a fully loaded Basel 3 basis as at 31 December 2016 and 4.2% under the PRA transitional definition.	• Under the 2016 BoE stress test, CET1 ratio reached a low point of 5.5% in 2017, below the CET1 hurdle rate of 6.6%. • Post the impact of management actions and the conversion of £2 billion AT1 capital in place for 2015, the Group's low point CET1 ratio increased from 5.5% to 6.7%, meeting the CET1 ratio hurdle rate. • Tier 1 leverage rate was projected to be 2.7% in 2017, which increased to 2.9% after the management actions, below the 3% leverage hurdle rate. • The stress was based on an end of 2015 starting balance sheet position. Since then, the Group has taken actions to strengthen its capital position. As a result, the Group now has a revised capital plan that brings it back over the thresholds.
What does this mean?	• The 2016 EBA and BoE stress test results demonstrate that the Group has made good progress in transforming the balance sheet to being safe and sustainable. However, the legacy issues still heavily impact the Group's performance. • Rebuilding the capital strength remains one of the Group's core strategic priorities. During 2016, RBS narrowed the range of uncertainty around its capital and leverage position by addressing a number of legacy issues including recording additional provisions of £5.9 billion for conduct and litigation costs. RBS also continued to de-risk its balance sheet. • In August 2016 the Group successfully issued an additional £2 billion AT1 capital, bolstering the Group's capital position and leverage ratio.	

*unaudited

Capital risk* continued

Capital sufficiency: gone concern view

The Group will be required to hold sufficient capital and other loss absorbing instruments such that, in the event of failure, there can be an orderly resolution that minimises any adverse impact on financial stability whilst preventing public funds being exposed to loss.

In November 2016, the BoE published its policy statement on its approach to setting MREL.

MREL will be set by the BoE on a case-by-case basis but it has stated that it expects institutions that are G-SIBs and subject to a bail-in resolution strategy, such as the Group, to meet interim MREL requirements from 1 January 2019 and end state MREL requirements from 1 January 2022 as follows:

Interim MREL	
1 January 2019	The minimum requirements set out in the FSB total loss absorbing capacity standard being the higher of: • 16% of the Group's RWAs; and • 6% of the Group's leverage exposures
1 January 2020	The higher of: • The sum of two times the Group's Pillar 1 requirement and one times the Group's Pillar 2A add-ons; and • Two times the applicable leverage ratio requirement for the Group
End state MREL	
1 January 2022	The higher of: • Two times the sum of the Group's Pillar 1 requirement and Group's Pillar 2A add-ons; and • The higher of: o Two times the applicable leverage ratio requirement for the Group; and o 6.75% of the Group's leverage exposure

The BoE is intending to review its general approach to the calibration of MREL before the end of 2020 prior to setting end-state MRELs.

MREL may consist of capital and other loss absorbing instruments. In order for liabilities to be eligible for MREL, a number of strict conditions will be set by the BoE including the ability for the BoE to apply its stabilisation powers to those liabilities. In addition, liabilities must have an effective remaining maturity (taking account of any rights of early repayment to investors) of greater than one year.

*unaudited

On the basis of the BoE policy statement, the Group expects to issue between £3 billion and £5 billion of MREL compliant senior debt from the single resolution entity (RBSG) each year to meet this requirement.

In order that there is sufficient loss absorbing capacity pre-positioned across the Group, the proceeds of externally issued MREL will be downstreamed to material operating subsidiaries in the form of capital or other subordinated claims. This ensures that internal MREL will absorb losses before operating liabilities within operating subsidiaries.

Although the BoE continue to develop its approach to the calibration of MREL within banking groups, the BoE policy statement sets out the framework that it will use to determine the distribution of MREL within banking groups. Under this framework, the BoE will set individual MRELs for all institutions within the Group and may also set individual MRELs for entities within the Group that are important from a resolution perspective.

The Group is not planning to downstream the proceeds of external MREL issuance prior to the completion of legal entity and business realignment required to implement ring-fencing.

Regulatory changes that may impact capital requirements

The Group faces a number of changes in prudential regulation that may adversely impact the amount of capital it must hold and consequently may increase funding costs and reduce return on equity. The nature and timing of implementation of a number of these changes is not currently final.

In 2017, the UK, EU and BCBS are expected to further develop prudential regulation including the approach to calculating credit risk and operational risk RWAs, additional details on the MREL framework and a review of the leverage ratio framework.

Regulatory changes are actively monitored by the Group including engagement with industry associations and regulators and participation in quantitative impact studies. Monitoring the changing regulatory landscape forms a fundamental part of capital planning and management of its business.

The Group believes that its strategy to focus on simpler, lower risk activities within a more resilient recovery and resolution framework will enable it to manage the impact of these changes.

Key prudential regulatory developments that have been published and may impact the Group are set out in the following table.

Capital risk* continued

Summary of potential changes to regulation that may impact the Group's capital requirements

Area of development	Actual or potential key changes that might impact the Group's capital requirements	Source of changes
Capital adequacy buffers	• A new systemic risk buffer will apply to the RBS ring-fenced bank sub-group from 1 January 2019. • The buffer will be set between 0% and 3%.	• Statement of Policy published by the PRA in December 2016.
Credit risk RWAs	• Restriction in the scope of using internal models. • Avoidance of mechanistic reliance on external ratings. • For model-based RWAs, potential change to capital floors based on the standardised approach. • Potential amendment of risk weights for securitisation exposures. • Revision to UK residential mortgage risk weights.	• Mostly relate to consultations published by the BCBS. • Mortgage risk weights changes proposed by the PRA for 31 March 2019.
Counterparty credit risk RWAs	• Change to exposure amounts under the standardised approach. • Increase in the number of risk factors captured in the calculation of the counterparty valuation adjustment (CVA).	• The standardised approach relates to the CRR 2[(1)] proposal to amend regulation published by the European Commission. • Changes to CVA relate to a consultation published by the BCBS.
Market risk RWAs	• Change from value at risk to expected shortfall models. • Implementation of a more risk-sensitive standardised approach. • Inclusion of risk of market illiquidity.	• Relates to the CRR 2[(1)] proposal to amend regulation published by the European Commission.
Operational risk RWAs	• Incorporation of bank-specific loss data into the calculation.	• Consultation published by the BCBS.
Leverage ratio	• Changes to the design and calibration of the framework with a focus on derivative exposures and margining. • Recalibration of the UK leverage ratio framework to offset exclusion of central bank reserves from the calculation.	• Relates to the CRR 2[(1)] proposal to amend regulation published by the European Commission. • Statements made by the FPC and PRA.
Large exposure framework	• Changes to the design and calibration of the capital base and large exposure limit.	• Relates to the CRR 2[(1)] proposal to amend regulation published by the European Commission.

Note:
(1) CRR 2 relates to the European Commission publication on 23 November 2016 to amend the Capital Requirements Regulation. Additional amendments were proposed to amend the Capital Requirements Directive and Banking Recovery and Resolution Directive.

*unaudited

Capital risk* continued

Capital management

Capital management is the process by which the Group ensures that it has sufficient capital and other loss absorbing instruments to operate effectively including meeting minimum regulatory requirements, operating within Board approved risk appetite, maintaining its credit rating and supporting its strategic goals.

Capital management is critical in supporting the Group's business and is enacted through an end to end framework across the Group, its businesses and the legal entities on which it operates.

The key elements of the Group's capital management approach are set out below.

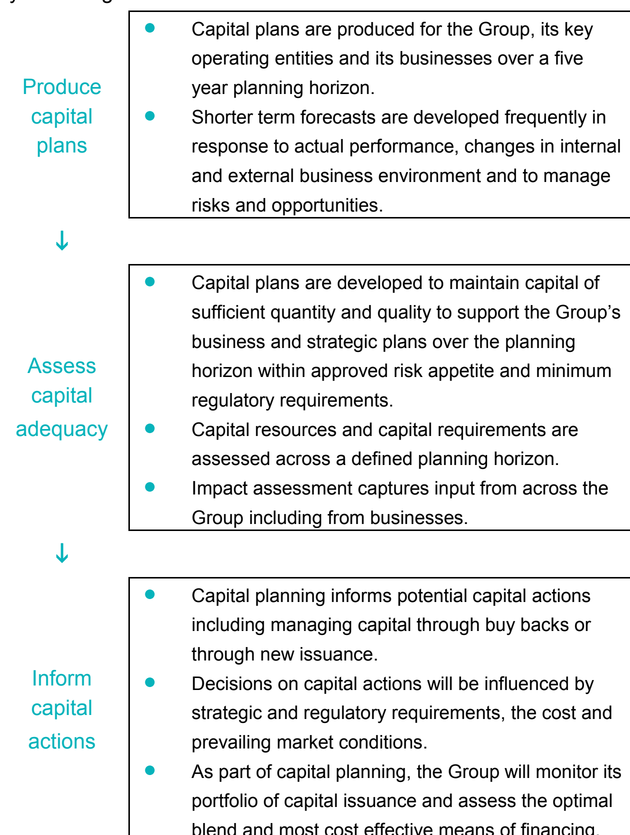
Risk appetite

Capital risk appetite is set by the Board, reflecting the Group's strategic objectives, current and future prudential regulatory requirements and market expectations.

It is expressed as a set of target ratios for CET1 and leverage under both normal and stressed financial conditions. Capital risk appetite is set at various levels including for the Group and its businesses. Performance against risk appetite is regularly monitored.

Capital planning

Capital planning is integrated into the Group's wider annual budgeting process and is assessed and updated at least monthly. Regular returns are submitted to the PRA which include a two year rolling forward view.



*unaudited

Capital planning is one of the tools that the Group uses to monitor and manage the risk of excessive leverage.

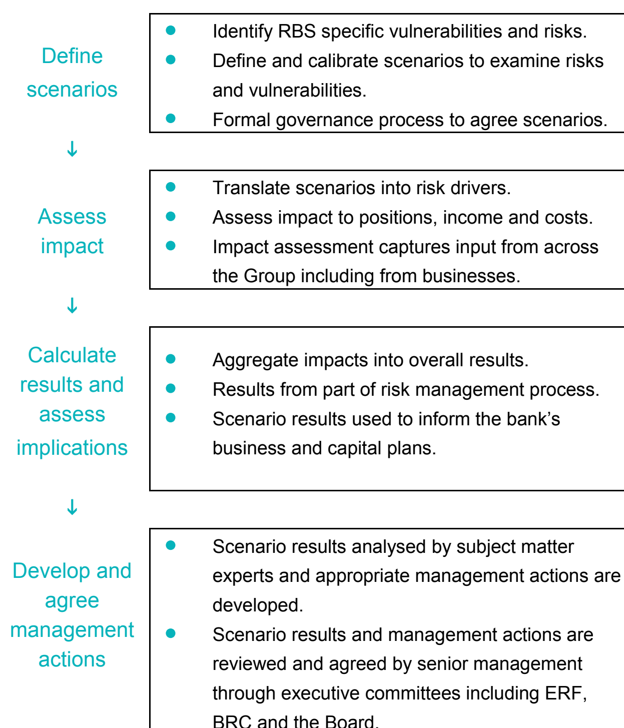
Stress testing

Stress testing is a key risk management tool used by the Group and is a fundamental component of the Group's approach to capital management.

Stress testing is used to quantify, evaluate and understand the potential impact on the financial strength of the Group, including its capital position, given specified changes to risk factors. Stress testing includes:

- Scenario testing: examines the impact of a hypothetical future state of the world to define changes in risk factors affecting the Group; and
- Sensitivity testing: examining the impact of an incremental change to one or more risk factors.

The process for stress testing consists of four broad stages:



Capital risk* continued

Stress testing is used widely across the Group; key areas are summarised in the diagram below:

Specific areas that involve capital management include:

1) *Strategic financial and capital planning:* through assessing the impact of sensitivities and scenarios on the capital plan and capital ratios.
2) *Risk appetite:* through gaining a better understanding of the drivers of and the underlying risks associated with risk appetite.
3) *Risk identification:* through a better understanding of the risks that could potentially impact the Group's financial strength and capital position.
4) *Risk mitigation:* through identifying actions that can be taken to mitigate risks or could be taken in the event of adverse changes to the business or economic environment. Risk mitigation is substantially supplemented through the Group's recovery plan.

The Group also undertakes regular reverse stress testing which examines circumstances that can lead to specific, defined business outcomes such as business failure. Reverse stress testing allows the Group to examine potential vulnerabilities in its business model more fully.

Internal assessment of capital adequacy

The Group conducts an annual internal assessment of its material risks and evaluates how much capital is required to cover these risks. This is referred to as the Internal Capital Adequacy Assessment Process (ICAAP). The ICAAP is approved by the Board and submitted to the PRA.

The ICAAP consists of a point in time capital assessment of the Group's exposures and risks at the financial year end and a forward looking stress capital assessment.

The ICAAP is used by the Group to form a view of capital adequacy separately to the regulatory minimum requirements. The ICAAP is used by the PRA to make an assessment of bank-specific capital requirements through the Pillar 2 framework.

*unaudited

Capital allocation

The Group has mechanisms to allocate capital across its legal entities and businesses that aim to optimise the utilisation of capital resources taking into account applicable regulatory requirements, strategic and business objectives and risk appetite.

The framework for allocating capital is approved by the Asset and Liability Committee.

Governance

Capital management is subject to substantial review and governance across the Group including capital management policies that are approved by the Asset and Liability Committee or Board Risk Committee

The Board approves the Group's capital plans, including its key legal entities and businesses, and including the results of the stress tests relating to those capital plans.

Recovery and resolution planning

The Group maintains a recovery plan that sets out credible recovery options that could be implemented in the event of a severe stress to restore its business to a stable and sustainable condition, focussing on addressing the Group's capital and liquidity position.

The recovery plan sets out a range of triggers that activate the implementation of the recovery plan and sets out the operational plan for its implementation.

The recovery plan is a key component of the overall risk management of the Group including the framework for managing its capital.

The recovery plan is prepared and updated annually and approved by the Board. The recovery plan is assessed for appropriateness on an ongoing basis, and is maintained in line with regulatory requirements.

Resolution is implemented if the Group fails and the appropriate regulator places the Group into resolution. Resolution is owned and implemented by the appropriate regulatory authority and the Group has a multi-year programme in place to develop resolution capability and meet regulatory requirements.

The Group is working with global regulators to ensure that the Group is compliant with the principles of resolution planning, demonstrating the process by which the Group and relevant regulatory bodies can develop a set of actions that would be taken to manage the failure of the Group or one of its significant legal entities in an orderly manner.

Ring-fencing

As part of the response to the 2008 financial crisis the UK Government's Independent Commission on Banking report recommended that banks separate their retail and investment banking operations, helping to mitigate against the risk of the investment bank division running into financial difficulty.

Primary legislation and FCA/PRA regulations have been issued which must be complied with by 1 January 2019. For more details on ring-fencing, refer to page 125.

Capital risk* continued

Measurement

Capital and leverage: Key ratios

Capital, RWAs and risk asset ratios, on the basis of end-point Capital Requirements Regulation (CRR) and transitional rules, calculated in accordance with PRA definitions, are set out below.

	2016		2015	
Capital	End-point CRR basis (1) £bn	PRA transitional basis £bn	End-point CRR basis (1) £bn	PRA transitional basis £bn
CET1	30.6	30.6	37.6	37.6
Tier 1	34.7	40.4	39.6	46.3
Total	43.8	52.3	47.6	60.0
RWAs				
Credit risk				
- non-counterparty	162.2	162.2	166.4	166.4
- counterparty	22.9	22.9	23.4	23.4
Market risk	17.4	17.4	21.2	21.2
Operational risk	25.7	25.7	31.6	31.6
Total RWAs	228.2	228.2	242.6	242.6
Risk asset ratios	%	%	%	%
CET1	13.4	13.4	15.5	15.5
Tier 1	15.2	17.7	16.3	19.1
Total	19.2	22.9	19.6	24.7
Leverage	2016		2015	
Tier 1 capital (£bn)	£34.7bn	£40.4bn	39.6	46.3
Leverage exposure (£bn)	£683.3bn	£683.3bn	702.5	702.5
Leverage ratio (%)	5.1%	5.9%	5.6%	6.6%
Average Tier 1 capital (£bn) (2)	£38.0bn	£43.7bn		
Average leverage exposure (£bn) (2)	£712.1bn	£712.1bn		
Average leverage ratio (%) (2)	5.3%	6.1%		

Notes:
(1) CRR as implemented by the Prudential Regulation Authority in the UK, with effect from 1 January 2014. All regulatory adjustments and deductions to CET1 have been applied in full for both bases with the exception of unrealised gains on available-for-sale securities which has been included from 2015 under the PRA transitional basis.
(2) Based on 3 month average of month end leverage exposure and Tier 1 Capital.

General:

From 1 January 2015, RBS has been required to meet at least 56% of its Pillar 2A capital requirement with CET1 capital and the balance with Additional Tier 1 and/or Tier 2 capital. The Pillar 2A capital requirement is the additional capital that RBS must hold, in addition to meeting its Pillar 1 requirements in order to comply with the PRA's overall financial adequacy rule.

Measures in relation to end-point CRR basis, including RWAs, are based on the current interpretation, expectations, and understanding, of the CRR requirements, as well as further regulatory clarity and implementation guidance from the UK and EU authorities (end-point CRR basis). The actual end-point CRR impact may differ when the final technical standards are interpreted and adopted.

Capital base:
(1) Own funds are based on shareholders' equity.
(2) The adjustment arising from the application of the prudent valuation requirements to all assets measured at fair value, has been included in full. Additional valuation adjustments relating to unearned credit spreads on exposures under the advanced internal ratings approach has been included in the determination of the expected loss amount deducted from CET1.
(3) Where the deductions from AT1 capital exceed AT1 capital, the excess is deducted from CET1 capital.
(4) Insignificant investments in equities of other financial entities (net): long cash equity positions are considered to have matched maturity with synthetic short positions if the long position is held for hedging purposes and sufficient liquidity exists in the relevant market. All the trades are managed and monitored together within the equities business.
(5) Based on our current interpretations of the Commission Delegated Regulation issued in December 2013 on credit risk adjustments, RBS's standardised latent provision has been reclassified to specific provision and is not included in Tier 2 capital.

RWAs:
(1) Current securitisation positions are shown as risk-weighted at 1,250%.
(2) RWA uplifts include the impact of credit valuation adjustments and asset valuation correlation on large financial sector entities
(3) RWAs reflect implementation of the full internal model method suite, and include methodology changes that took effect immediately on CRR implementation.
(4) Counterparties which meet the eligibility criteria under CRR are exempt from the credit valuation adjustments volatility charges
(5) The CRR final text includes a reduction in the risk-weight relating to small and medium-sized enterprises.

*unaudited

Capital risk continued

Capital and leverage: Capital resources

	2016 End-point CRR basis (1) £m	2016 PRA transitional basis (1) £m	2015* End-point CRR basis (1) £m	2015* PRA transitional basis(1) £m
Shareholders' equity (excluding non-controlling interests)				
Shareholders' equity	48,609	48,609	53,431	53,431
Preference shares - equity	(2,565)	(2,565)	(3,305)	(3,305)
Other equity instruments	(4,582)	(4,582)	(2,646)	(2,646)
	41,462	41,462	47,480	47,480
Regulatory adjustments and deductions				
Own credit	(304)	(304)	(104)	(104)
Defined benefit pension fund adjustment	(208)	(208)	(161)	(161)
Cash flow hedging reserve	(1,030)	(1,030)	(458)	(458)
Deferred tax assets	(906)	(906)	(1,110)	(1,110)
Prudential valuation adjustments	(532)	(532)	(381)	(381)
Goodwill and other intangible assets	(6,480)	(6,480)	(6,537)	(6,537)
Expected losses less impairments	(1,371)	(1,371)	(1,035)	(1,035)
Other regulatory adjustments	(8)	(8)	(86)	(64)
	(10,839)	(10,839)	(9,872)	(9,850)
CET1 capital	30,623	30,623	37,608	37,630
AT1 capital				
Eligible AT1	4,041	4,041	1,997	1,997
Qualifying instruments and related share premium subject to phase out	—	5,416	—	5,092
Qualifying instruments issued by subsidiaries and held by third parties	—	339	—	1,627
AT1 capital	4,041	9,796	1,997	8,716
Tier 1 capital	34,664	40,419	39,605	46,346
Qualifying Tier 2 capital				
Qualifying instruments and related share premium	6,893	7,066	5,745	6,265
Qualifying instruments issued by subsidiaries and held by third parties	2,268	4,818	2,257	7,354
Tier 2 capital	9,161	11,884	8,002	13,619
Total regulatory capital	43,825	52,303	47,607	59,965

Note:
(1) CRR as implemented by the Prudential Regulation Authority in the UK, with effect from 1 January 2014. All regulatory adjustments and deductions to CET1 have been applied in full for the end-point CRR basis with the exception of unrealised gains on available-for-sale securities which has been included from 2015 for the PRA transitional basis.
(2) The Group's Tier 1 grandfathering cap is set at £5.8 billion for 2016 (2015 - £6.7 billion).

The table below analyses the movement in end-point CRR CET1, AT1 and Tier 2 capital for the year.

	CET1 £m	AT1 £m	Tier 2 £m	Total £m
At 1 January 2016	37,608	1,997	8,002	47,607
Loss for the year	(6,955)	—	—	(6,955)
Own credit	(200)	—	—	(200)
Share capital and reserve movements in respect of employee share schemes	208	—	—	208
Ordinary shares issued	215	—	—	215
Foreign exchange reserve	1,214	—	—	1,214
Available-for-sale reserves	(69)	—	—	(69)
Goodwill and intangibles deduction	57	—	—	57
Deferred tax assets	204	—	—	204
Prudential valuation adjustments	(151)	—	—	(151)
Expected loss over impairment provisions	(336)	—	—	(336)
Capital instruments issued/(matured)	—	2,044	—	2,044
Net dated subordinated debt/grandfathered instruments	—	—	(826)	(826)
Foreign exchange movements	—	—	1,985	1,985
Other movements	(1,172)	—	—	(1,172)
At 31 December 2016	30,623	4,041	9,161	43,825

*unaudited

Capital risk* continued

Leverage exposure

The leverage exposure is based on the CRR Delegated Act.

Leverage	End-point CRR basis 2016 £bn	2015 £bn
Derivatives	247.0	262.5
Loans and advances	340.3	327.0
Reverse repos	41.8	39.9
Other assets	169.6	186.0
Total assets	798.7	815.4
Derivatives		
- netting	(241.7)	(258.6)
- potential future exposures	65.3	75.6
Securities financing transactions gross up	2.3	5.1
Undrawn commitments (analysis below)	58.6	63.5
Regulatory deductions and other adjustments	0.1	1.5
Leverage exposure	683.3	702.5
Tier 1 capital	34.7	39.6
Leverage ratio %	5.1	5.6
Average leverage exposure	712.1	
Average Tier 1 capital	38.0	
Average leverage ratio %	5.3	
UK leverage ratio %	5.6	

Note:
(1) The UK leverage ratio excludes central bank claims from the leverage exposure where deposits held are denominated in the same currency and of contractual maturity that is equal or longer than that of the central bank claims.

Weighted undrawn commitments

The table below provides a breakdown of weighted undrawn commitments.

	2016 £bn	2015 £bn
Unconditionally cancellable credit cards	2.4	2.4
Other Unconditionally cancellable items	7.7	7.2
Unconditionally cancellable items (1)	10.1	9.6
Undrawn commitments <1 year which may not be cancelled	1.8	0.6
Other off-balance sheet items with 20% CCF	0.9	1.4
Items with a 20% CCF	2.7	2.0
Revolving credit risk facilities	27.2	25.3
Term loans	3.1	4.3
Mortgages	0.1	5.9
Other undrawn commitments > 1 year which may not be cancelled & off-balance sheet items with 50% CCF	3.3	5.3
Items with a 50% CCF	33.7	40.8
Items with a 100% CCF	12.1	11.1
Total	58.6	63.5

Note:
(1) Based on a 10% credit conversion factor (CCF).

*unaudited

Capital risk* continued

Loss absorbing capital

RBS's capital components and estimated loss absorbing capital (LAC) at 31 December 2016 based on current regulatory interpretations are set out below. For details regarding regulatory developments in relation to MREL requirements, refer to page 176. The roll-off profile and average spread relating to senior debt and Tier 2 instruments is set out on the next page.

The following table illustrates the components of estimated LAC in RBSG and operating subsidiaries.

	2016				2015			
	Par value (1) £bn	Balance sheet value £bn	Regulatory value (2) £bn	LAC value (3) £bn	Par value (1) £bn	Balance sheet value £bn	Regulatory value (2) £bn	LAC value (3) £bn
CET1 capital (4)	30.6	30.6	30.6	30.6	37.6	37.6	37.6	37.6
Tier 1 capital: end-point CRR compliant AT1								
of which: RBSG (holdco)	4.0	4.0	4.0	4.0	2.0	2.0	2.0	2.0
of which: RBSG operating subsidiaries (opcos)	—	—	—	—	—	—	—	—
	4.0	4.0	4.0	4.0	2.0	2.0	2.0	2.0
Tier 1 capital: non end-point CRR compliant								
of which: holdco	5.5	5.6	5.5	4.0	6.0	6.0	5.9	4.6
of which: opcos	0.3	0.3	0.3	0.3	2.5	2.5	2.5	0.3
	5.8	5.9	5.8	4.3	8.5	8.5	8.4	4.9
Tier 2 capital: end-point CRR compliant								
of which: holdco	6.9	7.0	6.9	5.3	5.8	5.9	5.7	4.4
of which: opcos	6.0	6.4	4.0	5.6	5.1	5.5	3.8	5.5
	12.9	13.4	10.9	10.9	10.9	11.4	9.5	9.9
Tier 2 capital: non end-point CRR compliant								
of which: holdco	0.4	0.4	0.2	0.1	0.3	0.3	0.2	0.1
of which: opcos	2.5	2.7	2.1	2.1	3.3	3.6	3.0	2.9
	2.9	3.1	2.3	2.2	3.6	3.9	3.2	3.0
Senior unsecured debt securities issued by:								
RBSG holdco	6.9	6.8	—	5.0	4.9	5.0	—	2.9
RBSG opcos	14.8	15.0	—	—	17.7	18.1	—	—
	21.7	21.8	—	5.0	22.6	23.1	—	2.9
Total	77.9	78.8	53.6	57.0	85.2	86.5	60.7	60.3
RWAs				228.2				242.6
Leverage exposure				683.3				702.5
LAC as a ratio of RWAs (4)				24.9%				24.9%
LAC as a ratio of leverage exposure				8.3%				8.6%

Notes:
(1) Par value reflects the nominal value of securities issued.
(2) Regulatory capital instruments issued from operating companies are included in the transitional LAC calculation, to the extent they meet the MREL criteria.
(3) LAC value reflects RBS's interpretation of the Bank of England's policy statement on the minimum requirements for own funds and eligible liabilities (MREL), published in November 2016. MREL policy and requirements remain subject to further potential development, as such RBS estimated position remains subject to potential change. Liabilities excluded from LAC include instruments with less than one year remaining to maturity, structured debt, operating company senior debt, and other instruments that do not meet the MREL criteria. Includes Tier 1 and Tier 2 securities prior to incentive to redeem.
(4) CRD IV capital buffers met by CET1 in addition to MREL requirements: being 3.5% in 2017 based on a capital conservation buffer of 2.5% and G-SIB requirement of 1.0%, and 4.0% in 2016 based on a capital conservation buffer of 2.5% and a G-SIB requirement of 1.5%. Excludes consideration of any additional management buffer.
(5) Corresponding shareholders' equity was £48.6 billion (2015 - £53.4 billion).
(6) Regulatory amounts reported for AT1, Tier 1 and Tier 2 instruments are before grandfathering restrictions imposed by CRR.

*unaudited

Capital risk* continued

Roll-off profile

Based on current guidance, RBS anticipates issuing senior bonds from its holding company to ensure LAC classification under MREL proposals. The following table illustrates the roll-off profile and weighted average spreads of RBS's major wholesale funding programmes.

Senior debt roll-off profile (1)

	As at and for year ended	Roll-off profile					
RBSG	31 December 2016	H1 2017	H2 2017	2018	2019	2020 & 2021	2022 & later
- amount (£m)	6,832	371	449	83	1,413	2	4,514
- weighted average rate spread (bps)	220	128	190	172	218	162	231
RBS plc							
- amount (£m)	14,950	4,404	1,168	1,495	2,468	3,460	1,955
- weighted average rate spread (bps)	121	69	106	143	244	186	98
RBS N.V.							
- amount (£m)	47	4	8	24	—	4	7
- weighted average rate spread (bps)	92	10	43	125	—	5	136
Securitisation							
- amount (£m)	1,481	—	—	—	—	—	1,481
- weighted average rate spread (bps)	42	—	—	—	—	—	42
Covered bonds							
- amount (£m)	3,935	—	—	905	—	1,896	1,134
- weighted average rate spread (bps)	191	—	—	137	—	150	306
Total notes issued (£m)	27,245	4,779	1,625	2,507	3,881	5,362	9,091
Weighted average spread	159	74	128	142	235	174	174

Tier 2 capital instruments roll-off profile (2)

	As at and for year ended 31 December 2016	H1 2017	H2 2017	2018	2019	2020 & 2021	2022 & later
RBSG (£m)	7,404	87	—	290	888	—	6,139
RBS plc (£m)	6,584	3,901	138	2,020	38	—	487
NWB Plc (£m)	1,207	741	—	—	—	376	90
RBS N.V. (£m)	1,226	—	—	418	298	12	498
UBI DAC	76	—	—	—	—	—	76
Total Tier 2 capital (£m)	16,497	4,729	138	2,728	1,224	388	7,290

Notes:
(1) Based on final contractual instrument maturity.
(2) Based on first call date of instrument
(3) The weighted average spread reflects the average net funding cost to RBS. This is calculated as the difference between the issuing coupon and the equivalent hedging rate.

*unaudited

Capital risk* continued

Risk-weighted assets

The table below analyses the movement in credit risk RWAs on the end-point CRR basis during the year, by key drivers.

	Credit risk RWAs		
	Non-counterparty £bn	Counterparty £bn	Total £bn
At 1 January 2016	166.4	23.4	189.8
Foreign exchange movement	10.1	1.4	11.5
Business movements	(10.5)	(2.4)	(12.9)
Risk parameter changes (1)	(4.5)	0.5	(4.0)
Model updates	0.7	—	0.7
At 31 December 2016	162.2	22.9	185.1

Note:
(1) PD model changes relating to counterparty risks are included with risk parameter changes in line with EBA Pillar 3 Guidelines issued in December 2016.

The table below analyses the movement in market and operational risk RWAs on the end-point CRR basis during the year.

	Market risk RWAs			Operational risk	
	NatWest Markets £bn	Other £bn	Total £bn	RWAs £bn	Total £bn
At 1 January 2016	13.8	7.4	21.2	31.6	52.8
Business and market movements	(2.2)	(1.6)	(3.8)	(5.9)	(9.7)
At 31 December 2016	11.6	5.8	17.4	25.7	43.1

Key points

- RWAs decreased by £14.4 billion to £228.2 billion primarily as result of run down of Capital Resolution and the reduction in operational risk (£5.9 billion) partly offset by adverse exchange rate movements (£11.5 billion) as sterling weakened against all major currencies.
- The foreign exchange movement occurred primarily in Capital Resolution (£4.2 billion), Ulster Bank RoI (£2.6 billion) Commercial Banking (£2.1 billion) and NatWest Markets (£1.2 billion).
- The annual operational risk recalculation resulted in a decrease of £2.0 billion and a further £3.9 billion reduction relating to the removal of the Citizens related element following PRA approval.
- Growth in UK lending, both new and organic, and the transfer of Northern Ireland loans from UK PBB were the key contributors to the increase in Commercial Banking.
- NatWest Markets RWAs increased by £2.1 billion principally due to business movements and the impact of the weakening of sterling.
- Capital Resolution RWAs continued to decrease in line with risk reduction strategy (£14.5 billion) with the majority of the movement seen in Markets (£4.9 billion), primarily derivative mitigation activities and terminations, and disposals and run-off in Global Transactions Services (£3.1 billion), shipping (£1.7 billion) and legacy loan portfolio (£2.3 billion).
- The Central items decrease of £7.1 billion is significantly driven by the operational risk reduction relating to Citizens.

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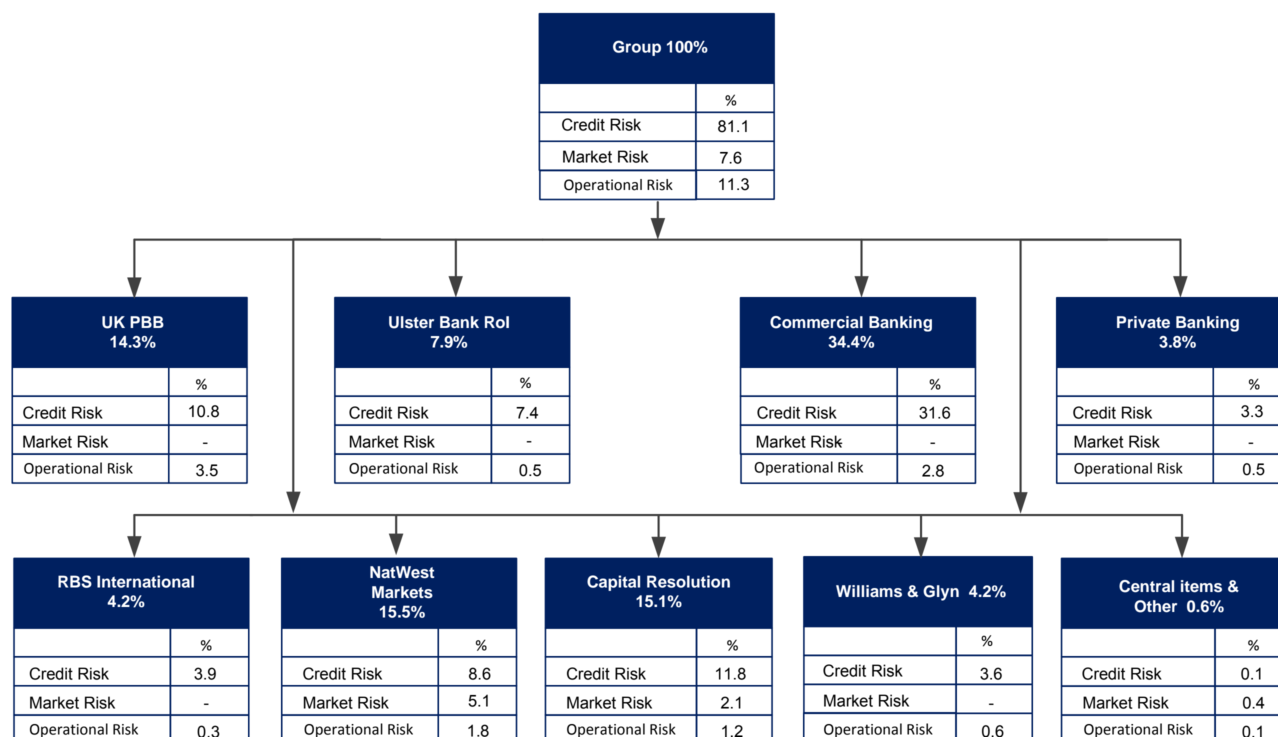
Capital risk* continued

RWAs by segment

The chart below illustrates the concentration of risk-weighted assets by segment.



The table below analyses the movement in end-point CRR RWAs by segment during the year.

Total RWAs	UK PBB £bn	Ulster Bank RoI £bn	Commercial Banking £bn	Private Banking £bn	RBSI £bn	NatWest Markets £bn	Capital Resolution £bn	W&G £bn	Central items & other £bn	Total £bn
At 1 January 2016	33.3	19.4	72.3	8.7	8.3	33.1	49.0	9.9	8.6	242.6
Foreign exchange movement	—	2.6	2.1	—	0.6	1.2	4.2	—	0.8	11.5
Business movements	—	(1.8)	4.1	—	0.6	1.2	(18.1)	(0.2)	(8.3)	(22.5)
Risk parameter changes (1)	(1.0)	(2.1)	(0.2)	—	—	0.1	(0.9)	—	0.1	(4.0)
Methodology changes	0.2	—	—	(0.1)	—	(0.4)	0.2	—	—	(0.1)
Model updates (2)	0.2	—	0.2	—	—	—	0.1	(0.1)	0.3	0.7
At 31 December 2016	32.7	18.1	78.5	8.6	9.5	35.2	34.5	9.6	1.5	228.2
Credit risk										
- non-counterparty	24.8	16.9	72.0	7.5	8.8	5.5	18.2	8.2	0.3	162.2
- counterparty	—	0.1	—	—	—	14.1	8.7	—	—	22.9
Market risk	—	—	—	—	—	11.6	4.8	—	1.0	17.4
Operational risk	7.9	1.1	6.5	1.1	0.7	4.0	2.8	1.4	0.2	25.7
Total RWAs	32.7	18.1	78.5	8.6	9.5	35.2	34.5	9.6	1.5	228.2

Notes:
(1) Risk parameter changes relate to changes in credit quality metrics of customers and counterparties such as probability of default (PD) and loss given default (LGD) as well as IRB model changes relating to counterparty credit risk (in line with EBA Pillar 3 Guidelines).
(2) Credit risk models were updated during the year including LGD model for quasi governments and PD model for banks.

*unaudited

Liquidity and funding risk

Definition

Liquidity and funding risk arises when RBS is unable to meet its financial obligations, including financing wholesale maturities or customer deposit withdrawals, as and when they fall due.

All the quantitative disclosures in this section are audited except for those in Liquidity metrics and Behavioural maturity.

Key developments in 2016

Liquidity position:

- The liquidity portfolio of £164 billion covered total wholesale funding, including derivative collateral, by more than two times. The liquidity portfolio increased by £8 billion in the year driven by secondary liquidity, as the volume of mortgage assets placed into the Discount Window Facility (DWF) increased during 2016.
- The regulatory liquidity coverage ratio (LCR) metric decreased to 123% at 31 December 2016 from 136% at the prior year end, driven by Capital Resolution run down and by UK PBB and Commercial Banking lending growth.
- Internal stressed outflow coverage (SOC) was 139% at 31 December 2016, down from 227% in 2015, primarily due to a change in approach that restricts reliance on DWF assets.

Funding position:

- Net stable funding ratio (NSFR) remained broadly unchanged from the prior year at 121%. This is comfortably above the minimum target of 100% and reflects RBS's funding strategy to rely on stable customer deposits.
- Loan:deposit ratio was 91% at the end of 2016, a 2% increase from the prior year, driven by Capital Resolution running down more deposits than loans.

Sources of liquidity and funding

Liquidity and funding risks arise through the maturity transformation role that banks perform. It is dependent on RBS specific factors such as maturity profile, composition of sources and uses of funding and the quality and size of the liquidity portfolio. Broader market factors, such as wholesale market conditions and depositor and investor behaviour, are also contributing factors.

RBS's primary funding sources are as follows:

Type	Description
Customer deposits	PBB and CPB deposit taking franchises.
Wholesale markets	Short-term (less than 1 year) unsecured money markets and secured repo market funding.
Term debt	Issuance of long-term (more than 1 year) unsecured and secured debt securities.

RBS may access various funding facilities offered by central banks from time to time. The use of such facilities can be both part of a wider strategic objective to support initiatives to help stimulate economic growth or as part of the broader liquidity management and funding strategy. Usage and repayment of available central bank facilities will fit within the overall liquidity risk appetite and concentration limits.

Policy, framework and governance

The key elements of the liquidity and funding framework within RBS are as follows:

Type	Description
Risk appetite	Meeting regulatory and set internal risk limits for liquidity and funding.
Policies	How we manage liquidity and funding across RBS.
Governance	Management oversight and three lines of defence.

Internal liquidity and funding policies are designed to ensure that RBS:

- *Has a clearly stated liquidity and funding risk tolerance:* The liquidity and funding risk tolerance forms part of RBS's bank-wide risk appetite statement, which is overseen by the Board Risk Committee and approved by the RBS Board. The risk appetite statement defines key metrics, risk trigger levels and capacity for liquidity and funding management within RBS The Board also sets the appetite for funding risk to ensure that stable sources of funding are used to fund RBS's core assets. RBS monitors its liquidity positions against these risk tolerances on a daily basis. In setting risk limits the Board considers the nature of RBS's activities, overall risk appetite, market best practice and regulatory compliance.
- *Has in place strategies, policies and practices to ensure that RBS maintains sufficient liquidity:* the risk management framework determines the sources of liquidity risks and the steps that can be taken when these risks exceed certain monitored limits. These steps include when and how to use the liquid asset portfolio, and other balance sheet actions that can be undertaken. The Asset and Liability Management Committee (ALCo), and by delegation the ALCo Technical Committee, oversees the implementation of liquidity and funding management across RBS within set risk appetite.
- *Incorporates liquidity costs, benefits and risks in product pricing and performance management:* RBS uses internal funds transfer pricing to ensure liquidity costs are reflected in the measurement of business performance, and to correctly incentivise the business to source the most appropriate mix of funding.

Liquidity and funding risk continued

Regulatory oversight and liquidity framework*

RBS operates across multiple jurisdictions and is subject to a number of regulatory regimes, with the key metrics being:

Ratio	Exposure type	Description
Liquidity coverage ratio	Liquidity profile	Coverage of 30 day net cash outflows in stress - effective from 1 October 2015.
Net stable funding ratio	Structural funding profile	Required and available stable funding sources less than and greater than 1 year timeline. Effective from 1 January 2018.

The principal regulator, the PRA, has a comprehensive set of liquidity regulations which implement the Capital Requirements Directive (CRD) IV liquidity regime in the UK. To comply with the PRA regulatory framework, RBS undertakes the following:

Activity	Description
Individual Liquidity Adequacy Assessment Process (ILAAP)	An ongoing exercise to comply with best practice and regulatory standards for liquidity management.
L-SREP	An annual Liquidity Supervisory Review and Evaluation Process (L-SREP) with the PRA, that involves a comprehensive review of the RBS ILAAP, liquidity policies and risk management framework. This results in the settings of the Individual Liquidity Guidance, which influences the size and overall composition of the liquidity portfolio.

Regulatory developments

LCR is being introduced on a phased basis and UK banks are initially required to maintain a minimum 90% LCR by 1 January 2017, rising to 100% by 1 January 2018.

The Basel Committee on Banking Supervision (BCBS) published its final recommendations for implementation of the NSFR in October 2014. The proposal included an implementation date of 1 January 2018, by which time banks are expected to meet and maintain an NSFR ratio of 100%. The European Commission (EC) is due to submit a legislative proposal to the European Parliament during 2017 for implementing the NSFR in the European Union (EU). In the meantime, RBS uses the definitions from the BCBS guidelines, and its own internal interpretations, to calculate the NSFR.

Measurement, monitoring and contingency planning

In implementing the liquidity risk management framework, a suite of tools are used to monitor, limit and stress test the risks within the balance sheet. Set limits control the amount and composition of funding sources, asset and liability mismatches and funding concentrations, in addition to the level of liquidity risk.

*unaudited

Liquidity risks are reviewed at significant legal entity and business levels daily, with performance reported to ALCos at least monthly.

Any breach of internal metric limits will set in motion a series of actions and escalations outlined under the RBS Recovery Plan (refer to page 179), which covers all legal entities within the Group. The plan sets out credible recovery options that could be implemented in the event of a severe stress to restore the business to a stable and sustainable position, focussing on addressing the bank's capital and liquidity position.

Two significant legal entities, RBS Securities Inc and The Royal Bank of Scotland International Limited, have been requested by local regulators to maintain separate recover plans to address specific liquidity risks. These plans will be aligned to the 2017 RBS Recovery Plan to ensure they operate consistently in the event of a stress scenario.

Stress testing*

Under the liquidity risk management framework RBS maintains the ILAAP, a component of which is an assessment of net stressed liquidity outflows. RBS considers a range of extreme but plausible stress scenarios on cash flows, liquidity resources, profitability, solvency, asset encumbrance and survival horizon.

Type	Description
Idiosyncratic scenario	The market perceives RBS to be suffering from a severe stress event which results in an immediate assumption of increased credit risk or concerns over solvency.
Market-wide scenario	A market stress event affecting all participants in a market through contagion, counterparty failure and other market risks. RBS is impacted under this scenario but no more severely than any other participants with equivalent exposure.
Combined scenario	This scenario models the combined impact of an idiosyncratic and market stress occurring at once. The combined scenario reflects the contingency that a severe name-specific event occurs at RBS in conjunction with a broader market stress, causing wider damage to the market and financial sector and severely impacting funding markets and assets.

RBS uses the most severe combination of these to set the internal stress testing scenario. The results of this enable the bank to set its internal liquidity risk appetite which complements the regulatory LCR requirement.

Liquidity and funding risk continued

Liquidity portfolio

The size of the portfolio is determined under the liquidity risk management framework with reference to RBS's liquidity risk appetite.

The majority of the portfolio is centrally managed by RBS Treasury, ring-fenced from the NatWest Markets trading book, and is the ultimate responsibility of the RBS Treasurer. This portfolio is held in the PRA regulated UK Domestic Liquidity Subgroup (UK DoLSub) comprising RBS's five licensed deposit taking UK banks: The Royal Bank of Scotland plc, National Westminster Bank Plc, Ulster Bank Limited, Coutts & Co and Adam & Company PLC.

Two of RBS's significant operating subsidiaries, RBS N.V. and Ulster Bank Ireland DAC, hold locally managed portfolios that comply with local regulations that may differ from PRA rules.

The UK DoLSub liquidity portfolio accounted for 96% of the total liquidity portfolio; this portion is available to meet liquidity needs as they arise across RBS. The remaining liquidity reserves are held within non-UK bank subsidiaries for local use.

Separate from the liquidity portfolio, RBS holds high quality assets to meet payment systems collateral requirements; these are managed by RBS Treasury.

RBS categorises its liquidity portfolio, including its locally managed liquidity portfolios, into primary and secondary liquid assets:

- Primary liquid assets such as cash and balances at central banks, treasury bills and other high quality government and US agency bonds.
- Secondary liquid assets are eligible as collateral for local central bank liquidity facilities, but do not meet the core local regulatory definition. These assets include own-issued securitisations or whole loans that are retained on balance sheet and pre-positioned with a central bank so that they may be converted into additional sources of liquidity at very short notice.

RBS retains a prudent approach to setting the composition of the liquidity portfolio, which is subject to internal policies and limits over quality of counterparty, maturity mix and currency mix. The liquidity value of the portfolio is determined with reference to current market prices and the haircuts necessary to generate cash from the asset.

Liquidity risk

Key metrics*

The table below sets out the key liquidity and related metrics monitored by RBS. Ratios are set out in order of tenor.

	2016	2015
Liquidity portfolio	£164bn	£156bn
Liquidity coverage ratio (1)	123%	136%
Stressed outflow coverage (2)	139%	227%
Net stable funding ratio (3)	121%	121%
Loan:deposit ratio	91%	89%

Notes:

(1) On 1 October 2015 the LCR became the PRA's primary regulatory liquidity standard. It is a Pillar 1 metric to which the PRA apply Pillar 2 add-ons. UK banks are required to meet a minimum standard of 90% from 1 January 2017, rising to 100% by 1 January 2018. The published LCR excludes Pillar 2 add-ons. RBS calculates the LCR using its own interpretations of the EU LCR Delegated Act, which may change over time and may not be fully comparable with those of other financial institutions.

(2) RBS's liquidity risk appetite is measured by reference to the liquidity portfolio as a percentage of stressed contractual and behavioural outflows under the worst of three severe stress scenarios of a market-wide stress, an idiosyncratic stress and a combination of both in RBS's ILAAP. This assessment is performed in accordance with PRA guidance.

(3) BCBS issued its final recommendations for the implementation of the net stable funding ratio in October 2014, proposing an implementation date of 1 January 2018. Pending further guidelines from the EU and the PRA, RBS uses the definitions and proposals from the BCBS paper and internal interpretations, to calculate the NSFR. Consequently RBS's ratio may change over time and may not be comparable with those of other financial institutions.

*unaudited

Liquidity and funding risk continued

Liquidity portfolio

The table below shows the liquidity portfolio by product, liquidity value and by carrying value. Liquidity value is lower than carrying value as it is stated after discounts applied by the Bank of England and other central banks to instruments, within the secondary liquidity portfolio, eligible for discounting.

	Liquidity value									
	2016					2015				
	31 December			Average		31 December			Average	
	UK DoLSub (1) £m	Other £m	Total £m	UK DoLSub (1) £m	Total £m	UK DoLSub (1) £m	Other £m	Total £m	UK DoLSub (1) £m	Total £m
Cash and balances at central banks	66,598	2,542	69,140	56,772	59,489	67,790	1,611	69,401	67,294	69,736
Central and local government bonds										
AAA rated governments	3,936	1,331	5,267	3,692	4,539	3,201	1,098	4,299	4,069	5,263
AA- to AA+ rated governments and US agencies	19,348	1,244	20,592	18,757	21,106	18,238	3,216	21,454	11,462	22,546
Below AA rated governments	—	237	237	—	—	—	—	—	—	46
Local government	—	—	—	—	—	—	—	—	—	12
	23,284	2,812	26,096	22,449	25,645	21,439	4,314	25,753	15,531	27,867
Primary liquidity	89,882	5,354	95,236	79,221	85,134	89,229	5,925	95,154	82,825	97,603
Secondary liquidity (2)	68,007	683	68,690	65,588	66,774	59,201	1,369	60,570	54,131	57,654
Total liquidity value	157,889	6,037	163,926	144,809	151,908	148,430	7,294	155,724	136,956	155,257
Total carrying value	184,136	6,209	190,345			181,240	7,494	188,734		

Notes:
(1) The PRA regulated UK DoLSub comprising RBS's five licensed deposit-taking UK banks: The Royal Bank of Scotland plc, National Westminster Bank Plc, Ulster Bank Limited, Coutts & Co and Adam & Company PLC. In addition, certain of RBS's significant operating subsidiaries, RBS N.V. and Ulster Bank Ireland DAC, hold managed portfolios that comply with local regulations that may differ from PRA rules.
(2) Comprises assets eligible for discounting at the Bank of England and other central banks.

The table below shows the liquidity value of the liquidity portfolio by currency.

Total liquidity portfolio	GBP £m	USD £m	EUR £m	Other £m	Total £m
2016	128,614	9,582	24,833	897	163,926
2015	110,289	20,861	24,574	—	155,724

Funding risk

The composition of RBS's balance sheet is a function of the broad array of product offerings and markets served by its core businesses. The structural composition of the balance sheet is augmented as needed through active management of both asset and liability portfolios. The objective of these activities is to optimise the liquidity profile, while ensuring adequate coverage of all cash requirements under extreme stress conditions.

RBS's asset and liability types broadly match. Customer deposits provide more funding than customer loans utilise; repurchase agreements are largely covered by reverse repurchase agreements; interbank lending and funding largely nets off and this gap has narrowed over the past five years; and derivative assets are largely netted against derivative liabilities.

Key funding metrics

The table below summarises the key funding metrics.

	Short-term wholesale funding (1)		Total wholesale funding		Net inter-bank funding (2)		
	Excluding derivative collateral £bn	Including derivative collateral £bn	Excluding derivative collateral £bn	Including derivative collateral £bn	Deposits £bn	Loans (3) £bn	Net inter-bank funding £bn
2016 total	13.9	34.6	59.3	80.0	12.6	(10.6)	2.0
2015 total	17.2	37.6	58.7	79.1	7.7	(7.3)	0.4

Notes:
(1) Short-term wholesale funding is funding with a residual maturity of less than one year.
(2) Excludes derivative cash collateral.
(3) Primarily short-term balances.

Liquidity and funding risk continued

Funding sources

The table below shows the carrying values of the principal funding sources.

	2016			2015		
By product	Short-term less than 1 year £m	Long-term more than 1 year £m	Total £m	Short-term less than 1 year £m	Long-term more than 1 year £m	Total £m
Deposits by banks						
Derivative cash collateral	20,674	—	20,674	20,367	—	20,367
Other deposits (1)	6,130	6,513	12,643	7,336	359	7,695
	26,804	6,513	33,317	27,703	359	28,062
Debt securities in issue						
Commercial paper and certificates of deposit	3,205	3	3,208	742	202	944
Medium-term notes	3,388	15,233	18,621	6,639	15,540	22,179
Covered bonds	96	3,839	3,935	2,171	3,414	5,585
Securitisations	—	1,481	1,481	4	2,438	2,442
	6,689	20,556	27,245	9,556	21,594	31,150
Subordinated liabilities	1,062	18,357	19,419	323	19,524	19,847
Notes issued	7,751	38,913	46,664	9,879	41,118	50,997
Wholesale funding	34,555	45,426	79,981	37,582	41,477	79,059
Customer deposits						
Derivative cash collateral (2)	11,487	—	11,487	10,373	—	10,373
Financial institution deposits	52,292	668	52,960	45,134	1,226	46,360
Personal deposits	162,958	1,877	164,835	154,066	3,212	157,278
Corporate deposits	123,495	1,095	124,590	130,514	1,466	131,980
Total customer deposits	350,232	3,640	353,872	340,087	5,904	345,991
Total funding excluding repos	384,787	49,066	433,853	377,669	47,381	425,050
Total repos	32,335	—	32,335	37,378	—	37,378
Total funding including repos	417,122	49,066	466,188	415,047	47,381	462,428

Notes:
(1) Includes £1.3 billion (2015 - £0.7 billion) relating to RBS's participation in central bank financing operations under the European Central Bank's Targeted Long Term Refinancing Operations.
(2) Cash collateral includes £10,002 million (2015 - £9,504 million) from financial institutions.

Repos

The table below analyses repos by counterparty type.

	2016 £m	2015 £m
Financial institutions		
- central and other banks	5,239	10,266
- other financial institutions	25,652	20,130
Other corporate	1,444	6,982
Total	32,335	37,378

Key point

- Reverse repos at 31 December 2016 were £41.8 billion (2015 - £39.9 billion). Fair value of securities received as collateral for reverse repos was £41.8 billion (2015 - £39.8 billion), of which £30.5 billion (2015 - £29.0 billion) had been rehypothecated for RBS's own transactions, in line with normal market practice.

Liquidity and funding risk continued

Loan:deposit ratios and funding surplus/(gap)

The table below shows loans and advances to customers, customer deposits, loan:deposit ratios (LDR) and funding surplus/(gap).

	2016				2015*			
	Loans and advances to customers (1) £m	Customer deposits (2) £m	LDR %	Funding surplus/(gap) (3) £m	Loans and advances to customers (1) £m	Customer deposits (2) £m	LDR %	Funding surplus/(gap) (3) £m
UK PBB	132,107	145,826	91	13,719	119,705	137,840	87	18,135
Ulster Bank RoI	18,930	16,109	117	(2,821)	16,673	13,102	127	(3,571)
Commercial Banking	100,069	97,886	102	(2,183)	91,286	88,859	103	(2,427)
Private Banking	12,157	26,560	46	14,403	11,193	23,084	48	11,891
RBSI	8,774	25,176	35	16,402	7,337	21,264	35	13,927
NatWest Markets	17,417	8,384	nm	(9,033)	16,076	5,674	nm	(10,402)
Capital Resolution	12,767	9,499	134	(3,268)	23,632	26,006	91	2,374
W&G	20,546	24,166	85	3,620	20,016	24,085	83	4,069
Central items & other	256	266	nm	10	416	3,272	nm	2,856
Disposal groups	—	—	—	—	1,639	2,805	58	1,166
	323,023	353,872	91	30,849	307,973	345,991	89	38,018

Notes:
(1) Excludes reverse repo agreements and net of impairment provisions.
(2) Excludes repo agreements.
(3) Calculated as customer deposits less loans and advances to customers
(4) nm = not meaningful

Key points

- The loan:deposit ratio was 91%, up from 89% at the end of 2015 as loans grew more than deposits.
- Loan growth was driven by mortgage lending in UK PBB and corporate lending in Commercial Banking.
- Deposit growth continued in 2016, particularly in UK PBB, Commercial Banking, Private Banking and RBSI. These increases were partially offset by deposit reductions in Capital Resolution as the business continued to run down, and the sale of the International Private Banking business.

*unaudited

Liquidity and funding risk continued

The table below shows RBS's principal funding sources.

	2016					2015				
	GBP	USD	EUR	Other	Total	GBP	USD	EUR	Other	Total
By currency	£m	£m	£m	£m	£m	£m	£m	£m	£m	£m
Deposits by banks	11,143	2,423	17,827	1,924	33,317	5,301	3,570	17,651	1,540	28,062
Debt securities in issue										
Certificates of deposit (CDs)	1,401	—	1,807	—	3,208	892	50	2	—	944
Medium-term notes (MTNs)	1,457	6,549	9,512	1,103	18,621	2,695	5,744	11,754	1,986	22,179
Covered bonds	1,134	—	2,801	—	3,935	1,079	—	4,506	—	5,585
Securitisations	175	302	1,004	—	1,481	403	713	1,326	—	2,442
	4,167	6,851	15,124	1,103	27,245	5,069	6,507	17,588	1,986	31,150
Subordinated liabilities	962	12,367	5,176	914	19,419	1,028	12,848	4,963	1,008	19,847
Wholesale funding	16,272	21,641	38,127	3,941	79,981	11,398	22,925	40,202	4,534	79,059
% of wholesale funding	20%	27%	48%	5%	100%	14%	29%	51%	6%	100%
Customer deposits	299,693	17,791	33,144	3,244	353,872	282,152	20,912	35,680	7,247	345,991
Total funding excluding repos	315,965	39,432	71,271	7,185	433,853	293,550	43,837	75,882	11,781	425,050
% of total funding	73%	9%	16%	2%	100%	69%	10%	18%	3%	100%

Notes issued - residual maturity profile by note type

The table below shows RBS's debt securities in issue and subordinated liabilities by residual maturity.

	Debt securities in issue							
	Commercial paper and CDs	MTNs	Covered bonds	Securitisations	Total	Subordinated liabilities	Total notes in issue	Total notes in issue
2016	£m	£m	£m	£m	£m	£m	£m	%
Less than 1 year	3,205	3,388	96	—	6,689	1,062	7,751	17
1-3 years	3	4,937	871	—	5,811	2,814	8,625	18
3-5 years	—	3,323	1,883	—	5,206	483	5,689	12
More than 5 years	—	6,973	1,085	1,481	9,539	15,060	24,599	53
Total including disposal groups	3,208	18,621	3,935	1,481	27,245	19,419	46,664	100
2015								
Less than 1 year	742	6,639	2,171	4	9,556	323	9,879	20
1-3 years	202	5,567	758	—	6,527	2,801	9,328	18
3-5 years	—	6,203	1,627	—	7,830	317	8,147	16
More than 5 years	—	3,770	1,029	2,438	7,237	16,406	23,643	46
Total	944	22,179	5,585	2,442	31,150	19,847	50,997	100

Liquidity and funding risk continued

Maturity analysis

The contractual maturity of balance sheet assets and liabilities reflects the maturity transformation role banks perform, lending long-term but obtaining funding predominantly through short-term liabilities such as customer deposits. In practice, the behavioural profiles of many liabilities exhibit greater stability and longer maturity than the contractual maturity. This is particularly true of many types of retail and corporate deposits which, despite being repayable on demand or at short notice, have demonstrated very stable characteristics even in periods of acute stress. In its analysis to assess and manage asset and liability maturity gaps RBS determines the expected customer behaviour through qualitative and quantitative techniques, incorporating observed customer behaviours over long periods of time. This analysis is subject to governance through ALCos down to a segment level.

Behavioural analysis*

Contractual maturity analysis and net behavioural funding surplus/(gap) are set out below.

	Behavioural maturity				Contractual maturity											
	Net surplus/(gap)				Net surplus/(gap)				Loans to customers				Customer accounts			
2016	Less than 1 year £bn	1-5 years £bn	Greater than 5 years £bn	Total £bn	Less than 1 year £bn	1-5 years £bn	Greater than 5 years £bn	Total £bn	Less than 1 year £bn	1-5 years £bn	Greater than 5 years £bn	Total £bn	Less than 1 year £bn	1-5 years £bn	Greater than 5 years £bn	Total £bn
UK PBB	3	(3)	14	14	132	(27)	(91)	14	12	29	91	132	144	2	—	146
UB RoI	—	(3)	—	(3)	14	(5)	(12)	(3)	1	6	12	19	15	1	—	16
CB	(9)	22	(15)	(2)	60	(42)	(20)	(2)	38	42	20	100	98	—	—	98
PB	1	2	12	15	22	(4)	(3)	15	5	4	3	12	27	—	—	27
RBSI	2	7	7	16	21	(2)	(3)	16	4	2	3	9	25	—	—	25
NWM (1)	3	(12)	—	(9)	(7)	(2)	—	(9)	15	2	—	17	8	—	—	8
CR (2)	—	—	(3)	(3)	2	(2)	(3)	(3)	7	3	3	13	9	1	—	10
W&G	1	—	2	3	20	(7)	(10)	3	4	7	10	21	24	—	—	24
Total	1	13	17	31	264	(91)	(142)	31	86	95	142	323	350	4	—	354
2015																
UK PBB	8	1	9	18	123	(24)	(81)	18	12	27	81	120	135	3	—	138
UB RoI	3	(4)	(3)	(4)	11	(4)	(11)	(4)	1	5	11	17	12	1	—	13
CB	5	15	(22)	(2)	55	(37)	(20)	(2)	34	37	20	91	89	—	—	89
PB	1	3	8	12	18	(4)	(2)	12	5	4	2	11	23	—	—	23
RBSI	1	5	8	14	19	(3)	(2)	14	2	3	2	7	21	—	—	21
NWM (1)	(3)	(7)	—	(10)	(9)	(1)	—	(10)	14	2	—	16	5	1	—	6
CR (2)	4	(1)	(1)	2	13	(6)	(5)	2	12	7	5	24	25	1	—	26
W&G	1	2	1	4	20	(7)	(9)	4	4	7	9	20	24	—	—	24
Central	4	—	—	4	4	—	—	4	2	—	—	2	6	—	—	6
Total	24	14	—	38	254	(86)	(130)	38	86	92	130	308	340	6	—	346

Notes:
(1) NatWest Markets
(2) Capital Resolution

Key points

- The net customer funding surplus has decreased by £7 billion during 2016 to £31 billion, driven by loan growth in addition to deposit rundown in Capital Resolution, partially offset by underlying deposit growth.
- Customer deposits and customer loans are broadly matched from a behavioural perspective.
- The net funding surplus in 2016 is concentrated in the longer dated buckets, reflecting the stable characteristics of customer deposits and lending that is behaviourally shorter dated.

*unaudited

Liquidity and funding risk continued

Contractual maturity

The following table shows the residual maturity of financial instruments, based on contractual date of maturity. Held-for-trading (HFT) assets and liabilities have been excluded from the maturity analysis in view of their short-term nature and are shown in total in the table below. Hedging derivatives are included within the relevant maturity bands.

	Other than held-for-trading										
2016	Less than 1 month £m	1-3 months £m	3-6 months £m	6 months -1 year £m	Subtotal £m	1-3 years £m	3-5 years £m	More than 5 years £m	Total excluding HFT £m	HFT £m	Total £m
Cash and balances at central banks	74,250	—	—	—	74,250	—	—	—	74,250	—	74,250
Bank reverse repos	1,543	197	—	—	1,740	—	—	—	1,740	11,120	12,860
Customer reverse repos	338	1,362	641	—	2,341	—	—	—	2,341	26,586	28,927
Loans to banks	9,521	237	655	38	10,451	46	—	1	10,498	6,780	17,278
Loans to customers	33,832	8,042	9,314	18,876	70,064	52,954	42,690	139,811	305,519	17,504	323,023
Personal	4,341	2,476	3,332	6,513	16,662	20,212	17,050	111,628	165,552	340	165,892
Corporate	25,112	4,859	4,475	7,243	41,689	28,338	24,222	26,148	120,397	3,702	124,099
Financial institutions (excluding banks)	4,379	707	1,507	5,120	11,713	4,404	1,418	2,035	19,570	13,462	33,032
Debt securities	1,911	2,279	3,016	3,138	10,344	10,103	7,356	20,215	48,018	24,504	72,522
Equity shares	—	—	—	—	—	—	—	537	537	166	703
Settlement balances	5,526	—	—	—	5,526	—	—	—	5,526	—	5,526
Derivatives	455	—	—	1,178	1,633	2,319	531	306	4,789	242,192	246,981
Total financial assets excluding disposal groups	127,376	12,117	13,626	23,230	176,349	65,422	50,577	160,870	453,218	328,852	782,070
Disposal groups	13	—	—	—	13	—	—	—	13	—	13
Total financial assets	127,389	12,117	13,626	23,230	176,362	65,422	50,577	160,870	453,231	328,852	782,083
Bank repos	917	197	—	—	1,114	—	—	—	1,114	4,125	5,239
Customer repos	3,910	—	—	—	3,910	—	—	—	3,910	23,186	27,096
Deposits by banks	5,632	462	31	2	6,127	1,284	5,000	150	12,561	20,756	33,317
Customer accounts	324,109	5,785	3,665	4,485	338,044	2,846	167	37	341,094	12,778	353,872
Personal	155,417	2,971	1,689	2,881	162,958	1,877	—	—	164,835	—	164,835
Corporate	119,156	1,759	1,493	758	123,166	769	98	34	124,067	2,008	126,075
Financial institutions (excluding banks)	49,536	1,055	483	846	51,920	200	69	3	52,192	10,770	62,962
Debt securities in issue	1,061	1,040	2,170	1,987	6,258	5,586	4,808	8,979	25,631	1,614	27,245
Settlement balances	3,645	—	—	—	3,645	—	—	—	3,645	—	3,645
Short positions	—	—	—	—	—	—	—	—	—	22,077	22,077
Derivatives	—	205	405	—	610	1,329	584	1,534	4,057	232,418	236,475
Subordinated liabilities	684	162	115	101	1,062	2,814	483	15,060	19,419	—	19,419
Other liabilities	2,028	—	—	—	2,028	—	—	—	2,028	—	2,028
Total financial liabilities	341,986	7,851	6,386	6,575	362,798	13,859	11,042	25,760	413,459	316,954	730,413

Liquidity and funding risk continued

	Other than held-for-trading										
2015	Less than 1 month £m	1-3 months £m	3-6 months £m	6 months -1 year £m	Subtotal £m	1-3 years £m	3-5 years £m	More than 5 years £m	Total excluding HFT £m	HFT £m	Total £m
Cash and balances at central banks	79,939	—	—	—	79,939	—	—	—	79,939	—	79,939
Bank reverse repos	535	748	—	—	1,283	—	—	—	1,283	11,069	12,352
Customer reverse repos	26	—	—	—	26	—	—	—	26	27,532	27,558
Loans to banks	7,425	217	17	27	7,686	—	21	1	7,708	11,295	19,003
Loans to customers	34,439	8,039	8,501	17,243	68,222	50,822	41,151	130,219	290,414	17,559	307,973
Personal	5,875	2,575	3,277	5,805	17,532	19,113	15,640	99,778	152,063	35	152,098
Corporate	23,976	4,932	4,072	7,699	40,679	26,460	24,046	28,126	119,311	4,644	123,955
Financial institutions (excluding banks)	4,588	532	1,152	3,739	10,011	5,249	1,465	2,315	19,040	12,880	31,920
Debt securities	3,246	2,766	5,662	2,866	14,540	7,199	6,932	17,988	46,659	35,857	82,516
Equity shares	—	—	—	—	—	—	—	725	725	660	1,385
Settlement balances	4,116	—	—	—	4,116	—	—	—	4,116	—	4,116
Derivatives	484	—	—	1,106	1,590	1,571	433	231	3,825	258,719	262,544
Total financial assets	130,210	11,770	14,180	21,242	177,402	59,592	48,537	149,164	434,695	362,691	797,386
Bank repos	609	—	—	—	609	—	—	—	609	9,657	10,266
Customer repos	1,542	—	—	—	1,542	—	—	—	1,542	25,570	27,112
Deposits by banks	6,023	536	30	739	7,328	—	—	265	7,593	20,469	28,062
Customer accounts	315,641	5,101	4,023	4,455	329,220	4,372	427	61	334,080	11,911	345,991
Personal	145,786	3,131	1,826	3,323	154,066	3,199	13	—	157,278	—	157,278
Corporate	126,306	1,314	1,689	830	130,139	786	364	57	131,346	1,503	132,849
Financial institutions (excluding banks)	43,549	656	508	302	45,015	387	50	4	45,456	10,408	55,864
Debt securities in issue	442	3,410	1,523	2,727	8,102	5,666	7,513	5,986	27,267	3,883	31,150
Settlement balances	3,397	—	—	—	3,397	—	—	—	3,397	—	3,397
Short positions	—	—	—	—	—	—	—	—	—	20,809	20,809
Derivatives	—	144	291	—	435	605	413	1,150	2,603	252,130	254,733
Subordinated liabilities	4	162	88	69	323	2,801	317	16,406	19,847	—	19,847
Other liabilities	1,886	—	—	—	1,886	—	—	—	1,886	—	1,886
Total financial liabilities	329,544	9,353	5,955	7,990	352,842	13,444	8,670	23,868	398,824	344,429	743,253

Liquidity and funding risk continued

Encumbrance

RBS evaluates the extent to which assets can be financed in a secured form (encumbrance), but certain asset types lend themselves more readily to encumbrance. The typical characteristics that support encumbrance are an ability to pledge those assets to another counterparty or entity through operation of law without necessarily requiring prior notification, homogeneity, predictable and measurable cash flows, and a consistent and uniform underwriting and collection process. Retail assets including residential mortgages, credit card receivables and personal loans display many of these features.

RBS categorises its assets into three broad groups; assets that are:

- Already encumbered and used to support funding currently in place via own asset securitisations, covered bonds and securities repurchase agreements.
- Pre-positioned with central banks as part of funding schemes and those encumbered under such schemes.
- Not currently encumbered. In this category, RBS has in place an enablement programme which seeks to identify assets which are capable of being encumbered and to identify the actions to facilitate such encumbrance whilst not impacting customer relationships or servicing.

Balance sheet encumbrance

	Encumbered as a result of transactions with counterparties other than central banks				Pre-positioned & encumbered	Unencumbered assets not pre-positioned with central banks				
2016	Covered bonds & securitisations (1) £bn	Derivatives £bn	Repos & similar (2) £bn	Total (3) £bn	assets held at central banks (4) £bn	Readily available (5) £bn	Other available (6) £bn	Cannot be used (7) £bn	Total £bn	Total £bn
Cash and balances at central banks	—	—	4.0	4.0	—	70.2	0.1	—	70.3	74.3
Loans and advances										
- banks	1.2	6.7	0.7	8.6	—	8.1	0.5	0.1	8.7	17.3
- residential mortgages										
- UK	10.1	—	—	10.1	97.9	19.8	9.5	—	29.3	137.3
- Irish	7.1	—	—	7.1	1.5	5.7	—	0.1	5.8	14.4
- US	0.3	—	—	0.3	—	—	—	—	—	0.3
- credit cards	—	—	—	—	—	4.0	0.3	—	4.3	4.3
- personal loans	—	—	—	—	—	6.2	3.3	—	9.5	9.5
- other	0.1	17.0	—	17.1	6.1	5.9	105.6	22.5	134.0	157.2
Reverse repos	—	—	—	—	—	—	—	41.8	41.8	41.8
Debt securities	—	2.8	35.4	38.2	—	33.2	0.8	0.3	34.3	72.5
Equity shares	—	—	0.1	0.1	—	0.3	0.2	0.1	0.6	0.7
Settlement balances	—	—	—	—	—	—	—	5.5	5.5	5.5
Derivatives	—	—	—	—	—	—	—	247.0	247.0	247.0
Intangible assets	—	—	—	—	—	—	—	6.5	6.5	6.5
PP&E	—	—	—	—	—	—	3.1	1.5	4.6	4.6
Deferred tax	—	—	—	—	—	—	—	1.8	1.8	1.8
Other assets	—	—	—	—	—	—	—	3.7	3.7	3.7
	18.8	26.5	40.2	85.5	105.5	153.4	123.4	330.9	607.7	798.7

For the notes to this table refer to the following page.

Liquidity and funding risk continued

2015	Encumbered as a result of transactions with counterparties other than central banks: Covered bonds & securitisation (1) £bn	Derivatives £bn	Repos & similar (2) £bn	Total £bn	Pre-positioned & encumbered assets held at central banks (4) £bn	Unencumbered assets not pre-positioned with central banks: Readily available (5) £bn	Other available (6) £bn	Cannot be used (7) £bn	Total £bn	Total £bn
Cash and balances at central banks	—	—	2.5	2.5	—	77.3	0.1	—	77.4	79.9
Loans and advances										
- banks	1.5	11.0	0.4	12.9	—	4.3	1.3	0.5	6.1	19.0
- residential mortgages										
- UK	15.2	—	—	15.2	81.3	18.6	8.4	—	27.0	123.5
- Irish	7.4	—	—	7.4	1.2	4.0	—	0.1	4.1	12.7
- credit cards	—	—	—	—	—	4.4	0.2	—	4.6	4.6
- personal loans	—	—	—	—	—	6.0	5.1	—	11.1	11.1
- other	0.8	17.2	0.4	18.4	8.3	8.9	98.4	22.1	129.4	156.1
Reverse repos	—	—	—	—	—	—	—	39.9	39.9	39.9
Debt securities	—	2.9	31.9	34.8	—	47.2	0.5	—	47.7	82.5
Equity shares	—	—	—	—	—	0.8	0.2	0.4	1.4	1.4
Settlement balances	—	—	—	—	—	—	—	4.1	4.1	4.1
Derivatives	—	—	—	—	—	—	—	262.5	262.5	262.5
Intangible assets	—	—	—	—	—	—	—	6.5	6.5	6.5
PP&E	—	—	0.3	0.3	—	—	3.1	1.1	4.2	4.5
Deferred tax	—	—	—	—	—	—	—	2.6	2.6	2.6
Other assets	—	—	—	—	—	—	—	4.5	4.5	4.5
	24.9	31.1	35.5	91.5	90.8	171.5	117.3	344.3	633.1	815.4

Notes:
(1) Covered bonds and securitisations include securitisations, conduits and covered bonds.
(2) Repos and other secured deposits, cash, coin and nostro balance held with the Bank of England as collateral against deposits and notes in circulation are included here rather than within those positioned at the central bank as they are part of normal banking operations.
(3) Total assets encumbered as a result of transactions with counterparties other than central banks are those that have been pledged to provide security and are therefore not available to secure funding or to meet other collateral needs.
(4) Assets pre-positioned at the central banks include loans provided as security as part of funding schemes and those encumbered under such schemes.
(5) Readily available for encumbrance: including assets that have been enabled for use with central banks but not pre-positioned; cash and high quality debt securities that form part of RBS's liquidity portfolio and unencumbered debt securities.
(6) Other assets that are capable of being encumbered are those assets on the balance sheet that are available for funding and collateral purposes but are not readily realisable in their current form. These assets include loans that could be prepositioned with central banks but have not been subject to internal and external documentation review and diligence work.
(7) Cannot be used includes:
(a) Derivatives, reverse repurchase agreements and trading related settlement balances.
(b) Non-financial assets such as intangibles, prepayments and deferred tax.
(c) Loans that cannot be pre-positioned with central banks based on criteria set by the central banks, including those relating to date of origination and level of documentation.
(d) Non-recourse invoice financing balances and certain shipping loans whose terms and structure prohibit their use as collateral.
(8) In accordance with market practice, RBS employs securities recognised on the balance sheet, and securities received under reverse repo transactions as collateral for repos. Secured derivative liabilities reflect net positions that are collateralised by balance sheet assets.

Business risk*

Definition and sources of risk

Business risk arises as a result of RBS's exposure to the macro-environment, to the competitive environment, and to technological changes. In addition, internal factors such as volatility in sales volumes, and input costs, and other operational risks such as RBS's ability to assess the business operating environment, or to execute its chosen strategy, contribute to business risk.

Key developments in 2016

The Board has ultimate responsibility for business risk and for approving strategic plans, initiatives and changes to strategic direction.

RBS's strategic planning process is managed by Strategy and Corporate Development. The Risk and Finance functions are key contributors to strategic planning.

Responsibility for the day-to-day management of business risk lies primarily with the franchises, with oversight by the Finance function. The franchises are responsible for delivery of their business plans and the management of such factors as pricing, sales volumes, marketing expenditure and other factors that can introduce volatility into earnings.

Business risk is identified and managed at the product and transaction level. Estimated revenue, costs and capital are key considerations in the design of any new product or in any new investment decision.

Business risk is reported, assessed and challenged at every governance level within the organisation. Each franchise monitors its financial performance relative to plans and reports this on a regular basis to the finance directors of each franchise.

RBS operates a monthly rolling forecasting process to identify projected changes in, or risks to, key financial metrics, and ensures appropriate actions are taken.

RBS continued to reduce its business risk profile by implementing its strategic plan to shift the business mix towards the UK and retail and commercial banking segments, with higher risk activities in NatWest Markets and Capital Resolution curtailed through disposals and run-downs.

RBS also continued with its simplification and cost reduction programmes.

Market conditions have become more volatile following the EU referendum result, and RBS has been closely monitoring and assessing the operating environment and its impact on business risk.

*unaudited

Reputational risk*

Definition and sources of risk

Reputational risk can arise from the conduct of employees; activities of customers and the sectors and countries in which they operate; provision of products and transactions; as well as operations and infrastructure.

Key developments in 2016

Reputational risk has Board-level oversight reinforced by a Reputational Risk Policy. The Board Risk Committee and Board Sustainable Banking Committee are responsible for overseeing how RBS manages its reputation. The Board's oversight of reputational issues is supported by the senior RBS-wide Reputational Risk Forum (RRF) which opines on cases that represent a material reputational risk to the whole organisation. The RRF, which has delegated authority from the Executive Risk Forum (ERF), also acts as a central forum to review sector or theme-specific reputational risk acceptance positions, including Environmental, Social and Ethical risk positions.

RBS articulated its appetite for reputational risk through the implementation of a qualitative reputational risk appetite statement and framework. This has improved the identification, assessment and management of customers and issues that present a material reputational risk, resulting in a greater awareness and focus on the importance of this risk and an increase in the number of cases brought to franchise and RBS-wide Reputational Risk fora.

Reputational risk is mitigated through the policy and governance framework, with ongoing staff training to ensure early identification, assessment and escalation of material issues.

The most material threats to RBS's reputation continued to originate from historical and more recent conduct issues. As a result, RBS has been the subject of investigations and reviews by a number of its regulators, some of which have resulted in fines and public censure. Refer to the Litigation, investigations and reviews section of Note 31 on the consolidated accounts on page 367.

Conduct and regulatory risk*

Definition

Conduct and regulatory risk is the risk that the behaviour of RBS and its staff towards customers, or in the markets in which it operates, leads to unfair or inappropriate customer outcomes and results in reputational damage, financial loss or both. The damage or loss may be the result of a failure to comply with (or adequately plan for changes to) relevant official sector policy, laws, regulations, or major industry standards, or of failing to meet customers' or regulators' expectations. All the disclosures in this section are unaudited.

Sources of risk

Conduct and regulatory risk exists across all stages of RBS's relationships with its customers, from the development of its business strategies, to post-sales processes. The activities through which conduct risk may arise are varied and include product design, marketing and sales, complaint handling, staff training, and handling of confidential Insider Information. Conduct risk also exists if RBS does not take effective action to prevent fraud, bribery and money laundering. Regulatory risk arises from the regulatory, business or operating environment and from RBS's response to it. As set out in the Litigation, investigations and reviews section in Note 30 on the consolidated accounts, RBS and certain members of staff are party to legal proceedings and are subject to investigation and other regulatory action in the UK, the US and other jurisdictions.

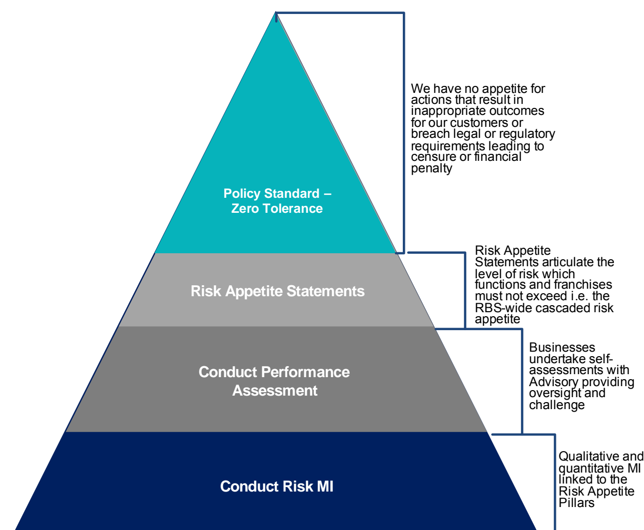
Key regulatory and conduct developments in 2016

RBS continued to remediate historical conduct issues, while also focusing its customer-facing businesses and support functions around the needs of its customers including the delivery of a number of regulatory change programmes. Conduct and litigation costs were £5.9 billion in 2016 compared with £3.6 billion in 2015.

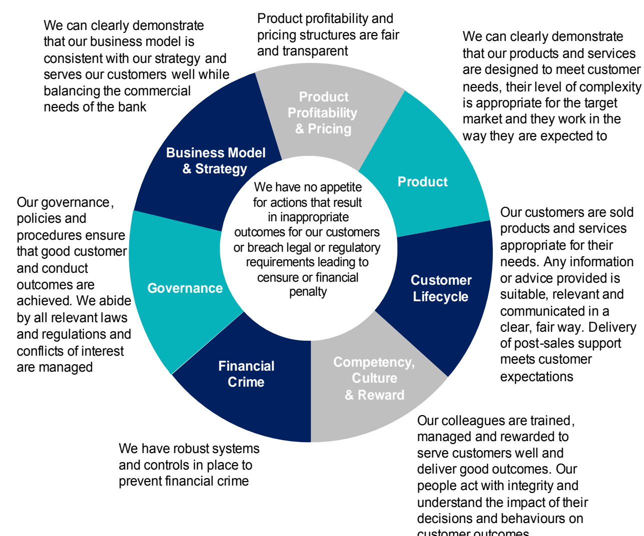
- The remediation of PPI continued, with the FCA due to update on policy during the first quarter of 2017. Provisioning was increased by £601 million principally to cover the potential pushing back of the time bar.
- On 8 November, RBS announced it would be taking two steps in relation to the FCA's S166 review into GRG, firstly to implement a complaints process with independent third-party oversight for all customers in scope and secondly to provide an automatic refund of complex fees paid by in-scope SME customers. The FCA review is ongoing and the final report findings are awaited.
- RBS made a provision for the industry-wide review by the Central Bank of Ireland on the treatment of customers who were sold mortgages with a tracker interest rate or with a tracker interest rate entitlement.
- Following the outcome of the FCA's thematic review on Packaged Bank Accounts, NatWest was required to provide an attestation that it is compliant with FCA rules.
- The application of the revised Markets in Financial Instruments Directive and Regulation (MiFID II/MiFIR) was delayed by a year to January 2018, while UK and EU regulators published several consultations on its implementation.
- The Market Abuse Regime took effect from July 2016.
- The UK's Senior Managers and Certification regime was successfully implemented.
- Work continues on the UK's ring-fencing requirements.

*unaudited

The Conduct Risk Appetite Framework was established in 2015 and continues to be embedded across RBS.



The Conduct Risk Appetite Framework is divided into seven pillars, ensuring that conduct risk exposures are understood and managed in accordance with agreed risk appetite. The Conduct Risk Appetite Framework requires regular and consistent assessment through periodic Conduct Performance Assessment, reporting of risk exposures and the operating effectiveness of controls, across the businesses.



Other activities undertaken to address regulatory risk included:

- Migration to simpler, principle-based policies with accountable executives identified and roles, accountabilities and responsibilities defined;
- Roll-out of RBS-wide policies, processes and strategic systems to identify and manage conflicts of interest better;
- Enhancement of the RBS-wide surveillance programme; and
- Significant investment in anti-money laundering controls, governance and training.

Conduct and regulatory risk* continued

Governance

RBS defines appropriate standards of conduct and drives adherence to those standards through its framework for managing conduct and regulatory risk. The Board and its senior committees receive updates on conduct risk exposures and action plans through regular reporting.

Key elements of the governance structure are set out below:

- The Conduct & Regulatory Affairs (C&RA) Executive Committee considers emerging material risks and issues, and implements Board and Executive Committee risk management policy decisions;
- The Financial Crime Accountable Executive Committee (accountable to the Executive Risk Forum) ensures that the customer businesses and the Services function fulfil strategic objectives by identifying and managing their financial crime risks effectively; and
- The Mandatory Change Advisory Committee, reports to the Bank-Wide Investment Committee, acting as the reception committee for reviewing externally mandated changes that may affect RBS. It also recommends appropriate responses, including change implementation activities. In doing so, it determines which businesses or functions own individual risks; and commissions and reviews impact assessments from customer businesses and functions.

Plans to merge parts of the C&RA function with Risk management were announced in December 2016 to take effect from 1 January 2017. The change is designed to take advantage of synergies across the risk, conduct and regulatory agendas. Regulatory Affairs will move to Corporate Governance & Secretariat, and Remediation and Complaints will move to Services' Chief Operating Office.

Controls and assurance

Under the Policy framework, there are 19 conduct risk policies. Each policy is designed to provide both high-level direction and RBS-wide requirements. The policies ensure RBS meets its regulatory obligations. They also provide the necessary clarity to staff on their conduct obligations.

RBS's Regulatory Affairs department separately oversees regulatory developments, interactions with regulators and regulatory approvals for individuals.

Assurance and monitoring activities are essential to measure the extent to which RBS manages its delivery of specific customer outcomes.

Risk assessments are used to identify material conduct risks and implement key controls across all business areas. The risk assessment process is designed to confirm that risks are effectively managed and prioritised, as well as ensure controls are tested.

Scenario analysis is used to assess the impact of extreme but plausible conduct risks including financial crime. The scenarios assess the exposures that could significantly affect RBS's financial performance or reputation and are an important component in the operational risk framework and capital model.

*unaudited

Risk appetite

The conduct risk appetite framework has now been embedded and the Conduct Performance Assessment, which forms part of it, facilitates a consistent approach across RBS for assessing conduct and regulatory risk.

Risk appetite statements, in line with RBS-wide risk appetite, articulate the levels of risk which franchises and functions must not exceed. Where businesses are operating outside of appetite, the problems are addressed through agreed risk mitigation plans.

Risk monitoring and measurement

The Board and senior RBS committees receive updates on conduct risk exposures and action plans through monthly reporting. The reporting is intended to be focused, forward-looking and action-oriented.

The most material conduct matters are reported to the appropriate committees, including the Board, the Group Audit Committee and Board Risk Committee.

An annual Money Laundering Reporting Officer's Report is submitted to the Board and the FCA. This covers RBS's Anti-Money Laundering (AML) framework and the operation and effectiveness of the systems and controls in place to comply with AML laws and regulations. In addition, it covers the systems and controls in place to prevent the financing of terrorism and to ensure compliance with sanctions as well as embargoes and export controls.

The Group Audit Committee is provided with a whistleblowing report on a biannual basis. It details cases by internal reporting categories based on the RBS definition of whistleblowing, which is contained within RBS's Speak Up policy.

The policy encompasses both the legislative definition contained within the Public Interest Disclosure Act 1998 and the regulatory definition within FCA and PRA regulations and guidance. It extends these to include conduct or behaviour which does not meet the expected bank standards documented in Our Code. The whistleblowing report identifies underlying trends and highlights the outcomes of investigations.

Each business within RBS has enhanced its use of management information by linking it to the risk appetite statement. This is required to help ensure appropriate customer outcomes are delivered and that the management information is compliant with the Basel Committee on Banking Supervision's principles for effective risk data aggregation and risk reporting.

Risk mitigation

Information is communicated to each customer-facing business and function about regulatory developments and discussions with regulators. This helps identify and execute any required mitigating changes to strategy or to business models.

Early identification and effective management of changes in legislation and regulation are critical to the successful mitigation of conduct and regulatory risk. The effects of all changes are managed to ensure timely compliance readiness. Changes assessed as having a 'High' or 'Medium-High' impact are managed closely.

Operational risk*

Definition

Operational risk is the risk of loss resulting from inadequate or failed internal processes, people and systems, or external events. It arises from day-to-day operations and is relevant to every aspect of the business.

Operational risk may directly affect customers, lead to financial loss or damage RBS's reputation (for example, a major IT systems failure or fraudulent activity). There can also be a link between operational risk failures and conduct risk issues.

All the disclosures in this section are unaudited.

Sources of risk

Operational risk may arise from a failure to manage operations, systems, transactions and assets appropriately. This can take the form of human error, an inability to deliver change adequately or on time, the non-availability of technology services, or the loss of customer data. Fraud and theft are sources of operational risk, as is the impact of natural and man-made disasters. It can also arise from a failure to account for changes in law or regulations or to take appropriate measures to protect assets.

Key developments in 2016

During 2016, RBS's operational risk management framework was enhanced with improved links between risk appetite and risk exposures. This underpins an appropriate risk-based approach to operational risk management.

The year also saw a continued focus on the risks arising from the execution of major projects, including the Transformation programme, the restructuring of NatWest Markets (formerly CIB), preparations for the implementation of the Independent Commission on Banking's ring-fencing proposals, the planned divestment of Williams & Glyn, and the impact on RBS's control environment due to cost reduction measures. These are essential to the achievement of RBS's strategic objectives and, accordingly, Operational Risk continued to oversee these, ensuring the associated risks were assessed and understood with mitigating activity in place wherever possible.

There was also a continued strong focus on RBS's enhanced risk and control assessment methodology. This approach enhances understanding of the risk profile for the most critical products and services. As a core aspect of the Controls Transformation Programme, the new approach, building on design in 2015, continued to be rolled out and embedded across the organisation. A significant number of assessments were carried out during 2016 in order to identify and quantify the most material risks to key products and services. Refer to page 203 for further details.

The external fraud threat environment across the industry continued to escalate in 2016, with this trend predicted to continue. RBS has put in place a collective bank-wide response plan to the increased threat. This aligns fraud prevention programmes across the bank with the objective of mitigating the customer and financial impacts of external fraud. The plan successfully delivered key strategic programmes in 2016 that enhanced RBS's fraud prevention and detection capabilities, enabling it to limit the impact of fraudulent activity on its customers. As a result RBS recorded an increase in its fraud detection rates in the second half of 2016. RBS is also supporting an industry-led education initiative in 2017-2018 which will offer advice to help the public protect themselves from preventable financial fraud. The initiative is led by Financial Fraud Action UK Ltd and is being delivered in conjunction with the Home Office, law enforcement and other banks.

The information and cyber security risk facing RBS continues to change in line with the constantly evolving threat environment in which it operates. Internal security improvement programmes continue to progress RBS-wide, developing new, and strengthening existing controls to protect RBS and its customers. RBS continuously develops and utilises pro-active threat management and intelligence processes to understand, manage and mitigate credible threats.

Throughout 2016 RBS has decommissioned a number of internet-facing websites thus reducing the attack surface visible to external parties such as hackers and fraudsters. Improvements have also been made to access controls for RBS systems. Internal training programmes continue to ensure all employees are fully aware of the constant threats facing RBS and remain vigilant to unauthorised attempts by internal or external parties to access systems and data.

Risk governance

A strong Operational Risk management function is vital to support RBS's ambitions to serve its customers better. Improved management of operational risk against a defined appetite directly supports the strategic risk objective of improving stakeholder confidence and is vital for stability and reputational integrity.

The Operational Risk function, part of the second line of defence, undertakes a leadership role and is tasked with delivering a robust operational risk management framework and culture across RBS. The Director of Operational Risk reports to the Chief Risk Officer.

The Operational Risk function is responsible for the design, development, delivery and continuous improvement of the operational risk management framework. The Operational Risk Policy is incorporated into the RBS Policy Framework and provides direction for the consistent identification, assessment, management, monitoring and reporting of operational risk. Through a network of oversight teams, the function seeks to ensure the integrity of the framework, and manages overall operational risk profile against risk appetite.

*unaudited

Operational risk* continued

The Operational Risk Executive Committee (OREC), which is a sub-committee of the Executive Risk Forum (ERF), acts on all operational risk matters. This includes reviewing operational risk exposure against risk appetite; identifying and assessing both current and emerging material operational risks; reviewing and monitoring the operational risk profile; and reviewing and approving material operational risk policy management framework changes.

Controls and assurance

The Control Environment Certification (CEC) process is a half yearly self-assessment by the CEOs of RBS's customer-facing franchises and business units, as well as the heads of the bank's support and control functions. It gives an assessment on the adequacy and effectiveness of the internal control environment in a consistent and comparable manner, highlighting areas where targeted effort is needed to meet the standards required in order to create a safer and more secure bank for customers. It covers material risks and the key controls that underpin them, including financial, operational and compliance controls, as well as the supporting risk management frameworks.

The CEC outcomes, including forward-looking assessments for the next two half-yearly cycles and the progress made to improve the control environment, are reported to the Board, the Group Audit Committee and the Board Risk Committee (BRC). They are also shared with external auditors.

The CEC process helps to ensure compliance with the RBS Policy Framework, Sarbanes-Oxley 404 requirements concerning internal control over financial reporting (as referenced in the Compliance report section on page 112), and certain requirements of the UK Corporate Governance Code.

Risk appetite

The operational risk appetite framework supports effective management of key operational risks. It expresses the level and types of operational risk the bank is willing to accept in order to achieve its strategic objectives and business plans.

RBS's operational risk appetite is expressed through a set of qualitative risk appetite statements and quantitative measures which are defined at an aggregate, bank-wide and individual business level. Appetite covers RBS's most material operational risks, defined by a materiality assessment, which in turn considers past, current and future risk exposures. Appetite exposures for all material risks are regularly reported to business risk committees, the OREC, ERF and BRC.

The aggregation of operational risk appetite drives measurement of how effectively RBS is managing its material risks across the core components of the operational risk management framework. It provides for an aggregate view of risk appetite, risk and control profile, loss and event data management and control environment.

*unaudited

Above these sit an RBS-level operational risk appetite statement which encompasses the full range of operational risks. This drives the strategic risk measurement of stakeholder confidence and is reviewed annually by the ERF. The statement is supported by three simple measures: (i) the relationship between operational risk losses and RBS's gross income; (ii) metrics covering control environment performance; and (iii) the requirement for the material RBS-wide operational risks to be managed within risk appetite.

Risk identification and assessment

Across all business areas, risk and control assessments are used to identify and assess material operational and conduct risks and key controls. To support identification of risk concentrations, all risks and controls are mapped to the risk directory. Risk assessments are refreshed at least annually to ensure they remain relevant and capture any emerging risks.

The process is designed to confirm that risks are effectively managed and prioritised in line with the stated risk appetite. Controls are tested at the appropriate frequency to verify that they remain fit-for-purpose and operate effectively.

During 2016, work continued on rolling out and embedding the enhanced end-to-end risk and control assessment methodology originally developed in 2015. This approach, which strengthens understanding of the risk profile of key products and services, is used to identify and quantify the most material operational risks. Subject matter experts and key stakeholders are engaged from across RBS to underpin management action in line with RBS's financial and non-financial appetite statement. Assessments were carried out on a number of critical products and services during 2016. The results of these assessments support RBS's on-going journey to build on, and enhance, its control environment.

Risk mitigation

Risks are mitigated through the application of key preventative and detective controls. This is an integral step in the risk assessment methodology, which determines residual risk exposure. Control owners are accountable for the design, execution, performance and maintenance of key controls.

These key controls are regularly assessed for adequacy and tested for effectiveness. The control testing results are monitored and, where a material change in performance is identified, it results in a re-evaluation of the associated risk.

RBS purchases insurance to provide the business with financial protection against specific losses and to comply with statutory or contractual requirements.

Risk monitoring

Monitoring and reporting are part of RBS's operational risk management processes, which aim to ensure that risks are identified, considered by senior executives, and managed effectively. The most material operational risks and their position relevant to risk appetite are regularly reviewed at the OREC, along with any emerging risks and the actions taken to mitigate them. These are also reported to the BRC and the ERF. Exposures specific to each business are communicated through regular risk and control reports discussed at business risk committees.

Operational risk* continued

Risk measurement

RBS uses the standardised approach to calculate its operational risk capital requirement. This is based upon multiplying three years' average historical gross income by coefficients set by the regulator based on type of income.

As part of the wider ICAAP an operational risk economic capital model is used as a key capital benchmark. The model uses loss data and scenario analysis inputs from the operational risk framework, plus external loss data and certain other factors to provide a risk-sensitive view of RBS's operational risk capital requirement.

Scenario analysis is used to assess how extreme but plausible operational risks will affect RBS. It provides a forward-looking basis for evaluating and managing operational risk exposures.

Refer to the Capital risk section for operational risk capital requirement figures.

Event and loss data management

The operational risk event and loss data management process ensures RBS captures and records operational risk loss events that meet defined criteria. Loss data is used for regulatory and industry reporting and is included in capital modelling when calculating economic capital for operational risk.

The most serious events are escalated in a simple, standardised process to all senior management, by way of a 'Group Notifiable Event Process'.

All losses and recoveries associated with an operational risk event are reported against their financial accounting date. A single event can result in multiple losses (or recoveries) that may take time to crystallise. Losses and recoveries with a financial accounting date in 2016 may relate to events that occurred, or were identified in, prior years.

Percentage and value of events

At 31 December 2016, events aligned to the 'clients, products and business practices' event category accounted for 99% of RBS's operational risk losses (compared to 98% in 2015). These losses primarily resulted from new conduct-related provisions in respect of RBS's issuance and underwriting of residential mortgage-backed securities (RMBS), the majority settlement of the 2008 shareholder litigation, the automatic refund of complex fees paid by SME customers in RBS's Global Restructuring Group and further increased provisions relating to Payment Protection Insurance, together with other regulatory settlements.

A small number of operational risk events contributed a high percentage of the total losses. In 2016, around 1% of the events contributed 97% of the losses. This was in line with 2015.

	Value of events				Volume of events (1)	
	£m		Proportion		Proportion	
	2016	2015	2016	2015	2016	2015
Fraud	51	40	1%	1%	79%	78%
Clients, products and business practices	6,282	3,449	99%	98%	13%	14%
Execution, delivery and process management	15	23	—	1%	8%	7%
Employment practices and workplace safety	1	15	—	—	—	1%
	6,349	3,527	100%	100%	100%	100%

Note:
(1) The calculation in the above table is based on the volume and value of events where the associated loss is more than or equal to £10,000.

*unaudited

Pension risk*

Definition

Pension obligation risk is the risk to RBS caused by its contractual or other liabilities to or with respect to a pension scheme (whether established for its employees or those of a related company or otherwise). It also means the risk that RBS will make payments or other contributions to or with respect to a pension scheme because of a moral obligation or because RBS considers that it needs to do so for some other reason.

Sources of risk

RBS has exposure to pension risk through its defined benefit schemes worldwide. The five largest schemes, which represent around 97% of RBS's pension liabilities are: the Main Section of The Royal Bank of Scotland Group Pension Fund (the Main scheme), the AA Section of The Royal Bank of Scotland Group Pension Fund, the Ulster Bank Pension Scheme, the Ulster Bank Pension Scheme (Republic of Ireland), and the Royal Bank of Scotland International Pension Trust. The Main scheme is the principal source of pension risk. Further detail on the Group's pension obligations can be found in Note 4 on the consolidated accounts.

Pension scheme liabilities vary with changes in long-term interest rates and inflation as well as with pensionable salaries, the longevity of scheme members and legislation. Pension scheme assets vary with changes in interest rates, inflation expectations, credit spreads, exchange rates, and equity and property prices. RBS is exposed to the risk that the schemes' assets, together with future returns and additional future contributions, are insufficient to meet liabilities as they fall due. In such circumstances, RBS could be obliged (or might choose) to make additional contributions to the schemes, or be required to hold additional capital to mitigate this risk.

Prior to 6 April 1997 individuals who contracted out of the UK State Second Pension were entitled to a Guaranteed Minimum Pension (GMP). Men accrued GMP at different rates to women. The Government intends that GMP should be equalised but until the mechanism is defined, pension funds are uncertain of their obligations. In the meantime, no allowance is made for GMP equalisation in the IAS 19 defined benefit obligations and risk disclosures.

Key developments in 2016

As part of the 31 December 2015 triennial valuation, RBS made a single £4.2 billion payment to the RBS Group Pension Fund in March 2016, instead of a series of annual contributions up to 2023, removing an element of pension risk. RBS and the trustee also agreed that the next valuation of the RBS Group Pension Fund will take place as at 31 December 2018, giving certainty to pension funding commitments until at least 2020.

*unaudited

Throughout 2016, various pension risk stress-testing initiatives were undertaken, focused both on internally defined scenarios and on scenarios to meet integrated Bank of England and European Banking Authority stress-testing requirements. For more information on stress testing, refer to the following page.

Governance

The Main scheme operates under a trust deed. The corporate trustee, RBS Pension Trustee Limited, is a wholly owned subsidiary of National Westminster Bank Plc. The trustee board comprises six directors selected by RBS and four directors nominated by members. The trustee is supported by RBS Investment Executive Ltd (RIEL), which specialises in pension investment strategy.

The Pension Committee (PC) chaired by the RBS Chief Risk Officer, acts as a sub-committee of the RBS Asset and Liability Committee (ALCo) and formulates RBS's view of pension risk. The PC considers mechanisms that could potentially be used for managing risk within the funds as well as financial strategy. It also reviews actuarial assumptions from a sponsor perspective as appropriate. The PC is a key component of RBS's approach to managing pension risk and it reviews and monitors risk management, asset strategy and financing issues on behalf of RBS. The PC also serves as a formal link between RBS, RIEL and the trustee.

For further information on Risk governance, refer to page 166.

Risk appetite

Investment policy for the schemes is defined by the trustee with input from RIEL and other specialist advisers employed by the trustee. While the trustee is responsible for the management of the scheme assets, it consults with RBS on material changes to the Main scheme's risk appetite and investment policy.

RBS maintains an independent view of the risk inherent in pension funds, with an associated risk appetite, and has defined metrics against which risk is measured. In addition to the scrutiny provided by the PC, RBS undertakes regular pension risk monitoring and reporting to the Board and the BRC on the material pension schemes that RBS has an obligation to support.

Risk mitigation

The trustee has taken measures to mitigate inflation and interest rate risks, both by investing in suitable financial assets and by entering into inflation and interest rate swaps. The Main scheme also uses derivatives to manage the allocation of the portfolio to different asset classes and to manage risk within asset classes. The assets of the Main scheme, which represented around 89% of RBS's pension plan assets at 31 December 2016, are invested in a diversified portfolio. This includes quoted and private equity, government and corporate fixed interest and index-linked bonds, property and other alternative assets.

Pension risk* continued

Risk monitoring and measurement

Pension risk reports are submitted quarterly in the RBS Risk and Conduct Report. The report includes a measurement of the overall deficit or surplus position, estimated capital requirements, and an assessment of the associated assets and liabilities.

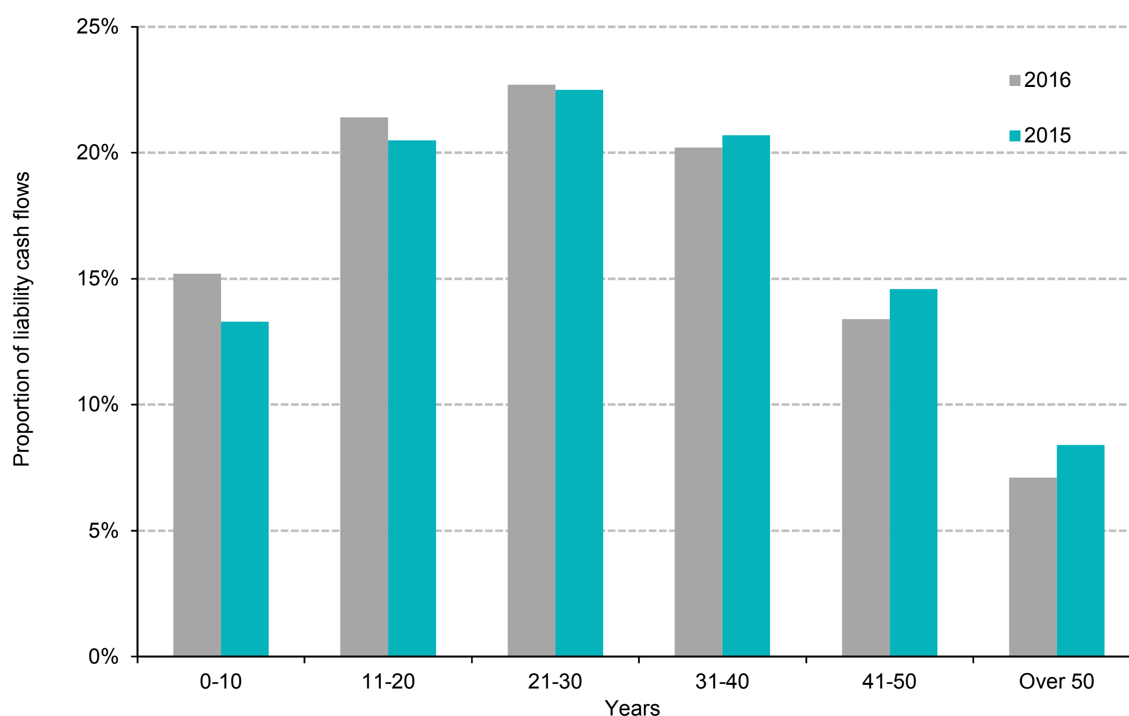
RBS also undertakes stress tests and scenario analyses on its material defined benefit pension schemes each year as part of its risk measurement framework. These stress tests are also used to satisfy the requests of regulatory bodies such as the Bank of England. The stress testing framework includes pension risk capital calculations for the purposes of the ICAAP as well as additional stress tests for a number of internal management purposes.

Pension stress tests take the form of both stochastic and deterministic stresses over time horizons ranging from instantaneous to five years in duration. They are designed to examine the behaviour of the pension schemes' assets and liabilities under a range of financial and demographic shocks. The results of the stress tests and their consequential impact on RBS's balance sheet, income statement and capital position are incorporated into the overall RBS-wide stress test results.

The table below shows the sensitivity of the Main scheme's assets and liabilities (measured according to IAS 19 'Employee Benefits'). It includes changes in interest rates and equity values at the year-end, taking account of the current asset allocation and hedging arrangements. Asset sensitivity to changes in nominal yields increased over the year as swap yields fell at longer durations.

2016	Change in value of assets £m	Change in value of liabilities £m	Change in net pension obligations £m
Fall in nominal swap yields of 0.25% at all durations with no change in credit spreads or real swap yields	1,048	502	546
Fall in real swap yields of 0.25% at all durations with no change in credit spreads or nominal swap yields	1,485	1,552	(67)
Fall in AA credit spreads of 0.25% at all durations with no change in nominal or real swap yields or other credit spreads	9	2,074	(2,065)
Fall in equity values of 10%	(905)	—	(905)
2015			
Fall in nominal swap yields of 0.25% at all durations with no change in credit spreads or real swap yields	874	363	511
Fall in real swap yields of 0.25% at all durations with no change in credit spreads or nominal swap yields	1,029	1,104	(75)
Fall in AA credit spreads of 0.25% at all durations with no change in nominal or real swap yields or other credit spreads	7	1,526	(1,519)
Fall in equity values of 10%	(667)	—	(667)

The chart below shows the pension liability cash flow profile, allowing for expected indexation of future payments. The majority of expected cash flows (80%) are anticipated within the next 40 years. The profile will vary depending on the assumptions made regarding inflation expectations and mortality.



*unaudited

Credit risk: management basis

Definition

Credit risk is the risk of financial loss due to the failure of a customer or counterparty to meet its obligation to settle outstanding amounts.

The following disclosures in this section are audited:

- Risk assessment and monitoring
- Portfolio overview - geography
- Wholesale credit risk management
  - Risk mitigation
  - Problem debt management - Forbearance
  - Key credit portfolios - Commercial Real Estate LTV distribution
- Personal credit risk management
  - Problem debt management - Forbearance
  - Overview of personal portfolios - Forbearance, mortgage balances, and LTV distribution.

Sources of credit risk*

The principal sources of credit risk for RBS are as follows:

Lending - RBS offers a number of lending products that involve an obligation to provide credit facilities to customers. To mitigate the risk of loss, security may be obtained in the form of physical collateral (such as commercial real estate assets and residential property) or financial collateral (such as cash and bonds). Exposures arising from leasing activities are also included.

Off-balance sheet products - RBS provides trade finance and guarantees for customers, as well as committed but undrawn lending facilities, and is exposed to credit risk as a result.

Derivatives and securities financing - RBS enters into derivatives contracts and securities financing transactions. These result in counterparty credit risk, which is the risk of financial loss arising from the failure of a counterparty to meet obligations that vary in value by reference to a market rate or asset price. To mitigate the risk of loss, collateral and netting are used along with the additional legal rights provided under the terms of over-the-counter contracts.

Debt securities - RBS holds some debt securities for liquidity management purposes and is exposed to credit risk as a result.

Other activities - RBS is exposed to settlement risk through its activities in foreign exchange, trade finance and payments.

Key developments in 2016*

Credit quality - The portfolio was reduced due to strategic disposals and the ongoing run-off of assets in Capital Resolution, although this was offset by the depreciation of the value of sterling relative to most major currencies. Asset quality remained stable against a backdrop of challenging economic conditions in the Shipping and Natural Resources sectors.

UK personal lending - The increase in the UK Personal portfolio was driven by significant mortgage lending activity. Underwriting standards are constantly monitored to ensure that they remain adequate in the current market environment and were not weakened to sustain the growth observed during the period. The UK unsecured lending portfolio remained stable during the year with no material changes to asset quality.

Shipping - RBS is winding down its shipping portfolio and has also disposed of assets during the year. RBS continues to witness difficult market conditions which are affecting vessel values and contributing to high levels of forbearance and impairments.

Natural Resources - The Oil & Gas sector continued to be affected by low oil prices which are predominantly due to over-supply. Exposures to the Oil & Gas sector were further reduced during 2016 and credit quality remained strong with the majority of the portfolio investment grade. The prolonged challenging market conditions did however result in a limited number of customers experiencing financial stress during the year, which resulted in impairments in the sector. For further information, refer to the Key credit portfolios section on page 228.

Credit risk measurement - RBS has changed its measure of credit risk exposure from Credit Risk Assets (CRA) to Current Exposure (CE) and Potential Exposure (PE). This change is discussed further on page 209.

Risk of Credit Loss - A new framework for managing problem debts in the wholesale portfolio was introduced during the year. The framework is discussed in detail on page 220.

IFRS 9 - The new IFRS 9 accounting requirement for loan impairments will draw extensively on the bank's risk models and measures in the calculation of expected credit loss required by the standard. A cross-functional programme involving teams in Finance, Risk and Services is delivering the additional capabilities in terms of models, systems and operational processes.

Credit risk management function*

Governance

The activities of the RBS credit risk management function, which is led by the Group Chief Credit Officer (GCCO), include:

- Approving credit for customers;
- Ensuring that credit risk is within the risk appetite set by the Board;
- Managing concentration risk and credit risk control frameworks;
- Developing and ensuring compliance with credit risk policies; and
- Conducting RBS-wide assessments of provision adequacy.

*unaudited

Credit risk: management basis continued

The key elements of the credit risk management function are set out below.

Element	Managed by	Description
Leadership	GCCO	The GCCO has overall responsibility for the credit risk function. The GCCO chairs the Credit Risk Committee and, with the CRO, co-chairs the RBS Provisions Committee.
Governance	Credit Risk Committees	The Wholesale Credit Risk Committee and the Retail Credit Risk Committee have authority for risk appetite (within appetite set by the board), strategy, frameworks and policy as well as oversight of RBS's credit profile.
	Provisions Committee (1,2)	The Provisions Committee has authority over provisions adequacy and to approve recommendations from business provisions committees in accordance with approval thresholds.
Risk appetite	Concentration frameworks - Wholesale ° Single name ° Sector ° Country ° Product and asset class - Personal credit risk appetite framework Reputational and environmental, social and ethical frameworks Credit policy	Wholesale frameworks are maintained to ensure that the risk of an outsized loss due to concentration to a particular borrower, sector, product type or country remains within appetite. The credit frameworks are aligned to the RBS risk appetite framework. RBS uses a product and asset class framework to control credit risk for its Personal businesses. The framework sets limits that measure and control the quality of both existing and new business for each relevant franchise or segment.
Controls and risk assurance	Risk Assurance	Credit policy standards are in place for both Wholesale and Personal portfolios and are expressed as a set of mandatory controls. Assurance activities, as defined by the RBS credit policy, are undertaken by the independent Risk Assurance function.
Credit stewardship	Credit assessment standards Credit risk mitigation and collateral Credit documentation Regular portfolio/customer review Problem debt identification and management	Credit risk stewardship takes place throughout the customer relationship, from initial credit approval and on a continuous basis thereafter. The methodology applied for assessing and monitoring credit risk varies between customer types and segments.
Customers	Segmentation	Customers are managed differently reflecting different customer types and risks. Wholesale customers - including corporates, banks and other financial institutions - are grouped by industry sectors and geography as well as by product/asset class and are managed on an individual basis. Personal customers - usually in UK PBB and Ulster Bank RoI as well as personal lending activities in Private Banking - are grouped into portfolios of similar risk and managed on a portfolio basis.

Notes:
(1) Authority is delegated by the Executive Risk Forum.
(2) For further information on the RBS provisioning and impairment practices refer to page 302.
*unaudited

Credit risk: management basis continued

Risk appetite

Risk appetite across all risk types is set using specific quantitative targets under stress, including earnings volatility and capital adequacy. The credit risk appetite frameworks have been designed to reflect factors that influence the ability to meet those targets. Tools such as stress testing and economic capital are used to measure credit risk volatility and develop links between the credit risk appetite frameworks and risk appetite targets. The frameworks are supported by a suite of policies and transaction acceptance standards that set out the risk parameters within which franchises must operate. For further information on the specific frameworks for Wholesale and Personal refer to page 218 and 234 respectively.

Risk measurements and models*

RBS has changed its measure of credit risk exposure from Credit Risk Assets (CRA) to Current Exposure (CE) and Potential Exposure (PE). In these credit risk disclosures the measure used, unless otherwise stated, is Current Exposure. 2015 comparatives have been restated in Current Exposure. The table below summarises the differences between CRA, Current Exposure and Potential Exposure:

<table>
<tr><th></th><th>CRA</th><th>Current Exposure</th><th>Potential Exposure (1)</th></tr>
<tr><td rowspan="2">Lending exposure
Comprises cash balances at central banks as well as loans and advances to banks and customers.</td><td rowspan="2">Drawn balances (gross of impairment provisions)</td><td>Drawn balances</td><td>Legally committed limits (2)</td></tr>
<tr><td colspan="2">Measured net of individual, collective and latent provisions unless otherwise stated.</td></tr>
<tr><td rowspan="2">Counterparty exposure</td><td rowspan="2">Measured using the mark-to-market value of derivatives after the effect of enforceable netting agreements and regulator-approved models but before the effect of collateral. Calculations are gross of credit valuation adjustments (CVAs).</td><td>Measured using the mark-to-market value of derivatives after the effect of enforceable netting agreements and net of legally enforceable financial collateral. (3)</td><td>Measured using scaled credit limit utilisation, which takes into account mark-to-market movements, any collateral held and expected market movements over a specified horizon. (2,3)</td></tr>
<tr><td colspan="2">Current and Potential Exposures are measured net of CVA unless otherwise stated.</td></tr>
<tr><td>Contingent obligations
Primarily letters of credit and guarantees.</td><td>Drawn balances</td><td>Drawn balances</td><td>Legally committed amount (2)</td></tr>
<tr><td>Exclusions</td><td>• Trading book bonds
• Equity securities
• Settlement risk
• Intra-group credit exposures
• Securities financing transactions (repos)
• Banking book debt securities</td><td colspan="2">• Trading book bonds
• Equity securities
• Settlement risk
• Suretyships
• Intra-group credit exposures</td></tr>
<tr><td>Other</td><td></td><td colspan="2">• Net of cash and gold collateral.
• Current Exposure and Potential Exposure are reported against the guarantor of a transaction to reflect the transfer of risk.</td></tr>
</table>

Notes:
(1) Potential Exposure includes all drawn exposure and all legally committed undrawn exposure.
(2) Cannot be less than Current Exposure.
(3) Current Exposure and Potential Exposure for exchange-traded derivatives are defined as exposure at default (EAD).

Comparing the Current Exposure measure to the previous CRA measure, the following changes are noted:

- Exposures to the Sovereign sector are higher. This is primarily due to the inclusion of government bond exposure held in the banking book and managed in Treasury and Capital Resolution. The increased current exposure value, compared to CRA, is also a result of risk transfer related to guarantees (pledged by sovereign customers) for obligors active in other sectors.
- In the Banks & Other Financial Institutions sector, the netting of financial collateral reduced the Current Exposure value compared to CRA. Risk transfer also reduced current exposure compared to CRA.
- Outside these sectors, the impact of risk transfer is less material. However, the impact of netting impairment provisions means that for most other wholesale sectors Current Exposure is less than CRA.

*unaudited

Credit risk: management basis continued

Risk models

RBS uses the output of credit risk models in the credit approval process, as well as for ongoing credit risk assessment, monitoring and reporting, to inform credit risk appetite decisions. These models are divided into different categories:

Model (1)	Calculation method	Wholesale	Personal
PD model	Individual counterparty/account	Each customer is assigned a probability of default (PD) rating and corresponding grade. PD is calculated using a combination of quantitative inputs, such as recent financial performance, and qualitative inputs such as management performance and sector outlook.	Each customer account is scored and models are used to assign a PD rating. Inputs vary across portfolios and include both internal account and customer level data, as well as data from credit bureaus. This score is used to support automated credit decision-making through the use of a statistically-derived scorecard.
LGD model	Individual counterparty/facility/product	Loss given default (LGD) models estimate the amount that would not be recovered in the event of a customer default. When estimating LGD, RBS's models assess both borrower and facility characteristics, as well as any credit risk mitigants. The cost of collections and a time-discount factor for the delay in cash recovery are also incorporated.	
EAD model	Individual counterparty/facility/product	Exposure at default (EAD) models provide estimates of credit facility utilisation at the time of a customer default, recognising that customers may make further drawings on unused credit facilities prior to default or that exposures may increase due to market movements. EAD estimates for committed and uncommitted facilities are based on historic data on limit utilisation. The estimates are also gross of provisions, as well as cash and gold collateral, and as a result can be higher or lower than Potential Exposure. In accordance with regulatory requirements, EAD for Lending Exposures must always be equal to, or higher, than the drawn balance sheet amount, though it can be reduced by a legally enforceable netting agreement.	
EC model	Portfolio level	The credit economic capital (EC) model is a framework that allows for the calculation of portfolio credit loss distributions and associated metrics over a given risk horizon for a variety of business purposes. The model takes into account migration risk (the risk that credit assets will deteriorate in credit quality across multiple years), factor correlation (the assumption that groups of obligors share a common factor) and contagion risk (for example, the risk that the weakening of the sovereign's credit worthiness has a significant impact on the creditworthiness of a business operating in that country).	

*unaudited

Credit risk: management basis continued

Impact of credit model changes

RBS reviews and updates models on an ongoing basis in order to reflect the effects of more recent data, changes to products and portfolios, and new regulatory requirements. The PD models for banks, local authorities, housing associations, property, housebuilders and mortgages were recalibrated during the year. This resulted in some downwards ratings migrations across internal asset quality bands.

Model changes affect year-on-year comparisons of risk measures in certain disclosures. Where meaningful, in commentary RBS has differentiated between instances where movements in risk measures reflect the impact of model changes and those where such movements reflect changes in the size of underlying credit portfolios or their credit quality.

For more information on model governance and review refer to the Models used in Risk section on page 169.

Asset quality*

Credit grades are assigned at legal entity level for wholesale customers.

All credit grades map to both an RBS-level asset quality scale, used for external financial reporting, and a master grading scale for wholesale exposures, used for internal management reporting across portfolios. Accordingly, measures of risk exposure may be aggregated and reported at differing levels of detail depending on stakeholder or business requirements. Performing loans are defined as AQ1-AQ9 (where the PD is less than 100%) and non-performing loans as AQ10 (where the PD is 100%).

The PD models used to assign a credit grade for the purposes of credit risk management assess the probability of a customer failing to honour its credit obligations over a one-year time period.

The AQ bands and corresponding probability of default ranges are set out below:

AQ band	Probability of default (mid-point)	Indicative S&P rating
AQ1	0% - 0.034%	AAA to AA
AQ2	0.034% - 0.048%	AA-
AQ3	0.048% - 0.095%	A+ to A-
AQ4	0.095% - 0.381%	BBB+ to BBB-
AQ5	0.381% - 1.076%	BB+ to BB
AQ6	1.076% - 2.153%	BB to B+
AQ7	2.153% - 6.089%	B+ to B
AQ8	6.089% - 17.222%	B- to CCC+
AQ9	17.222% - 100%	CCC to C
AQ10	100%	D

*unaudited

Risk mitigation*

Risk mitigation techniques, as set out in RBS's credit policies, are used in the management of credit portfolios across RBS, typically to mitigate credit concentrations in relation to an individual customer, a borrower group or a collection of related borrowers. Where possible, customer credit balances are netted against obligations. Mitigation tools applied can include: structuring a security interest in a physical or financial asset; use of credit derivatives, including credit default swaps, credit-linked debt instruments and securitisation structures; and use of guarantees and similar instruments (for example, credit insurance) from related and third parties. When seeking to mitigate risk, at a minimum RBS considers the following:

- The suitability of the proposed risk mitigation, particularly if restrictions apply;
- The means by which legal certainty is to be established, including required documentation, supportive legal opinions and the steps needed to establish legal rights;
- The acceptability of the methodologies to be used for initial and subsequent valuation of collateral, the frequency of valuations and the advance rates given;
- The actions which can be taken if the value of collateral or other mitigants is less than needed;
- The risk that the value of mitigants and counterparty credit quality may deteriorate simultaneously;
- The need to manage concentration risks arising from collateral types; and
- The need to ensure that any risk mitigation remains legally effective and enforceable.

The business and credit teams are supported by specialist in-house documentation teams. RBS uses industry-standard loan and security documentation wherever possible. However, when non-standard documentation is used, external lawyers are employed to review it on a case-by-case basis. Mitigants (including any associated insurance) are monitored throughout the life of the transaction to ensure that they perform as anticipated. Similarly, documentation is also monitored to ensure it remains enforceable.

For further information refer to the sub-sections on Wholesale credit risk management and Personal credit risk management.

Counterparty credit risk

RBS mitigates counterparty credit risk arising from both derivatives transactions and repurchase agreements through the use of market standard documentation, enabling netting, and through collateralisation.

Amounts owed by RBS to a counterparty are netted against amounts the counterparty owes the bank, in accordance with relevant regulatory and internal policies. However, generally, this is only done if a netting agreement is in place. A legal opinion, to the effect that the agreement is enforceable in the relevant jurisdictions, is also required.

Collateral may consist of either cash or securities. Additional collateral may be called should the net value of the obligations to RBS rise or should the value of the collateral itself fall. The majority of agreements are subject to daily collateral calls with collateral valued using RBS's internal valuation methodologies.

RBS restricts counterparty credit exposures by setting limits that take into account the potential adverse movement of an exposure after adjusting for the impact of netting and collateral (where applicable).

Credit risk: management basis continued

Risk assessment and monitoring

Practices for credit stewardship - including credit assessment, approval and monitoring as well as the identification and management of problem debts - differ between the Wholesale and Personal portfolios. For further information refer to the relevant sub-sections on page 218 and 234. A key aspect of credit risk stewardship is ensuring that, when signs of impairment are identified, appropriate impairment provisions are recognised.

Impairment, provisioning and write-offs

In the overall assessment of credit risk, impairment, provisioning and write-offs are used as key indicators of credit quality.

Impairment

A financial asset is impaired if there is objective evidence that the amount, or timing, of future cash flows has been adversely affected. Refer to accounting policies on page 302 for details regarding the quantification of impairment losses.

Days-past-due measures are typically used to identify evidence of impairment. In both Wholesale and Personal portfolios, a period of 90 days past due is used. In sovereign portfolios, the period used is 180 days past due. Indicators of impairment include the borrower's financial condition; a forbearance event; a loan restructuring; the probability of bankruptcy; or evidence of diminished cash flows.

Provisioning

The amount of an impairment loss is measured as the difference between the asset carrying amount and the present value of the estimated future cash flows discounted at the financial asset's original effective interest rate. The current net realisable value of the collateral will be taken into account in determining the need for a provision. This includes cash flows from foreclosure (less costs of obtaining and selling the collateral), whether or not foreclosure is probable. Impairment provisions are not recognised where amounts due are expected to be settled in full on the realisation of collateral. RBS uses one of the following three methods to quantify the provision required: individual; collective; and latent, as set out below:

Provision method	Asset type	Quantification method	Key factors considered
Individual	Impaired, individually significant	Case-by-case assessment of future cash flows	• Customer and guarantor performance. • Future value of collateral. • Future economic conditions based on factors available at the time.
Collective	Impaired but not individually significant, grouped into homogenous portfolios, by Retail products and Wholesale businesses	Quantitative review of relevant portfolio	• Level of arrears. • Value of security. • Historical and projected cash recovery trends. • Current economic conditions. • Operational processes. • Latest cash collection profile.
Latent	Not impaired	PD% x LGD% x EAD x Emergence Period	• For Wholesale customers PD, LGD and EAD values are used. • For Personal, calculations are performed at portfolio level by product (e.g. mortgages, credit cards or unsecured loans). • Portfolio-level emergence periods are based on products or businesses with similar homogenous characteristics. Emergence periods range from 120 to 365 days.

Note:
(1) Refer to pages 248 to 253 for an analysis of impaired loans, related provisions and impairments. Refer to page 302 for details of accounting policies. For details on collateral, refer to the Counterparty credit risk section on page 211 as well as the Wholesale and Personal risk mitigation sections on pages 218 and 234.

Credit risk: management basis continued

Sensitivity of impairments to assumptions

Key assumptions relating to impairment levels relate to economic conditions, the interest rate environment, the ease and timing of enforcing loan agreements in varying legal jurisdictions and the level of customer co-operation.

In addition, for secured lending, key assumptions relate to the valuation of the security and collateral held, as well as the timing and cost of asset disposals based on underlying market depth and liquidity. Assessments are made by relationship managers on a case-by-case basis for individually-assessed provisions and are validated by credit teams. The Restructuring Credit team will ultimately recommend or approve any provisions that may be required under their delegated authority. For individual impairments greater than £1 million, oversight is provided by the RBS Provisions Committee.

Available-for-sale portfolios

Available-for-sale portfolios are also regularly reviewed for evidence of impairment, including: default or delinquency in interest or principal payments; significant financial difficulty of the issuer or obligor; and increased likelihood that the issuer will enter bankruptcy or other financial reorganisation.

Determining whether evidence of impairment exists requires the exercise of management judgement. It should be noted that the following factors are not, of themselves, evidence of impairment, but may be evidence of impairment when considered with other factors:

- Disappearance of an active market because an entity's financial instruments are no longer publicly traded.
- A downgrade of an entity's credit rating.
- A decline in the fair value of a financial asset below its cost or amortised cost.

Write-offs

Impaired loans and receivables are written-off when there is no longer any realistic prospect of recovery of part, or the entire loan. For loans that are individually assessed for impairment, the timing of write-off is determined on a case-by-case basis. Such loans are reviewed regularly and write-offs may be prompted by bankruptcy, insolvency, forbearance and similar events. For details of the typical time frames, from initial impairment to write off, for collectively assessed portfolios refer to the accounting policies section on 301.

Amounts recovered after a loan has been written-off are credited to the loan impairment charge for the period in which they are received.

Credit risk: management basis continued

Portfolio overview - asset quality*

The table below summarises Current and Potential Exposure, net of provisions and after risk transfer, by sector and asset quality.

		Wholesale (1)						
2016	Personal £m	Banks and other FIs £m	Sovereigns (2) £m	Property £m	Natural resources £m	Transport £m	Other £m	Total £m
AQ1-AQ4	111,899	42,903	118,049	19,087	8,708	5,452	15,874	321,972
AQ5-AQ8	47,992	4,392	135	21,728	3,357	9,077	38,178	124,859
AQ9	2,622	32	4	149	33	52	357	3,249
AQ10	3,693	355	—	1,387	302	1,004	772	7,513
Total	166,206	47,682	118,188	42,351	12,400	15,585	55,181	457,593
Potential Exposure	172,607	84,300	119,056	54,734	25,425	23,690	81,442	561,254
Risk of Credit Loss (3)	—	1	4	93	2	386	370	856
Flow into forbearance (4)	834	5	1	637	531	755	1,309	4,072
Forbearance stock (5)	5,284	63	1	787	785	836	1,805	9,561
Provisions	2,192	58	1	696	237	469	802	4,455
- Individual and collective	*1,966*	*52*	—	*659*	*226*	*454*	*698*	*4,055*
- Latent	*226*	*6*	*1*	*37*	*11*	*15*	*104*	*400*
2015**								
AQ1-AQ4	96,830	41,254	123,410	21,062	8,773	7,960	17,054	316,343
AQ5-AQ8	49,684	4,214	183	18,233	2,733	10,924	36,613	122,584
AQ9	2,840	35	—	279	127	55	297	3,633
AQ10	3,765	769	1	2,284	149	396	888	8,252
Total	153,119	46,272	123,594	41,858	11,782	19,335	54,852	450,812
Potential Exposure	159,837	82,434	125,048	53,955	24,565	26,795	81,823	554,457
Watch Red	—	20	73	529	348	145	858	1,973
Flow into forbearance (4)	1,829	85	—	1,035	643	205	1,207	5,004
Forbearance stock (5)	7,143	181	—	1,549	734	275	1,728	11,610
Provisions	3,003	73	1	2,282	133	300	1,347	7,139
- Individual and collective	*2,613*	*60*	—	*2,232*	*124*	*276*	*1,250*	*6,555*
- Latent	*390*	*13*	*1*	*50*	*9*	*24*	*97*	*584*

Notes:
(1) Includes SME customers managed in UK PBB Business Banking who are assigned a sector under the Bank's sector concentration framework.
(2) Includes exposure to central governments, central banks and sub-sovereigns such as local authorities.
(3) Excludes Private Banking, Lombard and Invoice Finance exposures which are not material in context of the Risk of Credit Loss portfolio.
(4) Completed during the year.
(5) Forbearance stock: Wholesale forbearance stock represents loans that have been subject to a forbearance event in the two years up to the reported date. Personal forbearance stock is aligned to the European Banking Authority definition for forbearance reporting (refer to individual Personal section on page 234 for further details).

Key points

The following key portfolios are either designated high-oversight sectors under the sector framework or constitute a material proportion of Current Exposure and are discussed in more detail below.

Commercial Real Estate (CRE) (in Property) - refer to page 224;
Oil & Gas (in Natural Resources) - refer to page 228;
Mining & Metals (in Natural Resources) - refer to page 231;
Shipping - refer to page 232; and
Personal, including mortgages - refer to page 234.

- RBS's credit risk exposure has been affected by the significant appreciation of both the euro and US dollar against sterling. This was relevant to exposures in Ireland, Western Europe and the US and is discussed in further detail on page 216.
- The increase in credit risk exposure in the personal sector was predominantly driven by growth in UK mortgage lending. This portfolio is managed on a specific risk appetite framework and the growth observed the year was within risk appetite. For further information refer to page 236.
- The Wholesale portfolio decreased by 8% (£25.1 billion) on a constant currency basis (foreign exchange impact of £18.8 billion). This was predominately due to a reduction in the sovereign sector, driven by liquidity management activities, and in the transport sector in line with the exit strategy for the shipping sector.
- The quality of the Personal portfolio improved with AQ1-AQ4 making up 67% of personal lending against 63% in 2015. For the Wholesale portfolio AQ1-AQ4 made up 72% of the portfolio (2015 - 74%).

*unaudited
**restated - refer to page 209 for further details

Credit risk: management basis continued

- The Risk of Credit Loss framework was fully implemented in April 2016. Exposure classified as Risk of Credit Loss decreased during 2016 due to customers who defaulted during the year and are shown in AQ10.
- For Wholesale, the flow into forbearance remained stable and continued to reflect the challenging conditions in certain sectors, notably Transport. 45% (2015 - 29%) of the total forbearance granted related to non-performing loans. Provision coverage of non-performing forborne loans was 27% (2015 - 43%). Refer to the Wholesale Forbearance section (page 221) for further details.
- The reduction in defaulted exposures during the year was primarily due to specific portfolio disposals, including in the Republic of Ireland of small and medium enterprise-related exposures and buy-to-let mortgages, during the fourth quarter of 2016. This was partly offset by higher defaulted assets in Capital Resolution's Shipping portfolio.
- Credit impairment charges increased during 2016. In particular large individual charges were incurred in the Shipping, Oil & Gas and Mining & Metals sectors. Challenging economic conditions resulted in reduced global demand, oversupply and consequently volatile commodity prices, which adversely affected the shipping market and vessel values. Credit impairment releases were lower in 2016 with less asset disposal activity.
- In Personal, including mortgages, the flow into defaults was broadly stable year-on-year. Cash repayments and recoveries on previously defaulted debt remained strong.

*unaudited
**restated - refer to page 209 for further details

Credit risk: management basis continued

Portfolio overview - geography

The table below summarises both Current and Potential Exposure, net of provisions and after risk transfer by geographic region, as well as providing further detail for selected country risk exposure.

		Wholesale (1)						Current	Potential
2016	Personal £m	Banks and other FI £m	Sovereigns (2) £m	Property £m	Natural resources £m	Transport £m	Other £m	Exposure total £m	Exposure total £m
UK	148,882	19,393	69,390	38,001	8,357	9,324	45,515	338,862	391,370
RoI (3)	15,079	433	2,387	950	443	206	2,966	22,464	23,771
Other Western Europe	528	9,978	36,603	2,332	2,406	1,760	3,602	57,209	86,659
US	329	11,116	7,338	350	610	488	2,159	22,390	38,177
RoW (4)	1,388	6,762	2,470	718	584	3,807	939	16,668	21,277
Total	166,206	47,682	118,188	42,351	12,400	15,585	55,181	457,593	561,254
Of which:									
Southern Europe									
Spain	63	52	7	845	487	25	341	1,820	3,250
Italy	27	477	67	70	113	176	30	960	2,568
Portugal	6	90	8	13	148	2	1	268	439
Cyprus	9	—	—	—	—	—	—	9	10
Greece	13	—	—	5	—	—	12	30	30
Southern Europe total	118	619	82	933	748	203	384	3,087	6,297
Eurozone other (5)									
Germany	70	1,789	26,107	74	137	223	1,057	29,457	34,761
RoI (3)	15,079	433	2,387	950	443	206	2,966	22,464	23,771
Netherlands	32	2,399	4,740	235	230	118	563	8,317	12,217
France	69	1,835	3,170	288	563	611	578	7,114	15,299
Belgium	21	1,067	869	44	48	178	17	2,244	2,905
Luxembourg	9	703	28	490	1	41	274	1,546	2,736
Other (6)	14	365	674	47	22	72	261	1,455	2,383
Eurozone other total	15,294	8,591	37,975	2,128	1,444	1,449	5,716	72,597	94,072
Eurozone total	15,412	9,210	38,057	3,061	2,192	1,652	6,100	75,684	100,369
Japan (7)	25	467	1,008	—	—	—	146	1,646	2,613
India (7)	14	169	499	1	25	1	77	786	810
2015**									
UK	136,024	21,187	60,068	37,328	7,386	9,524	43,262	314,779	365,407
RoI (3)	13,440	433	1,624	692	436	218	2,542	19,385	20,661
Other Western Europe	548	9,481	33,942	2,408	2,144	2,567	4,334	55,424	84,143
US	301	8,121	21,819	622	864	911	2,386	35,024	54,120
RoW (4)	2,806	7,050	6,141	808	952	6,115	2,328	26,200	30,126
Total	153,119	46,272	123,594	41,858	11,782	19,335	54,852	450,812	554,457
Southern Europe									
Spain	79	58	6	671	526	75	326	1,741	2,960
Italy	27	428	52	62	175	67	59	870	2,271
Portugal	6	87	10	26	139	63	1	332	492
Cyprus	12	—	—	—	—	38	—	50	52
Greece	15	1	—	8	—	1	10	35	39
Southern Europe total	139	574	68	767	840	244	396	3,028	5,814
Eurozone other (5)									
Germany	63	1,533	23,801	91	150	800	1,073	27,511	32,574
RoI (3)	13,440	433	1,624	692	436	218	2,542	19,385	20,661
Netherlands	30	1,966	4,176	451	94	138	1,126	7,981	12,247
France	76	2,309	2,402	357	447	827	679	7,097	15,982
Belgium	22	702	537	158	44	138	61	1,662	2,427
Luxembourg	6	625	21	346	32	41	106	1,177	1,917
Other (6)	14	382	609	55	84	34	123	1,301	2,022
Eurozone other total	13,651	7,950	33,170	2,150	1,287	2,196	5,710	66,114	87,830
Eurozone total	13,790	8,524	33,238	2,917	2,127	2,440	6,106	69,142	93,644
Japan (7)	31	249	1,417	2	—	3	112	1,814	2,639
India (7)	11	227	824	1	92	43	436	1,634	1,733

**restated - refer to page 209 for further details. 2015 data is unaudited.

Credit risk: management basis continued

Notes:
(1) Includes SME customers managed in UK PBB Business Banking who are assigned a sector under RBS's sector concentration framework.
(2) Includes exposures to central governments, central banks and sub-sovereigns such as local authorities.
(3) RoI: Republic of Ireland.
(4) Comprises Asia Pacific, Central and Eastern Europe, the Middle East, Central Asia and Africa. RoW also includes supranationals such as the World Bank and exposure relating to ocean-going vessels which cannot be meaningfully assigned to specific countries from a country risk perspective.
(5) Countries where current exposure is greater than £1 billion.
(6) Finland, Austria, Malta, Slovakia, Estonia, Lithuania, Latvia and Slovenia.
(7) Non-eurozone countries displayed in the table are those that are A+ or worse and with current exposure greater than £1 billion.

Key points*

- Country Risk exposure was significantly affected by foreign exchange movements (£10.4 billion) during the year. On a constant currency basis, eurozone exposure decreased by £3.9 billion.
- Sovereign exposure to the US and RoW decreased. This is in line with RBS strategy to reduce activity in the US as well as reductions in RoW, which were partly due to reduced exposure in the shipping sector and other Capital Resolution disposals.
- The proportion of RBS's exposure to the UK is now 74% (70% - 2015).

*unaudited

Credit risk: management basis continued

Wholesale credit risk management

This section sets out further detail on RBS's approach to credit risk management for its Wholesale customers. Four formal frameworks are used to manage Wholesale credit concentration risks within RBS's risk appetite. These frameworks are regularly reassessed to ensure they remain appropriate for RBS's varied business franchises, economic and market conditions and to reflect refinements in risk measurement models as well as agreed risk appetite.

Wholesale credit risk framework*

A summary of the frameworks is set out below.

Concentration framework	Single name concentration (SNC)	Sector	Product and asset class	Country
Risk addressed	Concentration on a single borrower or borrower group.	Concentration in a single sector or across sectors susceptible to similar stress events.	Concentration on certain products or asset classes.	Concentration on a particular country.
Basis for classification	Size or LGD - based on net customer exposure for a given probability of default.	Size - based on exposure; and risk - based on Economic Capital and other qualitative factors.	Size - based on exposure to a product or asset class; and risk - based on heightened risk characteristics of a product.	Size - based on exposure to a particular country.
Limit types	Customer exposure and LGD limits relative to PD.	Bank-wide and franchise sector and sub-sector exposure limits.	Bank-wide and franchise product/asset class exposure limits and sub-limits.	Bank-wide country limits.
Controls within the framework	Elevated approval requirements, mandatory controls and procedures, monitoring and reporting, the requirement for regular reviews and for plans to address any exposures in excess of limit.			
Exposure measure (net/gross)	Both net and gross of "eligible" mitigants. To be eligible under the framework, mitigants must be legally enforceable, structurally effective and of appropriate maturity.	Gross exposure to a sector/sub-sector. Where PE is used it is net of eligible collateral and provisions.	Net/gross - dependent on type of risk and limit definition. Where PE is used it is net of eligible collateral and provisions.	Net of provisions and risk transfer.
Recent developments	The aggregate SNC exposure remained outside RBS long term risk appetite. Whilst the number of SNC excesses increased by 17.1%, the value of the SNC excesses decreased by 9.1% during the year. The top ten SNC excesses comprised 87.7% of total SNC excesses.	Risk appetite has remained broadly stable across all sectors, allowing for growth in our core franchises in accordance with our strategy. CRE limits have remained broadly flat, allowing for a limited amount of targeted growth within the sector and there has been some notable growth in certain of our non-Bank FI sectors where a more targeted growth strategy has been in place.	The product and asset class framework was enhanced during the year to encompass all products and asset classes where there is a specific identified credit risk which needs to be managed at the product and asset class level rather than at customer or sector level.	Risk appetite limits were reduced for exit countries taking account of the revised risk appetite and international strategy.

*unaudited

Credit risk: management basis continued

Risk assessment*

Before credit facilities are made available to customers a credit assessment is undertaken. The assessment process is the same for all customers. However, in RBS credit risk management is organised in terms of the complexity of the assessment rather than aligned to franchises. Capital Resolution is not managed separately but is shown in tables to aid understanding of the size of the exit portfolio. Credit is only granted to customers following joint approval by an approver from the business and the credit risk function.

These approvers act within a delegated approval authority under the wholesale Credit Authorities Framework (CAF) approved by the Executive Risk Forum.

The level of delegated authority held by approvers is dependent on their experience and expertise. Only a small number of senior executives hold the highest authority provided under the CAF. Both business and credit approvers are accountable for the quality of each decision taken but the credit risk approver holds ultimate sanctioning authority.

In 2016, new sector specific Transaction Acceptance Standards (TAS) were introduced to provide more detailed transactional lending and risk acceptance rules and guidelines. TAS are one of the tools used to control risk appetite at the customer/transaction level. The introduction of sector-specific TAS followed the introduction of general sector TAS in November 2015, providing full sector coverage. TAS are supplementary to the Credit Policy.

When assessing credit risk the following must be considered at a minimum:

- The amount, terms, tenor, structure, conditions, purpose and appropriateness of all credit facilities;
- Compliance with relevant credit policies and transaction acceptance standards;
- The customer’s ability to meet obligations, based on an analysis of financial information;
- A review of payment and covenant compliance history;
- The customer’s risk profile, including sector, sensitivity to economic and market developments and management capability;
- Legal capacity of the customer to engage in the transaction;
- Credit risk mitigation including requirements for valuation and revaluation. The customer’s credit grade and the loss given default estimate for the facilities, including any expected changes;
- The requirement for the provision of financial information, covenants and/or monitoring formulae to monitor the customer’s financial performance;
- Refinancing risk - the risk of loss arising from the failure of a customer to settle an obligation on expiry of a facility through the drawdown of another credit facility provided by RBS or by another lender;
- Consideration of other risks such as environmental, social and ethical, regulatory and reputational risks; and
- The portfolio impact of the transaction, including the impact on any credit risk concentration limits or agreed business franchise risk appetite.

Where the customer is part of a group, the credit assessment considers aggregated credit risk limits for the customer group as well as the nature of the relationship with the broader group (e.g. parental support) and its impact on credit risk.

Credit relationships are reviewed and credit grades (PD and LGD) re-approved annually. The review process addresses borrower performance, including reconfirmation or adjustment of risk parameter estimates; the adequacy of security; compliance with terms and conditions; and refinancing risk.

Risk mitigation

RBS mitigates credit risk relating to Wholesale customers through the use of netting, collateral and market standard documentation, depending on the nature of the counterparty and its assets. The most common types of mitigation are:

- Commercial real estate - Refer to CRE section on page 224.
- Other physical assets - Including stock, plant, equipment, machinery, vehicles, ships and aircraft. Such assets are suitable collateral only if RBS can identify, locate, and segregate them from other assets on which it does not have a claim. RBS values physical assets in a variety of ways, depending on the type of asset and may rely on balance sheet valuations in certain cases.
- Receivables - These are amounts owed to RBS’s counterparties by their own customers. RBS values them after taking into account the quality of its counterparty’s receivable management processes and excluding any that are past due.
- Financial collateral - Refer to Counterparty credit risk section on page 211.

All collateral is assessed case by case to ensure that it will retain its value independently of the provider. RBS monitors the value of the collateral and, if there is a shortfall, will seek additional collateral.

*unaudited

Credit risk: management basis continued

Key sectors where RBS provides asset-backed lending are commercial real estate and shipping. Valuation methodologies are detailed below.

Commercial real estate valuations - RBS has a panel of chartered surveying firms that cover the spectrum of geography and property sectors in which RBS takes collateral. RBS has a programme that identifies suitable valuers for particular assets. They are contracted through a single service agreement to ensure consistency of quality and advice. Valuations are commissioned when an asset is taken as security; a material increase in a facility is requested; or an event of default is anticipated or has occurred. In the UK, RBS also applies an independent third-party market indexation to update external valuations once they are more than a year old.

Shipping valuations - Vessel valuations are obtained using several different independent sources. Valuations are usually undertaken on a desktop basis, assuming a willing buyer and willing seller. Most vessels are valued on a charter-free basis, but in certain circumstances the valuations take account of longer term committed charter income. Valuations are normally performed on a quarterly basis. From time to time, particularly for facilities showing increased signs of financial stress, a more formal valuation or specialist advice will be obtained.

Problem debt management

*Early problem identification**

Each segment has defined early warning indicators (EWIs) to identify customers experiencing financial difficulty, and to increase monitoring if needed. EWIs may be internal, such as a customer's bank account activity, or external, such as a publicly-listed customer's share price. If EWIs show a customer is experiencing potential or actual difficulty, or if relationship managers or credit officers identify other signs of financial difficulty they may decide to classify the customer within the Risk of Credit Loss Framework.

*Risk of Credit Loss Framework**

The Risk of Credit Loss framework, which was fully implemented in April 2016, has replaced RBS's previous Watchlist process for managing problem debts. The new framework focuses on Wholesale customers whose credit profiles have deteriorated since origination. Expert judgement is applied by experienced credit risk officers to classify cases into categories that reflect progressively deteriorating credit risk to the bank. All customers that have been granted forbearance are managed under this framework. There are two classifications which apply to non-defaulted customers within the framework - Heightened Monitoring and Risk of Credit Loss. The framework also applies to those customers that have met the bank's default criteria (AQ10 exposures).

Heightened Monitoring customers are performing customers who have met certain characteristics, which have led to material credit deterioration. Collectively, characteristics reflect circumstances that may affect the customer's ability to meet repayment obligations. Characteristics include trading issues, covenant breaches, material PD downgrades and past due facilities. Sector specific characteristics also exist. Heightened Monitoring customers require pre-emptive actions (outside the customer's normal trading patterns) to return or maintain their facilities within the bank's current risk appetite prior to maturity.

Risk of Credit Loss customers are performing customers who have met the criteria for Heightened Monitoring and also pose a risk of credit loss to the bank in the next 12 months, should mitigating action not be taken or be successful.

Once classified as either Heightened Monitoring or Risk of Credit Loss a number of mandatory actions are taken in accordance with RBS-wide policies. This includes a review of the customer's credit grade, facility and security documentation and the valuation of security. Depending on the severity of the financial difficulty and the size of the exposure, the customer relationship strategy is reassessed by credit officers, by specialist credit risk or relationship management units in the relevant business or by Restructuring.

Agreed customer management strategies are regularly monitored by both the business and credit teams. The largest Risk of Credit Loss exposures in RBS and in each business are regularly reviewed by a Risk of Credit Loss Committee. The committee members are experienced credit, business and Restructuring specialists. The purpose of the committee is to review and challenge the strategies undertaken for those customers who pose the largest risk of credit loss to the bank.

Appropriate corrective action is taken when circumstances emerge that may affect the customer's ability to service its debt (see Heightened Monitoring characteristics). Corrective actions may include granting a customer various types of concessions. Any decision to approve a concession will be a function of specific country and sector appetite, the credit quality of the customer, the market environment and the loan structure and security. All customers granted forbearance are classified Heightened Monitoring as a minimum. For further information, refer to the Wholesale forbearance section.

Other potential outcomes of the relationship review are to: take the customer off the Risk of Credit Loss framework; offer additional lending and continue monitoring; transfer the relationship to Restructuring if appropriate; or exit the relationship altogether.

The Risk of Credit Loss framework does not apply to problem debt management for Business Banking customers in UK PBB. These customers are, where necessary, managed by specialised problem debt management teams, depending on the size of exposure or the Business Banking recoveries team where a loan has been impaired.

*unaudited

Credit risk: management basis continued

Restructuring*

For the Wholesale problem debt portfolio, customer relationships are managed by the Restructuring team (this excludes customers managed by PBB). The factor common to all customers with Restructuring involvement is that RBS's exposure is outside risk appetite. The purpose of Restructuring is to protect the bank's capital. Where practicable, Restructuring do this by working with corporate and commercial customers to support their turnaround and recovery strategies and enable them to return to mainstream banking. Restructuring will always aim to recover capital in a fair and efficient manner.

Specialists in Restructuring work with customers experiencing financial difficulties, and showing signs of financial stress, with the aim of restoring their business to financial health whenever practicable. The objective is to find a mutually acceptable solution, including restructuring of existing facilities, repayment or refinancing.

An assessment of the viability of the business, as well as the ability of management to deal with the causes of financial difficulty, is carried out by specialists in Restructuring, focusing on both financial and operational issues. Following the assessment, options which may include forbearance and/or restructuring of facilities are developed. Credit risk decisions, including reviewing and approving any restructuring solutions in relation to these customers, are made by a dedicated Restructuring Credit team, which is part of the credit risk management function.

Where a solvent outcome is not possible, insolvency may be considered as a last resort. However, helping the customer return to financial health and restoring a normal banking relationship is always the preferred outcome.

Forbearance

Forbearance takes place when a concession is made on the contractual terms of a loan in response to a customer's financial difficulties. Concessions granted where there is no evidence of financial difficulty, or where any changes to terms and conditions are within current risk appetite, or reflect improving credit market conditions for the customer, are not considered forbearance.

The aim of forbearance is to restore the customer to financial health while minimising risk to RBS. To ensure that forbearance is appropriate for the needs and financial profile of the customer, RBS applies minimum standards when assessing, recording, monitoring and reporting forbearance.

*unaudited

Types of wholesale forbearance

The type of forbearance offered is tailored to the customer's individual circumstances. For wholesale customers forbearance may involve the following types of concessions:

- Covenant waiver

  A recalibration of covenants or a covenant amendment may be used to cure a potential or actual covenant breach. In return for this relief, RBS may seek to obtain a return commensurate with the risk that it is required to take. The increased return for the increased risk can be structured flexibly to take into account the customer's circumstances. For example it may be structured as either increased margin on a cash or payment-in-kind basis, deferred-return instruments or both. While RBS considers these types of concessions qualitatively different from other forms of forbearance, they constitute a significant proportion of UK Wholesale forborne loans and are therefore included in these disclosures.
- Amendment to margin

  Contractual margin may be amended to assist the customer's day-to-day liquidity to help sustain its business as a going concern. This would normally be a short-term solution. RBS would seek a return commensurate to the risk that it is required to take.
- Payment concessions and loan rescheduling (including extensions in contractual maturity)

  May be granted to improve the customer's liquidity or in the expectation that the customer's liquidity will recover when market conditions improve. In addition, they may be granted if the customer will benefit from access to alternative sources of liquidity, such as an issue of equity capital. These options have been used in CRE transactions, particularly during periods where a shortage of market liquidity has ruled out immediate refinancing and made short-term collateral sales unattractive.
- Debt forgiveness/debt for equity swap

  May be granted where the customer's business condition or economic environment is such that it cannot meet obligations and where other forms of forbearance are unlikely to succeed. Debt forgiveness can be used for stressed corporate transactions and is typically structured on the basis of projected cash flows from operational activities, rather than underlying tangible asset values. Provided that the underlying business model, strategy and debt level are viable, maintaining the business as a going concern is the preferred option, rather than realising the value of the underlying assets.

Loans may be forborne more than once, generally where a temporary concession has been granted and circumstances warrant another temporary or permanent revision of the loan's terms. All customers are assigned a PD and related facilities an LGD. These are re-assessed prior to finalising any forbearance arrangement in light of the loan's amended terms and any revised grading is incorporated in the calculation of the impairment loss provisions for RBS's wholesale exposures.

Credit risk: management basis continued

The ultimate outcome of a forbearance strategy is unknown at the time of execution. It is highly dependent on the cooperation of the borrower and the continued existence of a viable business. Where forbearance is no longer viable, RBS will consider other options such as the enforcement of security, insolvency proceedings or both. The following are generally considered to be options of last resort:

- Enforcement of security or otherwise taking control of assets - Where RBS holds collateral or other security interest and is entitled to enforce its rights, it may enforce its security or otherwise take control of the assets. The preferred strategy is to consider other possible options prior to exercising these rights.
- Insolvency - Where there is no suitable forbearance option or the business is no longer sustainable, insolvency will be considered. Insolvency may be the only option that ensures that the assets of the business are properly and efficiently distributed to relevant creditors.

Provisions for forborne wholesale loans are assessed in accordance with normal provisioning policies (refer to Impairment loss provision methodology). The customer's financial position and prospects as well as the likely effect of the forbearance, including any concessions granted, are considered in order to establish whether an impairment provision is required.

Wholesale loans granted forbearance are individually assessed in most cases and are not therefore segregated into a separate risk pool.

Forbearance may result in the value of the outstanding debt exceeding the present value of the estimated future cash flows. This may result in the recognition of an impairment loss or a write-off.

For performing loans, credit metrics are an integral part of the latent provision methodology and therefore the impact of covenant concessions will be reflected in the latent provision. For non-performing loans, covenant concessions will be considered in determining the overall provision for these loans.

In the case of non-performing forborne loans, the loan impairment provision assessment almost invariably takes place prior to forbearance being granted. The amount of the loan impairment provision may change once the terms of the forbearance are known, resulting in an additional provision charge or a release of the provision in the period the forbearance is granted.

The transfer of wholesale loans subject to forbearance from impaired to performing status follows assessment by relationship managers and the Restructuring credit team. When no further losses are anticipated and the customer is expected to meet the loan's revised terms, any provision is written off and the balance of the loan returned to performing status. This course of action is not dependent on a specified time period and follows the credit risk manager's assessment.

Credit risk: management basis continued

Flow into forbearance

The table below shows the value of loans (excluding loans where RBS has initiated recovery procedures) where forbearance was completed during the year, by sector and types. This includes only the forborne facility Current Exposure net of provisions and after risk transfer. No exit criteria are currently applied.

Wholesale forbearance during the year by sector	2016 Performing £m	2016 Non-performing £m	2016 Total £m	2016 Provision coverage (1) %	2015** Performing £m	2015** Non-performing £m	2015** Total £m	2015** Provision coverage (1) %
Property	330	307	637	25	474	561	1,035	45
Natural resources	365	166	531	36	610	33	643	36
Transport	141	614	755	25	147	58	205	29
Retail and leisure	424	87	511	22	269	99	368	32
Services	201	225	426	33	451	105	556	44
Other	324	54	378	8	297	71	368	46
Total	1,785	1,453	3,238	27	2,248	927	3,175	43

Note:
(1) Provision coverage reflects impairment provision as a percentage of non-performing loans gross of provisions.

Forbearance arrangements

The table below shows the main types of Wholesale renegotiations. This includes only the forborne facility Current Exposure net of provisions and after risk transfer.

Wholesale renegotiations during the year by type (1)	2016 £m	2015** £m
Payment concessions	1,751	2,091
Non-payment concessions	1,487	1,084
Total	3,238	3,175

Note:
(1) Previously reported forbearance types are classified as non-payment (covenant concessions, release of security) and payment (payment concessions and loan rescheduling, forgiveness of all or part of the outstanding debt, variation in margin, standstill agreements).

**Restated - refer to page 209 for further details. 2015 data is unaudited.

Key points

- The levels of completed forbearance in 2016 remained stable. Year-on-year comparisons of the level of forbearance within the various sectors may be impacted by individual material cases during a given year.
- Loans totalling £1.4 billion were granted approval for forbearance but had not yet reached legal completion at 31 December 2016 (2015 - £1.4 billion). These exposures are referred to as “in process” and are not included in the tables above. 61% (£0.9 billion) of these “in process” exposures related to non-performing customers and 39% (£0.5 billion) related to performing loans. The principal types of arrangements offered were payment concessions and loan rescheduling.
- Forbearance in the Transport sector has increased in 2016 driven by the Shipping sector (£0.7 billion). A number of Shipping facilities which were forborne in 2016 were included in a portfolio sale during Q4. (Refer to page 232 for further information).
- The decrease in exposure in the Natural Resources sector is reflective of forbearance being granted to defaulted customers with provisions in the Oil & Gas sector given the sector’s challenges (refer to page 228 for further information). As the exposure measure is net of provisions, this reduced forborne exposure is not reported in the table above. On a gross basis, the level of forbearance granted to customers in the Natural Resources sector was consistent with 2015.
- Forbearance for performing Retail & Leisure customers increased driven by a limited number of covenant waivers for individually material cases, while the volume of customers receiving forbearance decreased.
- £1.6 billion of the facilities granted forbearance in 2016 were managed by Restructuring Credit. This equated to 48% of loans managed by Restructuring Credit (excluding loans to customers where recovery procedures have commenced).
- The value of loans forborne during 2015 and 2016 and still outstanding at 31 December 2016 was £4.3 billion (2015 - £4.5 billion), of which £1.0 billion related to arrangements completed during 2015 (2015 - £1.3 billion completed in 2014).
- By value, 77% (£1.7 billion) of the performing loans granted forbearance in 2015 (£2.2 billion) remained performing at 31 December 2016.
- Provisions for non-performing loans disclosed above are for the most part individually assessed. As a result, material provisions and associated fluctuations in coverage levels can impact direct comparison across periods. Provision coverage decreased in 2016, which is reflective of the proportion of the 2015 forborne portfolio relating to Exit portfolios where the strategy resulted in high levels of provisions. Provision coverage for non-performing "in process" loans was 29%. Additional provisions charged in 2016 and relating to loans forborne during 2015 totalled £160 million. Provision coverage of these loans at 31 December 2016 was 50%.
- The data presented above include loans forborne during 2015 and 2014. Until April 2014 a reporting threshold was in place which ranged from nil to £3 million after which no thresholds were in use. A number of immaterial portfolios have forbearance assessed under a portfolio approach.

Credit risk: management basis continued
Key credit portfolios
Commercial Real Estate
The CRE sector relates to lending activity for the development of, and investment in, commercial and residential properties.

A dedicated portfolio controls team is responsible for reviewing portfolio strategy, credit risk appetite and policies, as well as oversight of valuations and environmental frameworks. The sector is reviewed regularly at senior executive committees. Reviews include portfolio credit quality, capital consumption and control frameworks.

The majority of CRE lending applications are reviewed by specialist CRE transactional credit teams, including a dedicated development team. Lending guidelines and policy are informed by lessons learned from the 2008 financial crisis.

New business is monitored and controlled against agreed underwriting standards. Sub-sector and asset class limits are used to restrict exposure to emerging risks when appropriate. This activity is reviewed and monitored on a regular basis.

CRE lending exposure by geography and property type on a Current Exposure basis net of provisions and after risk transfer*

	Investment			Development			Overall
By geography (1)	Commercial £m	Residential £m	Total £m	Commercial £m	Residential £m	Total £m	total £m
2016							
UK	16,773	3,762	20,535	367	3,127	3,494	24,029
RoI	459	70	529	49	133	182	711
Other Western Europe	739	34	773	13	39	52	825
US	154	1	155	—	4	4	159
RoW	25	2	27	2	1	3	30
Total	18,150	3,869	22,019	431	3,304	3,735	25,754
Of which: Capital Resolution	953	46	999	1	74	75	1,074
Williams & Glyn	2,050	668	2,718	32	633	665	3,383
2015**							
UK	15,825	4,173	19,998	613	3,251	3,864	23,862
RoI	342	95	437	24	80	104	541
Other Western Europe	597	8	605	15	1	16	621
US	241	1	242	—	—	—	242
RoW	211	12	223	5	13	18	241
Total	17,216	4,289	21,505	657	3,345	4,002	25,507
Of which: Capital Resolution	1,318	47	1,365	50	104	154	1,519
Williams & Glyn	2,080	644	2,724	82	483	565	3,289

Note:
(1) Geography is based on country of collateral risk.

*unaudited
**restated - refer to page 209 for further details

Credit risk: management basis continued

CRE lending exposure by sub-sector based on current exposure net of provisions and after risk transfer*

By sub-sector	UK £m	RoI £m	Other Western Europe £m	US £m	RoW £m	Total £m
2016						
Residential	6,889	204	73	4	3	7,173
Office	3,322	155	518	41	15	4,051
Retail	4,970	50	56	—	2	5,078
Industrial	2,696	33	65	1	—	2,795
Mixed/other	6,152	269	113	113	10	6,657
Total	24,029	711	825	159	30	25,754
2015						
Residential	7,424	175	9	1	25	7,634
Office	2,938	76	398	85	62	3,559
Retail	4,497	93	85	19	22	4,716
Industrial	2,600	36	39	—	7	2,682
Mixed/other	6,403	161	90	137	125	6,916
Total	23,862	541	621	242	241	25,507

A breakdown of the Commercial Banking UK investment portfolio for 2016 by UK region is set out below.

UK region (1)	Proportion
Greater London	29%
Portfolio (2)	22%
Midlands	13%
South East	12%
North	11%
Scotland	7%
Rest of the UK (3)	6%

Notes:
(1) Based on management estimates using the postcode of the security. Percentages are based on current exposure gross of provisions.
(2) Includes lending secured against property portfolios comprising numerous properties across multiple UK locations.
(3) Includes Northern Ireland.

Key points

- A slowdown in the UK commercial property investment market, which began in the third quarter of 2015, continued after the EU referendum result in June 2016. As a result, capital values were down by approximately 3% on average in the second half of 2016. Despite a minor recovery in the final months of 2016, forecasts suggest that values will remain under pressure during 2017. However, the sector continues to attract equity flows given its attractive yields.
- With the outlook for UK commercial property more uncertain, underwriting standards have been tightened across all commercial property investment portfolios to mitigate potential declines in property values.
- Lending to the CRE sector in the UK increased during the year as a result of CPB and PBB having appetite to support activity in the sector.
- The increase in exposure in RoI and Western Europe was primarily due to foreign exchange movements.

*unaudited

Credit risk: management basis continued

CRE exposure by LTV band

The table below provides a breakdown of the CRE portfolio by LTV band.

	2016			2015**		
	AQ1-AQ9	AQ10	Total	AQ1-AQ9	AQ10	Total
2016	£m	£m	£m	£m	£m	£m
<= 50%	10,695	53	10,748	9,896	72	9,968
> 50% and <= 70%	6,508	120	6,628	5,964	116	6,080
> 70% and <= 80%	474	67	541	685	125	810
> 80% and <= 90%	299	57	356	353	376	729
> 90% and <= 100%	130	41	171	143	150	293
> 100% and <= 110%	74	24	98	149	75	224
> 110% and <= 130%	136	357	493	221	122	343
> 130% and <= 150%	82	28	110	44	65	109
> 150%	108	61	169	253	199	452
Total with LTVs	18,506	808	19,314	17,708	1,300	19,008
Total portfolio average LTV (1)	48%	113%	51%	52%	167%	63%
Minimal security (2)	1	—	1	2	4	6
Other	2,357	349	2,706	2,253	238	2,491
Development (3)	3,553	180	3,733	3,641	361	4,002
	24,417	1,337	25,754	23,604	1,903	25,507

Notes:
(1) Includes other regions in addition to UK and RoI.
(2) Weighted average by Current Exposure gross of provisions
(3) Relates to the development of commercial and residential properties. LTV is not a meaningful measure for this type of lending activity.

Key points

- The reduction in overall portfolio average is primarily the result of repayments, asset sales and write-offs of legacy non-performing assets from Ulster Bank RoI, CPB and NatWest Markets. Remaining exposures with LTVs greater than 100% are legacy transactions.
- The exposure in Other relates mainly to lending to large corporate entities. It is not asset-backed but lent against corporate balance sheets.
- Interest payable on outstanding loans was covered 3.7x in Commercial Banking and 1.1x in Capital Resolution (2015 - 3.4x and 1.6x respectively).

**restated - refer to page 209 for further details. 2015 data is unaudited.

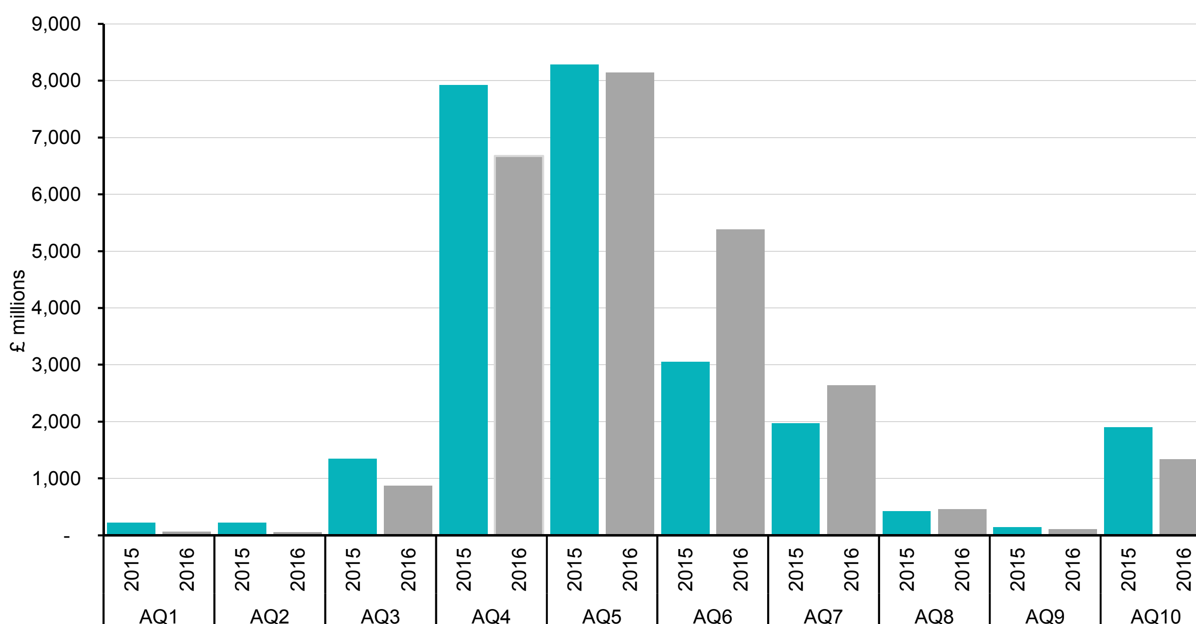
Credit risk: management basis continued

A breakdown of CRE portfolio lending, gross of provision and after risk transfer, risk elements in lending (REIL) and provisions is provided below.

	Total		Commercial Banking		Capital Resolution	
	2016	2015*	2016	2015*	2016	2015*
CRE loans, REIL and provisions	£m	£m	£m	£m	£m	£m
Lending (gross of provisions)	26,265	27,561	18,296	18,178	1,193	2,842
Of which REIL	1,407	3,560	731	1,050	497	1,951
Provisions	511	2,054	263	305	119	1,323
REIL as a % of gross loans to customers	5.4%	12.9%	4.0%	5.8%	41.7%	68.6%
Provisions as a % of REIL	36%	58%	36%	29%	24%	68%

Asset quality*

A breakdown of asset quality of the CRE portfolio measured on a Current Exposure basis, net of provisions and after risk transfer, is set out below.**



Note:

(1) There is little variation between CE and PE figures for the CRE portfolio as facilities tend to be fully drawn.

Key point

- The growth in AQ6 band is the result of the introduction of a more conservative calibration of certain commercial real estate asset quality models, rather than deterioration of underlying asset quality.

*unaudited
**restated - refer to page 209 for further details

Credit risk: management basis continued

Natural Resources*

Exposure to the Natural Resources sector, measured on both a Current Exposure (CE) and Potential Exposure (PE) basis, net of provisions and after risk transfer, is summarised below.

	2016				2015**			
	CE £m	Of which: Capital Resolution £m	PE £m	Of which: Capital Resolution £m	CE £m	Of which: Capital Resolution £m	PE £m	Of which: Capital Resolution £m
Oil and gas	2,911	159	5,286	191	3,544	1,539	6,798	2,117
Mining and metals	623	32	1,887	126	729	237	1,823	391
Electricity	3,430	797	9,076	1,087	2,851	1,128	7,683	1,773
Water and waste	5,436	3,386	9,176	6,041	4,657	1,648	8,261	3,039
	12,400	4,374	25,425	7,445	11,781	4,552	24,565	7,320
Commodity traders	631	1	992	1	900	444	1,320	452
Of which: Natural resources	*568*	—	*744*	—	*521*	*212*	*752*	*212*

Key points

- Oil & Gas - CE and PE decreased during the year by 27% and 32% (£1.1 billion and £2.5 billion) respectively on a constant currency basis, with foreign exchange impact of £0.5 billion (CE) and £1.0 billion (PE). This portfolio remains subject to active risk management (see below).
- Mining & Metals - CE and PE decreased during the year by 23% and 10% (£0.2 billion and £0.2 billion) on a constant currency basis, with foreign exchange impact of £0.1 billion (CE) and £0.3 billion (PE). There was some deterioration in asset quality due to challenging market conditions and this portfolio remains subject to active risk management (see below).
- Electricity - CE and PE increased during the year by 9% and 5% (£0.3 billion and £0.4 billion) on a constant currency basis, with foreign exchange impact of £0.3 billion (CE) and £1.0 billion (PE). This was mainly due to refined classification of exposure in the natural resources sector which lead to a transfer of regulated utility exposure from Oil and Gas to Electricity and an increase in Project Finance exposure as part of the RBS growth strategy.
- Water & Waste - CE and PE increased during the year by 16% and 10% (£0.7 billion and £0.8 billion) on a constant currency basis, with foreign exchange impact of £0.1 billion (CE) and £0.1 billion (PE). These increases are predominately due to mark-to-market movements in long-dated inflation linked swaps driven by changes in long-term inflation outlook.

Oil & Gas*

Exposure to the Oil & Gas sector, split by sub-sector and geography, measured on a Potential Exposure basis, net of provisions and after risk transfer, is summarised below.

2016	UK £m	RoI £m	Other Western Europe £m	US £m	RoW (1) £m	Total £m
Producers (including international oil companies)	664	—	1,087	2	236	1,989
Oilfield service providers	701	9	630	68	5	1,413
Other wholesale and trading activities	489	43	542	46	280	1,400
Refineries	27	—	—	285	3	315
Pipelines	33	4	121	1	10	169
	1,914	56	2,380	402	534	5,286
Of which:						
National oil companies	—	—	16	—	76	92
International oil companies	450	—	821	155	14	1,440
Exploration and production	302	—	154	2	141	599
2015**						
Producers (including international oil companies)	1,177	51	1,028	275	256	2,787
Oilfield service providers	700	10	678	279	51	1,718
Other wholesale and trading activities	450	76	475	45	432	1,478
Refineries	21	2	—	327	18	368
Pipelines	98	—	310	31	8	447
	2,446	139	2,491	957	765	6,798
Of which:						
National oil companies	—	—	21	—	70	91
International oil companies	654	—	868	273	10	1,805
Exploration and production	338	—	38	130	118	624

Note:
(1) Comprises Asia Pacific, Central and Eastern Europe, the Middle East, Central Asia and Africa.

*unaudited
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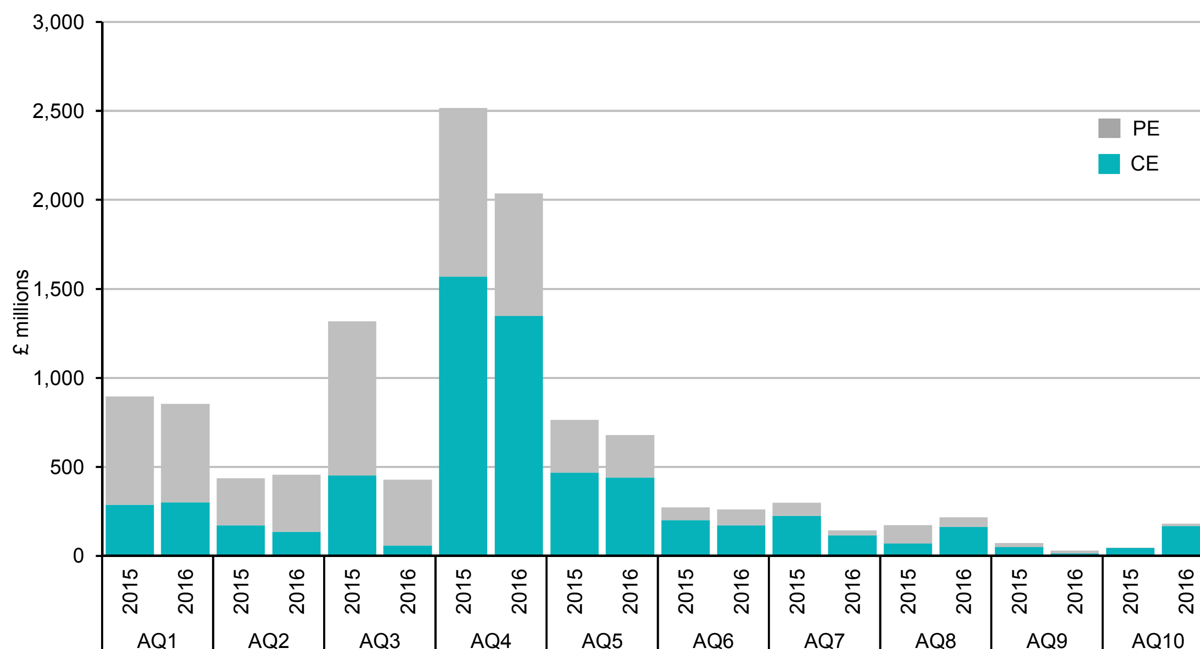
Credit risk: management basis continued

Asset quality

A breakdown of asset quality for the oil and gas portfolio, measured on both a Current Exposure and Potential Exposure basis, net of provisions and after risk transfer, is summarised below.**



Key points

- Oil prices dipped below $30 per barrel at the start of the year but ended the year above $50 per barrel following positive announcements from OPEC and Non-OPEC producers around implementing production cuts of 1.8 million barrels a day. However, there is considerable market uncertainty around future oil prices and the outlook for the sector remains challenging.
- The portfolio reduced by £1.5 billion during the year or 22% (32% or £2.5 billion on a constant currency basis). Regulated gas distribution companies are no longer reported under the Oil and Gas sector and this reclassification reduced sector exposure by £724 million. The other reductions are attributable to the continued run-off of the US and APAC portfolios and active risk management in all regions.
- The risk management strategy during the year remained to focus the portfolio towards investment grade customers with robust credit profiles and strong liquidity to manage through the extended downturn. At 31 December 2016, 71% (2015 - 76%) of the portfolio exposure was investment grade (AQ1-AQ4 or equivalent to BBB- and above).
- The sub-sector in which a customer operates is a primary consideration for assessing credit risk. Customers involved in exploration and production (E&P) are most immediately exposed to low oil prices and these companies have introduced capital spending reductions and tight cost controls to conserve cash. In turn, this has impacted oilfield service providers, with E&P companies buying fewer products and services from the oilfield service providers, and demanding lower prices for those they do purchase.
- The other principal components of exposure to producers are International Oil Companies (IOCs) and National Oil Companies (NOCs). IOCs and NOCs are less vulnerable to the oil price decline due to scale, diversification and, in the case of NOCs, implicit support from governments. At 31 December 2016, 29% of the portfolio exposure was to IOCs and NOCS combined (2015 - 28%).

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Credit risk: management basis continued

- Committed lending exposure included legal commitments to syndicated bank facilities and bilateral facilities with tenors up to five years. These committed facilities are for general corporate purposes - including funding operating needs and capital expenditures - and are available as long as counterparties comply with the terms of the credit agreement. Contingent obligations relate to guarantees, letters of credit and suretyships provided to customers. RBS had no high-yield bond or loan underwriting positions at 31 December 2016 (2015 - Nil).
- The number of forbearance events was consistent with 2015. In 2016 there was an increase in payment concessions granted compared to 2015 which predominantly involved the relaxation of financial covenants to give customers more financial flexibility. Most forbearance involved customers in the E&P and oilfield services sub-sectors where earnings have been more immediately and materially affected by the downturn.
- The number and value of cases on the Risk of Credit Loss framework in the Oil & Gas sector decreased during the year. The framework exposure is predominantly classified as Heightened Monitoring and the sector continues to be monitored closely. At 31 December 2016, exposures classified as Risk of Credit Loss totalled £2 million.
- The increase in AQ10 reflected ongoing challenging market conditions which resulted in a small number of customers experiencing financial stress during the year. AQ10 assets at 31 December 2016 totalled £181 million (2015 - £44 million).

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Credit risk: management basis continued

Mining & Metals*

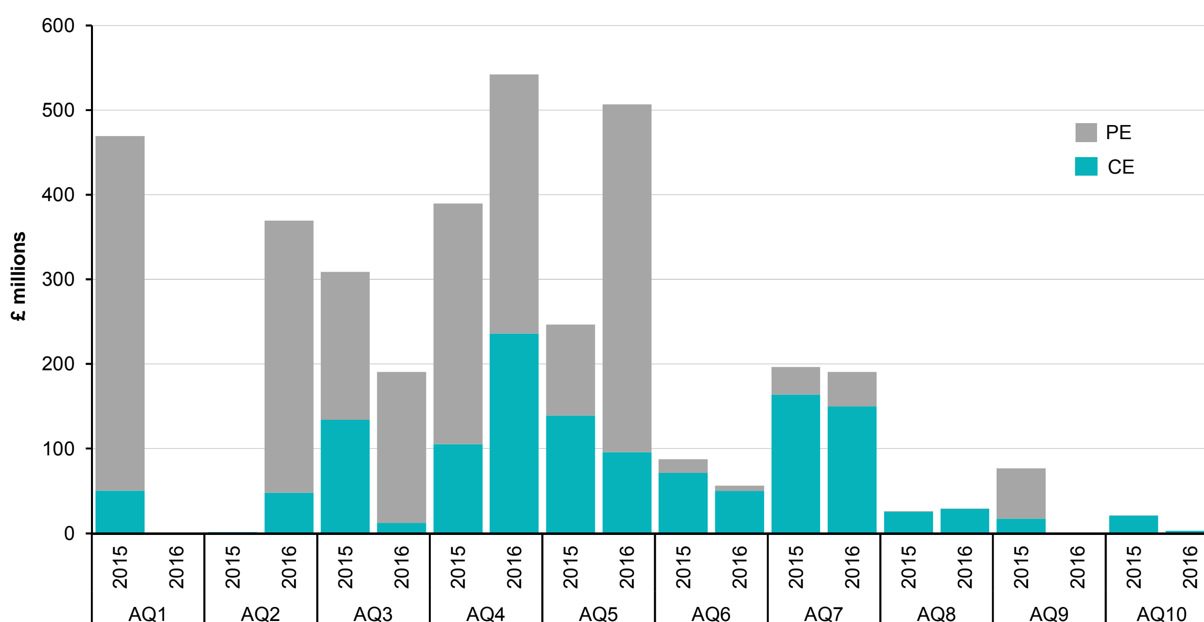
Exposure to the Mining & Metals sector, measured on a Potential Exposure basis, net of provisions and after risk transfer, is summarised below.

2016	UK £m	RoI £m	Other Western Europe £m	US £m	RoW (1) £m	Total £m
Mining	118	36	129	—	566	849
Metals - production	120	1	340	—	2	463
- wholesale	184	3	382	6	—	575
	422	40	851	6	568	1,887
2015**						
Mining	31	1	7	105	447	591
Metals - production	308	1	361	13	40	723
- wholesale	164	2	309	34	—	509
	503	4	677	152	487	1,823

Note:
(1) Comprises Asia Pacific, Central and Eastern Europe, the Middle East, Central Asia and Africa

Asset quality

A breakdown of asset quality for the Mining & Metals portfolio, measured on both a Current Exposure and Potential Exposure basis, net of provisions and after risk transfer, is summarised below.**



Key point

- The deterioration in asset quality reflected the challenging operating environment in 2016.

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Credit risk: management basis continued

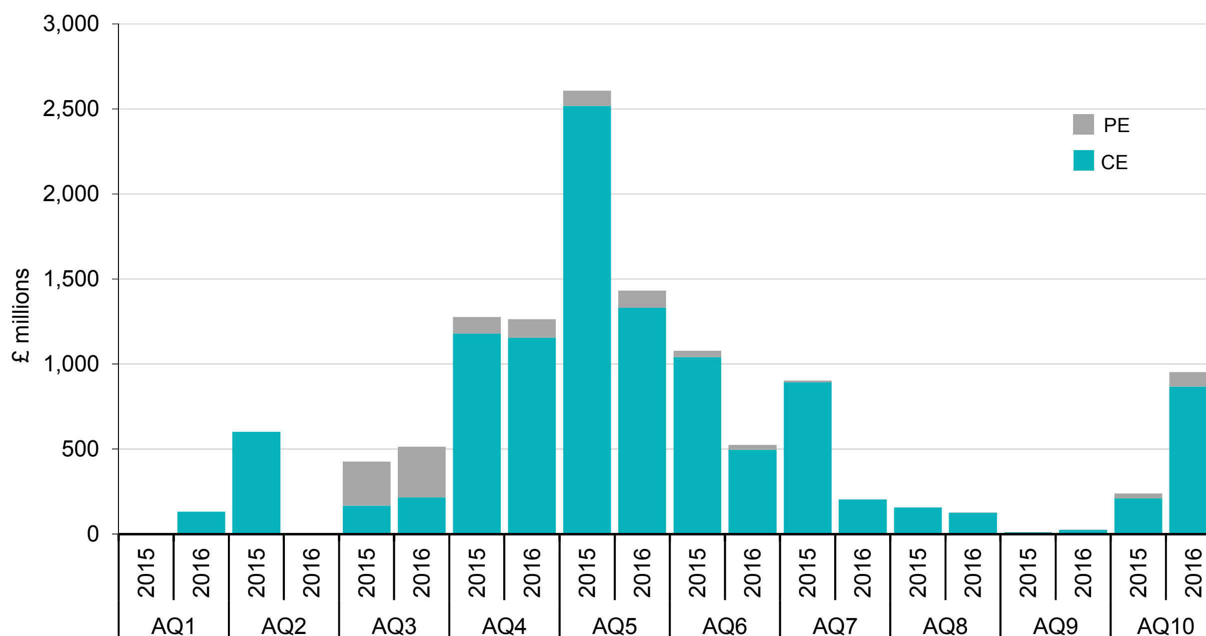
Shipping*

Exposure to the Shipping sector, measured on both a Current Exposure and Potential Exposure basis net of provisions and after risk transfer, is summarised below.

	2016				2015**			
	Current Exposure £m	Of which: Capital Resolution £m	Potential Exposure £m	Of which: Capital Resolution £m	Current Exposure £m	Of which: Capital Resolution £m	Potential Exposure £m	Of which: Capital Resolution £m
Shipping	4,553	3,854	5,173	4,005	6,776	6,162	7,301	6,309

Asset quality

A breakdown of asset quality for the Shipping sector, measured on both a Current Exposure and Potential Exposure basis, net of provisions and after risk transfer, is summarised below.**



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Credit risk: management basis continued

Key points

- Shipping exposure was £4.6 billion on a Current Exposure basis (down 43% or £3.4 billion on a constant currency basis compared with 2015, with foreign exchange impact of £1.2 billion) and £5.2 billion on a Potential Exposure basis (down 40% or £3.4 billion on a constant currency basis compared with 2015, with foreign exchange impact of £1.3 billion).
- Most of the Shipping portfolio is managed in Capital Resolution and is related to exposure secured by ocean-going vessels. The remaining exposure outside Capital Resolution related principally to is within the Shipbuilding and Inland Water Transport sub-sectors. The reduction in exposure was mainly driven by asset sales and debt repayments in Capital Resolution, in line with RBS's strategy.
- Within Capital Resolution, Concentrations were as follows: Containers 34% (2015 - 21%), Dry Bulk 26% (2015 - 37%), Tankers at 18% (2015 - 23%). Other vessel types included liquid petroleum gas, natural gas and roll-on/roll-off vessels at 22% of exposure (2015 - 19%).
- Conditions remained depressed in the Dry Bulk market, notwithstanding a gradual improvement during the second half of the year. The Container market also saw a marked downturn in 2016 with a significant reduction in spot rates and vessel values and this is set to continue into 2017. Tanker rates also weakened in 2016 with a general deterioration in vessel values.
- The Capital Resolution portfolio LTV at 31 December 2016 was 102% (2015 - 85%), or 92% net of the provisions outlined below. The year-on-year increase in LTV is reflective of the market and vessel value movements outlined above. The LTV calculation includes vessel security only and does not incorporate any non-vessel security such as cash or guarantees.
- At 31 December 2016, exposures classified as Risk of Credit Loss totalled £363 million reflecting the prolonged market downturn in this sector.
- Provisions, excluding latent provisions, increased from £169 million to £386 million during 2016. Again, this was due to weak market conditions, and increasing LTV, which led to an increase in the portfolio's levels of default.
- At 31 December 2016, AQ10 exposure, net of provisions was £867 million (2015 - £210 million).
- There was an increase in the number of forbearance events, mainly involving the relaxation of minimum security covenants due to deteriorating asset prices. Total forbearance for this sector was £723 million.

Credit risk: management basis continued

Personal credit risk management

This section sets out further detail on RBS's approach to credit risk management for its personal customers.

Risk appetite*

RBS uses a credit risk appetite framework to control credit risk for its personal businesses. The framework sets limits that measure and control, for each relevant franchise or reportable segment, the quality of both existing and new business. The actual performance of each portfolio is tracked relative to these limits and action taken where necessary. These limits apply to a range of credit risk-related measures including expected loss of the portfolio, the expected loss in a given stress scenario, projected credit default rates and the LTV of personal mortgage portfolios.

Personal credit risk assessment*

Personal lending entails making a large number of small-value loans. To ensure that these lending decisions are made consistently, RBS analyses credit information, including the historical debt servicing behaviour of customers with respect to both RBS and their other lenders. RBS then sets its lending rules accordingly, developing different rules for different products. The process is then largely automated, with customers receiving a credit score that reflects a comparison of their credit profile with the rule set. However, for relatively high-value, complex personal loans, including some residential mortgage lending, specialist credit managers make the final lending decisions.

Personal risk mitigation*

RBS takes collateral in the form of residential property to mitigate the credit risk arising from mortgages and home equity lending. RBS values residential property during the loan underwriting process by either appraising properties individually or valuing them collectively using statistically valid models. RBS updates residential property values quarterly using the relevant residential property index, namely:

Region	Index used
UK	Halifax quarterly regional house price index
Northern Ireland	UK House Price Index (published by the Land Registry)
RoI	Central Statistics Office residential property price index

Problem debt management*

Personal customers in financial difficulty are managed through either collections or recoveries functions.

Collections*

Collections functions in each of RBS's personal businesses provide support to customers who cannot meet their obligations to RBS. Such customers may miss a payment on their loan, borrow more than their agreed limit, or ask for help. Dedicated support teams are also in place to identify and help customers who have not yet missed a payment but may be facing financial difficulty. The collections function uses a range of tools to initiate contact with such customers, establish the cause of their financial difficulty and support them where possible.

*unaudited

In the process, they may consider granting the customer forbearance.

Additionally, in the UK and Ireland support is provided to customers with unsecured loans who establish a repayment plan with RBS through a debt advice agency or a self-help tool. Such "breathing space" suspends collections activity for a 30-day period to allow time for the repayment plan to be put in place. Arrears continue to accrue for customer loans granted breathing space.

If collections strategies are unsuccessful the relationship is transferred to the recoveries team.

Forbearance

Forbearance takes place when a concession is made on the contractual terms of a loan in response to a customer's financial difficulties.

Customers who contact RBS directly because of financial difficulties, or who are already in payment arrears, may be granted forbearance. In the course of assisting customers, more than one forbearance treatment may be granted.

The type of forbearance granted will differ based upon an assessment of the customer's circumstances. Forbearance is granted principally to customers with mortgages and less frequently to customers with unsecured loans. This includes instances where forbearance may be taken for customers with highly flexible mortgages.

Forbearance options include, but are not limited to:

- Payment concessions - A temporary reduction in, or elimination of, the periodic (usually monthly) loan repayment is agreed with the customer. At the end of the concessionary period, forborne principal and accrued interest outstanding is scheduled for repayment over an agreed period. Ulster Bank RoI also offers payment concessions in the form of discounted interest rates that involve the forgiveness of some interest.
- Capitalisation of arrears - The customer repays the arrears over the remaining term of the mortgage and returns to an up-to-date position.
- Term extensions - The loan's maturity date is extended.
- Interest only conversions - The loan converts from principal and interest repayment to interest only repayment. This is only available in Ulster Bank RoI and Ulster Bank North on a temporary basis. These forbearance concessions are no longer offered to customers in UK PBB, RBSI and Private Banking.

Types of forbearance offered in the unsecured portfolios vary by reportable segment.

Credit risk: management basis continued

Monitoring of forbearance - Forborne loans are separated into a distinct population and reported on a regular basis until they exit the forborne population.

A loan is considered to have exited forbearance when it meets the criteria set out by the European Banking Authority (EBA) requirements for Financial Reporting. These include being classified as performing for two years since the last forbearance event, making regular repayments and the debtor being less than 30 days past due.

The act of granting of forbearance in itself will only change the delinquency status of the loan in exceptional circumstances, which can include capitalisation of principal and interest in arrears, where the loan may be returned to the performing book if it remains up to date for the duration of the probation period and is deemed likely to continue to do so.

Additionally for some forbearance types a loan may be transferred to the performing book (following a probationary period) if a customer makes payments that reduce loan arrears below 90 days (Ulster Bank RoI, UK PBB collections function).

Impairments for forbearance

The methodology used for provisioning in respect of forborne loans will differ depending on whether the loans are performing or non-performing and which business is managing them due to local market conditions.

For the latent calculation, an extended emergence period is applied to account for the impact of forbearance within the portfolio. Additionally for portfolios with material forbearance, forborne loans form a separate risk pool and use different PD model:

- UK PBB (excl. NI) and W&G: forborne mortgages form a separate risk pool for 24 months after the agreement of forbearance and the calculation uses the higher of the observed default rates or PD. On unsecured loans, separate risk pools are used for the duration of the forbearance treatment.
- Ulster Bank: forborne and previously forborne mortgages form a separate risk pool taking into account the term of the forbearance treatment and applicable probationary periods. The PD model used is calibrated separately for forborne loans, using information on the historic performance of loans subject to similar arrangements.

For non-performing loans, there is no difference in treatment with the exception of Ulster Bank, where forborne loans which result in an economic loss to the group form a separate risk pool where specific LGDs are allocated using observed cohort performance.

Recoveries*

Once a loan has been identified as impaired it is managed by recoveries teams in the relevant businesses. The teams seek to minimise RBS's loss by maximising cash recovery while treating customers fairly.

Where an acceptable repayment arrangement cannot be agreed with the customer litigation may be considered. In the UK and Northern Ireland, no repossession procedures are initiated until at least six months following the emergence of arrears (in the Republic of Ireland, regulations prohibit taking legal action for an extended period). Additionally, certain forbearance options are made available to customers managed by the recoveries function.

*unaudited

Credit risk: management basis continued

Overview of personal portfolio split by product type and segment on a Current Exposure basis net of provisions*

2016	UK PBB £m	Ulster Bank RoI £m	Private Banking £m	RBSI £m	W&G £m	Total £m
Mortgages	117,040	14,396	7,168	2,637	10,856	152,097
Of which:						
Interest only variable rate	11,694	349	3,625	692	1,317	17,677
Interest only fixed rate	11,132	7	2,290	81	1,186	14,696
Mixed (capital and interest only)	5,316	75	—	23	687	6,101
Buy-to-let	16,678	1,777	770	881	1,427	21,533
Provisions	151	919	2	27	23	1,122
REIL	736	3,144	23	84	101	4,088
Other lending (1)	8,962	291	1,730	64	958	12,005
Provisions	834	48	18	1	113	1,014
REIL	860	50	61	5	117	1,093
Total lending	126,002	14,687	8,898	2,701	11,814	164,102
Mortgage LTV ratios (2)						
- Total portfolio	56%	76%	56%	57%	54%	58%
- New business	69%	74%	55%	66%	69%	68%
- Buy-to-let	56%	82%	54%	49%	55%	56%
- Performing	56%	72%	56%	56%	53%	57%
- Non-performing	60%	94%	68%	105%	56%	77%
2015**						
Mortgages	104,599	12,713	6,552	2,525	10,430	136,819
Of which:						
Interest only variable rate	13,252	407	3,025	730	1,388	18,802
Interest only fixed rate	9,112	6	2,431	49	1,076	12,674
Mixed (capital and interest only)	5,380	76	7	29	745	6,237
Buy-to-let	14,098	1,762	476	835	1,150	18,321
Provisions	180	1,062	4	18	26	1,290
REIL	878	2,550	19	63	123	3,633
Other lending (1)	8,795	233	3,458	62	958	13,506
Provisions	1,028	48	22	1	129	1,228
REIL	1,028	49	53	5	140	1,275
Total lending	113,394	12,946	10,010	2,587	11,388	150,325
Mortgage LTV ratios (2)						
- Total portfolio	56%	83%	54%	57%	54%	59%
- New business	69%	77%	57%	62%	68%	68%
- Buy-to-let	57%	95%	58%	51%	57%	60%
- Performing	56%	80%	54%	57%	54%	58%
- Non-performing	63%	106%	92%	96%	60%	83%

Notes:
(1) Excludes loans guaranteed by a company and commercial real estate lending to personal customers.
(2) Weighted by current exposure gross of provisions.

*unaudited
**restated - refer to page 209 for further details

Credit risk: management basis continued

Overview of new mortgage lending on a Current Exposure basis net of provisions*

2016	UK PBB £m	Ulster Bank RoI £m	Private Banking £m	RBSI £m	W&G £m	Total £m
Gross new mortgage lending (1)	29,027	893	3,291	470	2,156	35,837
Of which:						
Owner occupied	25,086	876	2,819	300	1,833	30,914
Average LTV by weighted value	71%	74%	55%	69%	70%	70%
Buy-to-let	3,941	17	472	170	323	4,923
Average LTV by weighted value	62%	59%	54%	62%	62%	61%

(1) Excludes additional lending to existing customers

2015	UK PBB £m	Ulster Bank RoI £m	Private Banking £m	RBSI £m	W&G £m	Total £m
Gross new mortgage lending	22,713	553	2,383	258	1,728	27,635
Of which:						
Owner occupied	18,884	541	2,161	179	1,412	23,177
Average LTV by weighted value	71%	77%	54%	64%	69%	69%
Buy-to-let	3,829	12	222	79	316	4,458
Average LTV by weighted value	64%	65%	64%	57%	64%	64%

Forbearance stock and flow on a Current Exposure basis net of provisions

2016	UK PBB £m	Ulster Bank RoI £m	Private Banking £m	RBSI £m	W&G £m	Total £m
Forbearance stock (1)	1,290	3,709	65	43	177	5,284
Forbearance stock: arrears						
Current	790	2,077	65	29	107	3,068
1-3 months in arrears	286	473	—	2	41	802
>3 months in arrears	214	1,159	—	12	29	1,414
Provisions against forbearance stock	51	790	—	1	8	850
Forbearance type:						
Long-term arrangements (2)	701	1,249	63	37	111	2,161
Short-term arrangements (3)	860	2,460	2	6	110	3,438
Forbearance flow	406	316	49	10	53	834

2015*	UK PBB £m	Ulster Bank RoI £m	Private Banking £m	RBSI £m	W&G £m	Total £m
Forbearance stock (1)	1,444	3,643	64	43	202	5,396
Forbearance stock: arrears						
Current	863	2,165	64	31	124	3,247
1-3 months in arrears	329	470	—	6	46	851
>3 months in arrears	252	1,008	—	6	32	1,298
Provisions against forbearance stock	59	884	—	1	8	952
Forbearance type:						
Long-term arrangements (2)	800	1,173	39	35	129	2,176
Short-term arrangements (3)	953	2,470	25	8	120	3,576
Forbearance flow	435	197	47	17	57	753

Notes:
(1) Q4 2016 forbearance calculation has moved to the FINREP EBA basis.
(2) Capitalisation term extensions, economic concessions.
(3) Payment concessions, amortising payments of outstanding balances, payment holidays and temporary interest arrangements

*unaudited

Credit risk: management basis continued

Mortgage LTV distribution by segment on a Current Exposure basis net of provisions

LTV ratio value (1)	<=50% £m	50% <=70% £m	70% <=80% £m	80% <=90% £m	90% <=100% £m	100% <=110% £m	110% <=130% £m	130% <=150% £m	>150% £m	Total with LTVs £m	Other £m	Total £m
2016												
UK PBB												
AQ1-AQ9	43,332	41,442	15,778	10,862	2,885	175	150	76	55	114,755	705	115,460
AQ10	548	637	182	113	51	15	7	3	5	1,561	19	1,580
	43,880	42,079	15,960	10,975	2,936	190	157	79	60	116,316	724	117,040
Of which: buy-to-let	5,645	8,196	2,290	360	105	27	20	14	6	16,663	15	16,678
Ulster Bank RoI												
AQ1-AQ9	3,079	2,897	1,649	1,411	1,144	1,056	1,205	119	22	12,582	—	12,582
AQ10	252	296	169	179	177	199	340	154	48	1,814	—	1,814
	3,331	3,193	1,818	1,590	1,321	1,255	1,545	273	70	14,396	—	14,396
Private Banking												
AQ1-AQ9	2,594	3,188	820	163	29	7	2	8	13	6,824	233	7,057
AQ10	25	49	12	8	1	5	2	—	—	102	9	111
	2,619	3,237	832	171	30	12	4	8	13	6,926	242	7,168
RBSI												
AQ1-AQ9	1,099	812	378	236	26	29	6	6	15	2,607	—	2,607
AQ10	(2)	11	3	4	4	3	2	—	5	30	—	30
	1,097	823	381	240	30	32	8	6	20	2,637	—	2,637
W&G												
AQ1-AQ9	4,565	3,754	1,280	867	178	6	—	—	—	10,650	10	10,660
AQ10	81	89	17	7	2	—	—	—	—	196	—	196
	4,646	3,843	1,297	874	180	6	—	—	—	10,846	10	10,856
2015**												
UK PBB												
AQ1-AQ9	38,430	38,645	14,372	7,985	2,646	255	174	90	18	102,615	251	102,866
AQ10	483	713	250	152	77	26	12	7	3	1,723	10	1,733
	38,913	39,358	14,622	8,137	2,723	281	186	97	21	104,338	261	104,599
Of which: buy-to-let	4,374	6,879	2,202	431	131	34	30	14	1	14,096	2	14,098
Ulster Bank RoI												
AQ1-AQ9	2,276	2,075	1,222	1,155	1,004	964	1,633	410	49	10,788	—	10,788
AQ10	226	258	153	163	179	178	385	264	119	1,925	—	1,925
	2,502	2,333	1,375	1,318	1,183	1,142	2,018	674	168	12,713	—	12,713
Private Banking												
AQ1-AQ9	2,431	2,846	707	147	30	15	1	12	20	6,209	323	6,532
AQ10	3	1	3	1	9	1	1	—	1	20	—	20
	2,434	2,847	710	148	39	16	2	12	21	6,229	323	6,552
RBSI												
AQ1-AQ9	985	873	339	190	40	27	19	2	14	2,489	—	2,489
AQ10	5	11	2	3	5	1	3	1	5	36	—	36
	990	884	341	193	45	28	22	3	19	2,525	—	2,525
W&G												
AQ1-AQ9	4,113	3,738	1,216	648	174	11	1	—	—	9,901	297	10,198
AQ10	71	100	27	18	8	1	—	—	—	225	7	232
	4,184	3,838	1,243	666	182	12	1	—	—	10,126	304	10,430

Note:
(1) LTV is calculated on a Current Exposure basis, gross of provisions.

**restated - refer to page 209 for further details. 2015 data is unaudited.

Credit risk: management basis continued

Key points

UK PBB*

- The total portfolio increased by 11.9% from 31 December 2015. This was in line with the segment's growth strategy and within risk appetite. The portfolio is closely monitored and risk appetite is regularly reviewed to ensure it is appropriate for market conditions. Underwriting standards were not relaxed during the year.
- Other Personal lending remained stable during the year in the context of an upward trend in unsecured household debt in the wider UK market. Asset quality remained stable with no deterioration in the arrears rate from the prior year.
- Gross new mortgage lending amounted to £29.0 billion (excluding additional lending to existing customers) in 2016 with an average LTV by weighted value of 69% (2015 - 69%). Lending to owner-occupiers during this period was £25.1 billion (2015 - £18.9 billion) and had an average LTV by weighted value of 71% (2015 - 71%). Buy-to-let lending was £3.9 billion (2015 - £3.8 billion) with an average LTV by weighted value of 62% (2015 - 64%).
- Approximately 12% by value of owner-occupied mortgages were on interest-only terms with a bullet repayment and 5% were on a combination of interest-only and capital and interest. The remainder were capital and interest. 65% by value of the buy-to-let mortgages were on interest-only terms and 3% on a combination of interest only and capital and interest.
- Fixed interest rate products of varying time durations accounted for approximately 73% by value of the mortgage portfolio with 2% a combination of fixed and variable rates and the remainder variable rate. The proportion of the portfolio on fixed rate products rose due to the very high proportion of customers taking out fixed rate mortgages in 2016.
- Based on the Halifax House Price Index at September 2016, the portfolio average indexed LTV by volume was 50% (2015 - 49%) and 56% by weighted value of debt outstanding (2015 - 56%). The £2.2 billion of mortgages granted by Ulster Bank North were indexed against the UK house price index published by the Land Registry.
- The arrears rate (three or more repayments past due) fell from 0.8% (by volume) in December 2015 to 0.7% at 31 December 2016. The number of properties repossessed in 2016 was also lower at 519 compared with 727 in 2015.
- The flow of new forbearance was £406 million in 2016 compared with £435 million in 2015. The value of mortgages subject to forbearance decreased by 10.4% compared with 2015 to £1.3 billion (equivalent to 1.1% of the total mortgage book). This was mainly driven by benign market conditions.
- A release of provision on historically-impaired mortgages was the key driver in an overall provision release of £20.5 million for the year (2015 charge of £2.8 million). The value of underlying defaults was slightly lower year-on-year.

The table below summarises UK mortgage exposure by region and LTV.

LTV ratio value 2016	<=50% £m	50% <=70% £m	70% <=80% £m	80% <=90% £m	90% <=100% £m	100% <=110% £m	110% <=130% £m	130% <=150% £m	>150% £m	Total with LTVs £m	WA (1) LTV %	Other £m	Total £m
South East	12,793	11,521	3,371	1,734	320	4	8	1	—	29,752	53%	153	29,905
Greater London	12,624	7,108	1,715	675	228	1	2	1	—	22,354	48%	158	22,512
Scotland	2,931	3,521	1,684	1,316	553	42	4	—	—	10,051	61%	51	10,102
North West	2,713	3,728	1,836	1,682	342	13	4	2	—	10,320	62%	70	10,390
South West	3,535	4,116	1,499	853	97	5	3	5	—	10,113	56%	62	10,175
West Midlands	2,033	2,960	1,334	1,001	289	3	2	2	—	7,624	61%	47	7,671
Rest of the UK (2)	7,251	9,125	4,521	3,714	1,107	122	134	68	60	26,102	62%	183	26,285
Total	43,880	42,079	15,960	10,975	2,936	190	157	79	60	116,316	56%	724	117,040
2015													
South East	10,402	10,668	3,279	1,410	318	8	7	6	—	26,098	54%	45	26,143
Greater London	11,402	6,426	1,252	418	90	1	2	1	—	19,592	47%	68	19,660
Scotland	3,198	3,775	1,497	840	323	34	2	—	—	9,669	58%	25	9,694
North West	2,475	3,548	1,662	1,162	476	47	5	—	—	9,375	61%	31	9,406
South West	2,850	3,549	1,581	851	217	8	6	5	—	9,067	58%	23	9,090
West Midlands	1,728	2,601	1,301	737	324	17	2	3	—	6,713	61%	23	6,736
Rest of the UK (2)	6,858	8,791	4,050	2,719	975	166	162	82	21	23,824	62%	46	23,870
Total	38,913	39,358	14,622	8,137	2,723	281	186	97	21	104,338	56%	261	104,599

Notes:
(1) Weighted average.
(2) Includes Northern Ireland.

*unaudited

Credit risk: management basis continued

The table below shows interest only mortgage portfolios (excluding mixed repayment mortgages) by type and by contractual year of maturity.

2016	2017 (1) £m	2018-19 £m	2020-24 £m	2025-29 £m	2030-34 £m	2035-44 £m	After 2044 £m	Total £m
Bullet principal repayment (2)	452	956	3,528	5,320	6,015	6,096	453	22,820
Conversion to amortising (2,3)	6	—	—	—	—	—	—	6
Total	458	956	3,528	5,320	6,015	6,096	453	22,826

2015**	2016 (4) £m	2017-18 £m	2019-23 £m	2024-28 £m	2029-33 £m	2034-43 £m	After 2043 £m	Total £m
Bullet principal repayment (2)	461	1,028	3,413	5,006	6,362	5,743	348	22,361
Conversion to amortising (2,3)	3	—	—	—	—	—	—	3
Total	464	1,028	3,413	5,006	6,362	5,743	348	22,364

Notes:
(1) 2017 includes pre-2017 maturity exposure.
(2) Includes £0.1 billion (2015 - £0.1 billion) of repayment mortgages that have been granted interest-only concessions (forbearance).
(3) Maturity date relates to the expiry of the interest only period.
(4) 2016 includes pre-2016 maturity exposure.

Key points

Ulster Bank RoI *

- Excluding the impact of exchange rate movements, the portfolio decreased by 2.9% (£433 million) from 31 December 2015 as a result of amortisation and portfolio sales (£588 million). The volume of new business has increased reflecting continuing market demand.
- Tracker-rate products accounted for approximately 64% of the portfolio, while variable rate totalled 21% and fixed rate 15%.
- The decrease in portfolio average indexed LTV reflected positive house price index trends over the last 12 months and the impacts of Central Bank of Ireland requirements for new lending.
- At 31 December 2016, 26% of total mortgage assets (£3.7 billion) were subject to a forbearance arrangement, an increase of 2% (£66 million) from 31 December 2015. Excluding the impact of exchange rate movements of £606 million, the value of mortgage assets subject to a forbearance arrangement decreased by £540 million (13%).
- The number of customers approaching Ulster Bank RoI for the first time in respect of forbearance assistance declined during 2016. The majority (69%) of forbearance arrangements were less than 90 days in arrears.
- A key driver of both reduced forbearance rates and longer average forbearance durations was the introduction of Ulster Bank RoI's sustainability policy in the fourth quarter of 2015. Under that policy customers are only eligible for forbearance as part of a sustainable solution. The use of forbearance is therefore more limited than previously, applying only to those customers who can be returned to a sustainable status through forbearance.
- The AQ10 population reduced to £1.8 billion. This was mainly the result of the disposal of a distressed portfolio. There was a very high provision coverage in relation to this portfolio and, as a result, the disposal also led to a reduction in provision coverage.

The table below shows interest only mortgage portfolios (excluding mixed repayment mortgages) by type and by contractual year of maturity.

2016	2017 (1) £m	2018-19 £m	2020-24 £m	2025-29 £m	2030-34 £m	2035-44 £m	After 2044 £m	Total £m
Bullet principal repayment (2)	9	11	31	47	59	34	6	197
Conversion to amortising (2,3)	110	29	4	3	7	5	2	160
Total	119	40	35	50	66	39	8	357

2015**	2016 (4) £m	2017-18 £m	2019-23 £m	2024-28 £m	2029-33 £m	2034-43 £m	After 2043 £m	Total £m
Bullet principal repayment (2)	6	13	25	41	63	25	5	178
Conversion to amortising (2,3)	118	104	5	3	3	1	1	235
Total	124	117	30	44	66	26	6	413

Notes:
(1) 2017 includes pre-2017 maturity exposure.
(2) Includes £0.2 billion (2015 - £0.3 billion) of repayment mortgages that have been granted interest only concessions (forbearance).
(3) Maturity date relates to the expiry of the interest only period.
(4) 2016 includes pre-2016 maturity exposure.

*unaudited
**restated - refer to page 209 for further details

Credit risk: management basis continued

Key points

Private Banking*

- The majority of the Private Banking personal lending portfolio related to mortgage lending. The net portfolio increase was £616 million (9.4%) from 31 December 2015, in line with the segment's growth strategy and risk appetite.
- Gross new mortgage lending amounted to £3.3 billion in 2016. Lending to owner-occupiers during the period was £2.8 billion (2015 - £2.2 billion) and had an average LTV by weighted value of 55% (2015 - 54%). Buy-to-let lending was £472 million (2015 - £222 million) with an average LTV by weighted value of 54% (2015 - 64%).
- Fixed interest rate products accounted for approximately 41% of the mortgage portfolio, with two-year term products accounting for 58% of all fixed deals.
- Approximately 82% of all mortgages were on interest-only terms; 82% of owner-occupied mortgages were interest-only with 90% of buy-to-let mortgages on interest-only terms.
- Provisions remained minimal during the period.

The table below shows interest only mortgage portfolios (excluding mixed repayment mortgages) by type and by contractual year of maturity.

2016	2017 (1) £m	2018-19 £m	2020-24 £m	2025-29 £m	2030-34 £m	2035-44 £m	After 2044 £m	Total £m
Bullet principal repayment	1,399	1,081	1,452	1,111	453	415	3	5,914

2015**	2016 (2) £m	2017-18 £m	2019-23 £m	2024-28 £m	2029-33 £m	2034-43 £m	After 2043 £m	Total £m
Bullet principal repayment	846	1,585	1,658	859	296	210	2	5,456

Notes:
(1) 2017 includes pre-2017 maturity exposure.
(2) 2016 includes pre-2016 maturity exposure.

Key points

RBS International*

- The total portfolio increased by 4% from £2.6 billion to £2.7 billion from 31 December 2015 in line with the franchise's growth strategy and risk appetite.
- Gross new mortgage lending amounted to £470 million in 2016. Lending to owner-occupiers during this period was £300 million (2015 - £175 million) and had an average LTV by weighted value of 69% (2015 - 64%). Buy-to-let lending was £170 million (2015 - £79 million) with an average LTV by weighted value of 62% (2015 - 57%).
- The number of customers granted forbearance in 2016 decreased by 28%. A total of £37 million of forborne loans were subject to a long-term arrangement (term extensions and covenant breaches) at 31st December 2016 (2015 - £35 million). Short term forbearance comprises payment suspensions and reduced payments.
- The arrears rate increased from 0.75% in December 2015 to 0.78% at the end of December 2016.
- There was a provision impairment charge of £8.5 million for personal mortgages in 2016 (release of £1 million in 2015.

The table below shows interest only mortgage portfolios (excluding mixed repayment mortgages) by type and by contractual year of maturity.

2016	2017 (1) £m	2018-19 £m	2020-24 £m	2025-29 £m	2030-34 £m	2035-44 £m	After 2044 £m	Total £m
Bullet principal repayment	117	98	107	170	128	59	94	773

2015**	2016 (2) £m	2017-18 £m	2019-23 £m	2024-28 £m	2029-33 £m	2034-43 £m	After 2043 £m	Total £m
Bullet principal repayment	77	177	157	183	145	39	1	779

Notes:
(1) 2017 includes pre-2017 maturity exposure.
(2) 2016 includes pre-2016 maturity exposure.

*unaudited
**restated - refer to page 209 for further details

Credit risk: management basis continued

Key points

Williams & Glyn*

- The total portfolio increased by 3.74% from 31 December 2015, driven by gross new mortgage lending amounting to £2.2 billion in 2016 but remained within risk appetite. Lending to owner-occupiers during this period was £1.8 billion (2015 - £1.4 billion) and had an average LTV by weighted value of 70% (2015 - 70%). Buy-to-let lending was £323 million (2015 - £316 million) with an average LTV by weighted value of 62% (2015 - 64%).
- Fixed interest rate products of varying time durations accounted for approximately 65% of the mortgage portfolio with 6% a combination of fixed and variable rates and the remainder variable rate.
- The flow of new forbearance remained low during the year, with exposure totalling £53 million (2015 - £57 million) granted forbearance in 2016. The value of mortgages subject to forbearance remain low, showing a decrease of 12% in 2016 to £0.18 billion (equivalent to 1.6% of the total mortgage portfolio) as a result of improved market conditions.
- There was a reduction of impairment provision balances for personal mortgages in 2016 to £23 million compared with £26 million in 2015. The provision release resulted from revised modelling assumptions reflecting current market conditions.

The table below shows interest only mortgage portfolios (excluding mixed repayment mortgages) by type and by contractual year of maturity.

2016	2017 (1) £m	2018-19 £m	2020-24 £m	2025-29 £m	2030-34 £m	2035-44 £m	After 2044 £m	Total £m
Bullet principal repayment	66	136	451	702	626	486	37	2,504

2015**	2016 (2) £m	2017-18 £m	2019-23 £m	2024-28 £m	2029-33 £m	2034-43 £m	After 2043 £m	Total £m
Bullet principal repayment	58	124	419	621	670	538	34	2,464

Notes:
(1) 2017 includes pre-2017 maturity exposure.
(2) 2016 includes pre-2016 maturity exposure.

*unaudited
**restated - refer to page 209 for further details

Credit risk: management basis continued

Balance sheet to current exposure bridge*

The table below provides a bridge between the balance sheet and the related components of Current Exposure (CE).

2016	Balance sheet £bn	Within the scope of market risk (1) £bn	Disposal groups (2) £bn	Netting and collateral (3) £bn	Methodology differences and reclassifications (4) £bn	Not within the scope of CE (5) £bn	CE £bn
Cash and balances at central banks	74.3	—	—	—	(0.6)	(4.2)	69.5
Reverse repurchase agreements and stock borrowing (6)	41.8	—	—	(39.4)	—	—	2.4
Loans and advances	340.3	(0.2)	—	(24.4)	(8.4)	(1.7)	305.6
Debt securities	72.5	(24.4)	—	—	0.4	—	48.5
Equity shares	0.7	(0.2)	—	—	(0.5)	—	—
Settlement balances	5.5	—	—	—	—	(5.5)	—
Derivatives	247.2	—	—	(226.8)	(1.4)	—	19.0
Other assets (7)	16.8	—	—	—	—	(15.5)	1.3
Total assets	799.1	(24.8)	—	(290.6)	(10.5)	(26.9)	446.3
Contingent obligations							11.3
							457.6
2015							
Cash and balances at central banks	79.4	—	0.5	—	(0.2)	(3.9)	75.8
Reverse repurchase agreements and stock borrowing (6)	39.8	—	—	(37.3)	—	—	2.5
Loans and advances	324.7	(0.3)	2.4	(28.9)	(8.3)	(1.5)	288.1
Debt securities	82.1	(35.7)	0.5	—	0.6	(0.3)	47.2
Equity shares	1.4	(0.7)	—	—	(0.7)	—	—
Settlement balances	4.1	—	—	—	—	(4.1)	—
Derivatives	262.5	—	—	(244.0)	2.2	—	20.7
Other assets (7)	21.4	—	(3.4)	—	(0.1)	(16.5)	1.4
Total assets	815.4	(36.7)	—	(310.2)	(6.5)	(26.3)	435.7
Contingent obligations							15.1
							450.8

Notes:
(1) The exposures in regulatory trading book businesses are subject to market risk and are hence excluded from current exposure.
(2) Amounts reclassified to balance sheet lines.
(3) Primarily includes:
- Reverse repos: reflects netting of collateral and cash legs.
- Loans and advances: cash collateral pledged with counterparties in relation to net derivative liability positions.
- Derivatives: impact of master netting arrangements.
(4) Primarily includes cash management pooling arrangements not allowed under IFRS for Loans and Advances.
- Settlement balances: exposure not included in current exposure measure
(5) Primarily includes cash in ATMs and branches; Other assets (see note below); and Settlement balances (not within the scope of current exposure).
(6) Balance sheet position shows reverse repurchase and stock borrowing position; current exposure position shows net reverse repurchase / stock borrowing and repurchase / stock lending position.
(7) Balance sheet position includes intangible assets, property, plant and equipment, deferred tax, prepayments and accrued income and assets of disposal groups.

*unaudited

Credit risk: balance sheet analysis

Current and Potential Exposures presented in Credit risk: management basis are used by Risk Management for risk management and monitoring. However, they exclude certain exposures, primarily trading securities and take account of legal netting agreements that provide a right of legal set-off but do not meet the offset criteria in IFRS. The tables that follow are therefore provided to supplement the disclosures in the Credit risk: management basis section, to reconcile to the balance sheet. The tables in this section include balances relating to disposal groups, reflecting the total credit risk and losses faced by RBS. All the disclosures in this section are audited.

Financial assets

Exposure summary and credit mitigation

The following table analyses financial asset exposures, both gross and net of offset arrangements, as well as credit mitigation and enhancement.

					Collateral (4)					Exposure post credit mitigation and enhancement
							Real estate and other			
2016	Gross exposure £bn	IFRS offset (1) £bn	Carrying value (2) £bn	Balance sheet offset (3) £bn	Cash (5) £bn	Securities (6) £bn	Residential (7) £bn	Commercial (7) £bn	Credit enhancement (8) £bn	£bn
Cash and balances at central banks	74.3	—	74.3	—	—	—	—	—	—	74.3
Reverse repos	73.5	(31.7)	41.8	(1.1)	—	(40.7)	—	—	—	—
Lending	340.9	(0.6)	340.3	(29.8)	(0.8)	(3.5)	(154.3)	(52.8)	(2.1)	97.0
Debt securities	72.5	—	72.5	—	—	—	—	—	—	72.5
Equity shares	0.7	—	0.7	—	—	—	—	—	—	0.7
Derivatives	298.1	(51.1)	247.0	(197.3)	(28.7)	(8.4)	—	—	(12.6)	—
Settlement balances	7.0	(1.5)	5.5	—	—	—	—	—	—	5.5
Total	867.0	(84.9)	782.1	(228.2)	(29.5)	(52.6)	(154.3)	(52.8)	(14.7)	250.0
Short positions	(22.1)	—	(22.1)	—	—	—	—	—	—	(22.1)
Net of short positions	844.9	(84.9)	760.0	(228.2)	(29.5)	(52.6)	(154.3)	(52.8)	(14.7)	227.9
2015										
Cash and balances at central banks	79.9	—	79.9	—	—	—	—	—	—	79.9
Reverse repos	74.3	(34.4)	39.9	(2.5)	—	(37.3)	—	—	—	0.1
Lending	330.0	(3.0)	327.0	(35.6)	(0.7)	(3.3)	(140.8)	(52.7)	(3.4)	90.5
Debt securities	82.5	—	82.5	—	—	—	—	—	—	82.5
Equity shares	1.4	—	1.4	—	—	—	—	—	—	1.4
Derivatives	386.3	(123.7)	262.6	(214.8)	(27.6)	(7.5)	—	—	(12.7)	—
Settlement balances	5.3	(1.2)	4.1	—	—	—	—	—	—	4.1
Total	959.7	(162.3)	797.4	(252.9)	(28.3)	(48.1)	(140.8)	(52.7)	(16.1)	258.5
Short positions	(20.8)	—	(20.8)	—	—	—	—	—	—	(20.8)
Net of short positions	938.9	(162.3)	776.6	(252.9)	(28.3)	(48.1)	(140.8)	(52.7)	(16.1)	237.7

Notes:

(1) Relates to offset arrangements that comply with IFRS criteria and transactions cleared through and novated to central clearing houses, primarily London Clearing House and US Government Securities Clearing Corporation. During 2016, changes in the legal contracts with LCH led to many derivatives cleared through that counterparty being settled to market each day rather than being collateralised as previously. This led to the derecognition of the associated assets and liabilities.

(2) The carrying value on the balance sheet represents the exposure to credit risk by class of financial instrument.

(3) The amount by which credit risk exposure is reduced through arrangements, such as master netting agreements and cash management pooling, which give RBS a legal right to set off the financial asset against a financial liability due to the same counterparty.

(4) RBS holds collateral in respect of individual loans and advances to banks and customers. This collateral includes mortgages over property (both personal and commercial); charges over business assets such as plant, inventories and trade debtors; and guarantees of lending from parties other than the borrower. RBS obtains collateral in the form of securities in reverse repurchase agreements. Cash and securities are received as collateral in respect of derivative transactions.

(5) Includes cash collateral pledged by counterparties based on daily mark-to-market movements of net derivative positions with the counterparty.

(6) Represent the fair value of securities received from counterparties, mainly relating to reverse repo transactions as part of netting arrangements.

(7) Property valuations are capped at the loan value and reflect the application of haircuts in line with regulatory rules to indexed valuations. Commercial collateral includes ships and plant and equipment collateral.

(8) Comprises credit derivatives (bought protection) and guarantees against exposures.

Key points

- The majority of the £227.9 billion net exposure comprises cash and balances at central banks, unsecured commercial and personal bank lending and sovereign debt securities.
- Net exposure fell by £9.8 billion or 4% reflecting disposals and run-down within Ulster Bank RoI and Capital Resolution and lower held-for-trading bonds partially offset by higher unsecured lending.
- Lending increase of £6.5 billion primarily reflected growth in PBB and CPB.

Credit risk: balance sheet analysis continued

Sector concentration

The following table analyses financial assets by industry sector.

2016	Reverse repos £m	Lending £m	Securities Debt £m	Securities Equity £m	Derivatives £m	Other financial assets £m	Balance sheet value £m	Offset £m	Exposure post offset £m
Central and local government	219	6,091	58,472	—	2,508	63	67,353	(5,188)	62,165
Financial institutions - banks	12,860	17,291	3,437	11	145,565	74,250	253,414	(149,941)	103,473
- other (1)	28,407	33,083	9,738	619	87,965	5,290	165,102	(91,395)	73,707
Personal - mortgages	—	153,319	—	—	—	8	153,327	—	153,327
- unsecured	—	14,492	—	—	39	—	14,531	—	14,531
Property	—	34,756	148	54	1,140	13	36,111	(1,111)	35,000
Construction	—	4,247	—	—	105	35	4,387	(779)	3,608
Manufacturing	43	9,609	198	12	2,007	18	11,887	(1,083)	10,804
Finance leases and instalment credit	—	12,269	—	—	3	—	12,272	(3)	12,269
Retail, wholesale and repairs	—	12,823	7	—	662	2	13,494	(1,610)	11,884
Transport and storage	—	6,428	28	—	1,178	—	7,634	(971)	6,663
Health, education and leisure	—	11,526	17	—	685	11	12,239	(648)	11,591
Hotels and restaurants	—	6,079	6	—	50	—	6,135	(181)	5,954
Utilities	193	3,938	159	—	3,783	15	8,088	(1,603)	6,485
Other	65	18,818	394	88	1,291	71	20,727	(2,324)	18,403
Total gross of provisions	41,787	344,769	72,604	784	246,981	79,776	786,701	(256,837)	529,864
Provisions	—	(4,455)	(82)	(81)	—	—	(4,618)	n/a	(4,618)
Total	41,787	340,314	72,522	703	246,981	79,776	782,083	(256,837)	525,246
2015									
Central and local government	10	6,707	67,720	—	3,307	126	77,870	(6,346)	71,524
Financial institutions - banks	12,352	19,004	2,378	52	169,517	79,939	283,242	(177,804)	105,438
- other (1)	27,314	31,981	11,724	956	78,522	3,777	154,274	(84,992)	69,282
Personal - mortgages	—	137,601	—	—	—	—	137,601	—	137,601
- unsecured	—	16,654	—	—	45	—	16,699	—	16,699
Property	—	35,744	124	99	1,343	—	37,310	(1,084)	36,226
Construction	—	4,421	—	3	266	—	4,690	(932)	3,758
Manufacturing	184	9,861	128	160	1,947	94	12,374	(1,593)	10,781
Finance leases and instalment credit	—	11,443	1	—	10	—	11,454	(2)	11,452
Retail, wholesale and repairs	—	12,096	156	31	570	10	12,863	(1,329)	11,534
Transport and storage	—	8,909	87	2	1,494	—	10,492	(873)	9,619
Health, education and leisure	—	10,960	17	6	641	7	11,631	(690)	10,941
Hotels and restaurants	—	5,372	11	—	81	5	5,469	(232)	5,237
Utilities	—	3,463	53	19	3,284	—	6,819	(1,689)	5,130
Other	50	19,899	311	144	1,517	97	22,018	(2,957)	19,061
Total gross of provisions	39,910	334,115	82,710	1,472	262,544	84,055	804,806	(280,523)	524,283
Provisions	—	(7,139)	(194)	(87)	—	—	(7,420)	n/a	(7,420)
Total	39,910	326,976	82,516	1,385	262,544	84,055	797,386	(280,523)	516,863

Note:
(1) Includes loans made by consolidated conduits to asset owning companies.

For geographic concentrations refer to:

- Lending: Loans and related credit metrics and Credit risk management basis: Portfolio overview - asset quality
- Debt securities: Issuer and IFRS measurement and Credit risk - Country risk and Credit risk management basis: Portfolio overview - geography
- Derivatives: Summary and uncollaterised exposures
- Equity shares.

Credit risk: balance sheet analysis continued

Asset quality

The asset quality analysis presented below is based on internal asset quality ratings which have ranges for the probability of default. Customers are assigned credit grades, based on various credit grading models that reflect the key drivers of default for the customer type. All credit grades across RBS map to both an asset quality scale, used for external financial reporting, and a master grading scale for wholesale exposures used for internal management reporting across portfolios. Debt securities are analysed by external ratings and are therefore excluded from the following table and are set out on pages 254 to 256.

The table that follows details the relationship between internal asset quality (AQ) bands and external ratings published by Standard & Poor's (S&P), for illustrative purposes only. This relationship is established by observing S&P's default study statistics, notably the one year default rates for each S&P rating grade. A degree of judgement is required to relate the probability of default ranges associated with the master grading scale to these default rates given that, for example, the S&P published default rates do not increase uniformly by grade and the historical default rate is nil for the highest rating categories.

Internal asset quality band	Probability of default range	Indicative S&P rating
AQ1	0% - 0.034%	AAA to AA
AQ2	0.034% - 0.048%	AA-
AQ3	0.048% - 0.095%	A+ to A
AQ4	0.095% - 0.381%	BBB+ to BBB-
AQ5	0.381% - 1.076%	BB+ to BB
AQ6	1.076% - 2.153%	BB- to B+
AQ7	2.153% - 6.089%	B+ to B
AQ8	6.089% - 17.222%	B- to CCC+
AQ9	17.222% - 100%	CCC to C
AQ10	100%	D

The mapping to the S&P ratings is used by RBS as one of several benchmarks for its wholesale portfolios, depending on customer type and the purpose of the benchmark. The mapping is based on all issuer types rated by S&P. It should therefore be considered illustrative and does not, for instance, indicate that exposures reported against S&P ratings either have been or would be assigned those ratings if assessed by S&P. In addition, the relationship is not relevant for retail portfolios, smaller corporate exposures or specialist corporate segments given that S&P does not typically assign ratings to such entities.

2016	AQ1 £bn	AQ2 £bn	AQ3 £bn	AQ4 £bn	AQ5 £bn	AQ6 £bn	AQ7 £bn	AQ8 £bn	AQ9 £bn	AQ10 £bn	Past due £bn	Impaired £bn	Impairment provision £bn	Total £bn
Cash and balances at central banks	74.2	—	0.1	—	—	—	—	—	—	—	—	—	—	74.3
Banks														
- Reverse repos	4.7	—	—	6.4	0.6	0.4	0.4	—	0.4	—	—	—	—	12.9
- Derivative cash collateral	0.9	—	1.2	4.4	0.2	—	—	—	—	—	—	—	—	6.7
- Bank loans	6.1	—	2.7	1.2	0.3	0.1	—	—	0.1	—	—	—	—	10.5
- Total	11.7	—	3.9	12.0	1.1	0.5	0.4	—	0.5	—	—	—	—	30.1
Customers														
- Reverse repos	23.2	0.2	0.5	4.4	0.6	—	—	—	—	—	—	—	—	28.9
- Derivative cash collateral	8.1	0.4	1.0	7.3	0.2	—	—	—	—	—	—	—	—	17.0
- Customer loans	25.3	12.3	35.7	107.3	53.7	30.9	20.1	4.5	4.2	1.0	6.6	8.9	(4.5)	306.0
- Total	56.6	12.9	37.2	119.0	54.5	30.9	20.1	4.5	4.2	1.0	6.6	8.9	(4.5)	351.9
Settlement balances and other financial assets	3.8	0.2	0.2	0.9	0.1	—	0.2	—	—	0.1	—	—	—	5.5
Derivatives	38.2	1.4	25.9	168.7	9.4	1.1	2.3	—	—	—	—	—	—	247.0
Undrawn commitments	22.9	7.7	15.2	42.8	26.7	11.4	10.7	0.5	0.1	0.6	—	—	—	138.6
Contingent liabilities	0.7	0.4	1.0	7.1	1.5	0.7	0.4	0.1	—	0.1	—	—	—	12.0
Total	208.1	22.6	83.5	350.5	93.3	44.6	34.1	5.1	4.8	1.8	6.6	8.9	(4.5)	859.4
Total %	24.2%	2.6%	9.7%	40.8%	10.9%	5.2%	4.0%	0.6%	0.6%	0.2%	0.7%	1.0%	(0.5%)	100%

Credit risk: balance sheet analysis continued

2015	AQ1 £bn	AQ2 £bn	AQ3 £bn	AQ4 £bn	AQ5 £bn	AQ6 £bn	AQ7 £bn	AQ8 £bn	AQ9 £bn	AQ10 £bn	Past due £bn	Impaired £bn	Impairment provision £bn	Total £bn
Cash and balances at central banks	77.5	—	2.3	0.1	—	—	—	—	—	—	—	—	—	79.9
Banks														
- Reverse repos	1.6	0.6	3.5	4.8	1.3	0.4	0.2	—	—	—	—	—	—	12.4
- Derivative cash collateral	3.6	4.6	1.4	1.2	0.2	—	—	—	—	—	—	—	—	11.0
- Bank loans	2.5	0.6	3.4	0.7	0.3	0.1	0.1	—	0.2	—	0.1	—	—	8.0
- Total	7.7	5.8	8.3	6.7	1.8	0.5	0.3	—	0.2	—	0.1	—	—	31.4
Customers														
- Reverse repos	20.7	0.4	1.5	3.2	1.7	0.1	—	—	—	—	—	—	—	27.6
- Derivative cash collateral	9.2	1.1	3.6	3.0	0.2	0.1	—	—	—	—	—	—	—	17.2
- Customer loans	23.3	12.1	28.8	106.6	52.0	29.3	20.3	4.2	2.6	1.1	6.7	10.9	(7.1)	290.8
- Total	53.2	13.6	33.9	112.8	53.9	29.5	20.3	4.2	2.6	1.1	6.7	10.9	(7.1)	335.6
Settlement balances and other financial assets	2.3	0.1	0.1	0.6	—	—	—	—	—	—	1.0	—	—	4.1
Derivatives	41.5	65.7	89.1	57.8	6.2	1.1	0.8	—	0.2	0.1	—	—	—	262.5
Undrawn commitments	24.1	6.9	20.1	41.9	27.6	8.8	7.0	0.6	0.2	0.5	—	—	—	137.7
Contingent liabilities	0.9	1.3	1.8	8.3	1.9	0.6	0.9	0.1	0.1	0.1	—	—	—	16.0
Total	207.2	93.4	155.6	228.2	91.4	40.5	29.3	4.9	3.3	1.8	7.8	10.9	(7.1)	867.2
Total %	23.8%	10.8%	17.9%	26.3%	10.5%	4.7%	3.4%	0.6%	0.4%	0.2%	0.9%	1.3%	(0.8%)	100%

Credit risk: balance sheet analysis continued

Loans, REIL and impairment provisions

Risk elements in lending (REIL) comprises impaired loans and accruing loans past due 90 days or more as to principal or interest. Impaired loans are all loans (including loans subject to forbearance) for which an impairment provision has been established; for collectively assessed loans, impairment loss provisions are not allocated to individual loans and the entire portfolio is included in impaired loans. Accruing loans past due 90 days or more comprise loans past due 90 days where no impairment loss is expected.

Loans and related credit metrics

The tables below analyse gross loans and advances (excluding reverse repos) and related credit metrics by reportable segment.

	Gross loans to				Credit metrics				
2016	Banks £m	Customers £m	REIL £m	Provisions £m	REIL as a % of gross loans to customers %	Provisions as a % of REIL %	Provisions as a % of gross loans to customers %	Impairment losses/ (releases) £m	Amounts written-off £m
UK PBB	504	133,399	1,992	1,292	1.5	65	1.0	83	453
Ulster Bank RoI	2,418	20,130	3,513	1,200	17.5	34	6.0	(113)	2,057
Commercial Banking	582	101,824	1,946	845	1.9	43	0.8	206	577
Private Banking	111	12,188	105	31	0.9	30	0.3	(3)	3
RBS International	18	7,902	109	38	1.4	35	0.5	10	6
NatWest Markets	3,313	17,419	—	1	—	nm	—	—	—
Capital Resolution	4,558	13,569	2,264	802	16.7	35	5.9	312	509
W&G	—	20,791	380	245	1.8	64	1.2	42	68
Central items & other	5,787	256	1	1	0.4	100	0.4	—	22
Total	17,291	327,478	10,310	4,455	3.1	43	1.4	537	3,695
2015									
UK PBB	965	121,552	2,682	1,847	2.2	69	1.5	(6)	695
Ulster Bank RoI	1,971	18,584	3,503	1,911	18.8	55	10.3	(142)	168
Commercial Banking	665	92,002	1,911	749	2.1	39	0.8	69	263
Private Banking	54	11,230	115	37	1.0	32	0.3	13	7
RBS International	6	7,401	92	31	1.2	34	0.4	—	32
NatWest Markets	5,696	16,076	—	1	—	—	—	(7)	—
Capital Resolution	7,097	25,898	3,372	2,266	13.0	67	8.7	(794)	7,689
W&G	—	20,291	461	275	2.3	60	1.4	15	110
Central items & other	2,550	2,077	21	22	1.0	105	1.1	(1)	—
Total	19,004	315,111	12,157	7,139	3.9	59	2.3	(853)	8,964

Key points

- Customer loans increased by £12.4 billion (4%) mainly reflecting lending in UK PBB and Commercial Banking offset by disposals and wind downs in Capital Resolution.
- UK PBB: mortgage growth of £13.8 billion was the principal driver of the £11.4 billion gross lending increase in 2016.
- Commercial Banking: lending growth of £9.7 billion was across a variety of sectors supporting businesses in the UK and Western Europe.
- Ulster Bank RoI: customer lending increased by £1.5 billion reflecting new lending, invoice finance and foreign exchange movements, partially offset by portfolio sales and repayments.
- Private Banking: lending growth of £1.0 billion primarily mortgage lending.
- Capital Resolution: lending fell by £14.9 billion including wind downs and disposals of Markets (£5.2 billion), GTS (£2.4 billion) and Shipping (£1.8 billion).
- REIL and loan impairment provisions declined by £1.8 billion and £2.7 billion to £10.3 billion and £4.5 billion respectively. These reductions were predominantly driven by the portfolio sale of non-performing SME lending and buy-to-let mortgages in Ulster Bank RoI in Q4 2016 and related write-offs. These decreases were offset by the adverse impact of exchange rate movements of £1.0 billion in REIL and £0.5 billion in loan impairment provisions respectively.
- Net impairment charge of £537 million largely related to the Shipping portfolio within Capital Resolution.
- Amounts written off were significantly lower at £3.7 billion compared with £9.0 billion in 2015, primarily in commercial real estate (£1.5 billion in 2016 compared with £6.2 billion in 2015).

Credit risk: management basis continued

Impairment charge and provisions

The tables below analyse the categories of loan impairment losses/(releases) and provisions by reportable segment.

	Impairment losses/(releases)				Impairment provision			
2016	Individual £m	Collective £m	Latent £m	Total £m	Individual £m	Collective £m	Latent £m	Total £m
UK PBB	—	83	—	83	—	1,116	176	1,292
Ulster Bank RoI	(8)	99	(204)	(113)	69	1,053	78	1,200
Commercial Banking	196	3	7	206	479	278	88	845
Private Banking	2	—	(5)	(3)	27	—	4	31
RBS International	9	—	1	10	32	—	6	38
NatWest Markets	—	—	—	—	—	—	1	1
Capital Resolution	331	(2)	(17)	312	761	23	18	802
W&G	5	35	2	42	26	190	29	245
Central items & other	—	—	—	—	1	—	—	1
Total	535	218	(216)	537	1,395	2,660	400	4,455
2015								
UK PBB	—	73	(79)	(6)	1	1,665	181	1,847
Ulster Bank RoI	8	(126)	(24)	(142)	46	1,620	245	1,911
Commercial Banking	58	33	(22)	69	373	299	77	749
Private Banking	8	—	5	13	28	—	9	37
RBS International	1	—	(1)	—	27	—	4	31
NatWest Markets	—	—	(7)	(7)	—	—	1	1
Capital Resolution	(505)	(22)	(267)	(794)	2,173	52	41	2,266
W&G	20	8	(13)	15	24	225	26	275
Central items & other	—	(1)	—	(1)	22	—	—	22
Total	(410)	(35)	(408)	(853)	2,694	3,861	584	7,139

Credit risk: balance sheet analysis continued

Sector and geographical concentration

The tables below analyse gross loans and advances to banks and customers (excluding reverse repos) and related credit metrics by sector and geography based on the location of lending office. Ulster Bank RoI contributes a significant proportion of the European loan exposure. Refer to Business review on page 136.

				Credit metrics				
2016	Gross loans £m	REIL £m	Provisions £m	REIL as a % of gross loans %	Provisions as a % of REIL %	Provisions as a % of gross loans %	Impairment losses/ (releases) £m	Amounts written-off £m
Central and local government	6,091	1	1	—	100	—	1	2
Finance	33,083	61	51	0.2	84	0.2	(2)	17
Personal - mortgages (1)	153,319	4,091	1,019	2.7	25	0.7	222	290
- unsecured	14,492	1,113	900	7.7	81	6.2	138	396
Property	34,756	1,370	489	3.9	36	1.4	(162)	1,485
Construction	4,247	264	137	6.2	52	3.2	8	153
of which: commercial real estate	*26,265*	*1,407*	*511*	*5.4*	*36*	*1.9*	*(184)*	*1,483*
Manufacturing	9,609	173	90	1.8	52	0.9	13	90
Finance leases and instalment credit	12,269	139	79	1.1	57	0.6	8	12
Retail, wholesale and repairs	12,823	283	182	2.2	64	1.4	39	169
Transport and storage	6,428	1,388	422	21.6	30	6.6	419	301
Health, education and leisure	11,526	381	129	3.3	34	1.1	8	75
Hotels and restaurants	6,079	211	107	3.5	51	1.8	13	116
Utilities	3,938	95	50	2.4	53	1.3	(20)	2
Other	18,818	740	399	3.9	54	2.1	68	587
Latent	—	—	400	—	—	—	(216)	—
Total	327,478	10,310	4,455	3.1	43	1.4	537	3,695
Of which:								
UK								
Personal - mortgages	137,427	943	143	0.7	15	0.1	(4)	3
- unsecured	14,198	1,060	853	7.5	80	6.0	132	362
Property and construction	37,942	1,543	537	4.1	35	1.4	(98)	676
of which: commercial real estate	*25,311*	*1,323*	*426*	*5.2*	*32*	*1.7*	*(102)*	*600*
Other	115,833	3,133	1,299	2.7	41	1.1	666	629
Latent	—	—	318	—	—	—	(12)	—
Total	305,400	6,679	3,150	2.2	47	1.0	684	1,670
Europe								
Personal - mortgages	15,548	3,144	872	20.2	28	5.6	226	287
- unsecured	265	52	46	19.6	88	17.4	5	11
Property and construction	1,055	85	84	8.1	99	8.0	(56)	933
of which: commercial real estate	*947*	*78*	*78*	*8.2*	100	*8.2*	*(83)*	*878*
Other	3,920	279	165	7.1	59	4.2	(156)	665
Latent	—	—	83	—	—	—	(204)	—
Total	20,788	3,560	1,250	17.1	35	6.0	(185)	1,896
Total banks	17,291	—	—	—	—	—	—	—

Note:
(1) Mortgages are reported in sectors other than personal mortgages by certain businesses based on the nature of the relationship with the customer.

Credit risk: balance sheet analysis continued

				Credit metrics				
2015	Gross loans £m	REIL £m	Provisions £m	REIL as a % of gross loans %	Provisions as a % of REIL %	Provisions as a % of gross loans %	Impairment losses/ (release) £m	Amounts written-off £m
Central and local government	6,707	1	1	—	100	—	—	—
Finance	31,981	87	61	0.3	70	0.2	(10)	165
Personal - mortgages (1)	137,601	3,637	1,006	2.6	28	0.7	(82)	171
- unsecured	16,654	1,331	1,151	8.0	86	6.9	122	513
Property	35,744	3,505	2,012	9.8	57	5.6	(557)	5,999
Construction	4,421	357	269	8.1	75	6.1	(14)	313
of which: commercial real estate	*27,630*	*3,560*	*2,054*	*12.9*	*58*	*7.4*	*(811)*	*6,151*
Manufacturing	9,861	263	154	2.7	59	1.6	—	154
Finance leases and instalment credit	11,443	107	79	0.9	74	0.7	(8)	37
Retail, wholesale and repairs	12,096	434	299	3.6	69	2.5	7	325
Transport and storage	8,909	563	258	6.3	46	2.9	115	370
Health, education and leisure	10,960	394	190	3.6	48	1.7	14	171
Hotels and restaurants	5,372	336	201	6.3	60	3.7	1	346
Utilities	3,463	131	63	3.8	48	1.8	8	27
Other	19,899	1,010	810	5.1	80	4.1	(37)	340
Latent	—	—	584	—	—	—	(408)	—
Total customers	315,111	12,156	7,138	3.9	59	2.3	(849)	8,931
Of which:								
UK								
Personal - mortgages	123,653	1,083	158	0.9	15	0.1	17	36
- unsecured	14,348	1,262	1,085	8.8	86	7.6	126	501
Property and construction	38,006	2,814	1,282	7.4	46	3.4	27	2,773
of which: commercial real estate	*25,676*	*2,568*	*1,107*	*10.0*	*43*	*4.3*	*(121)*	*2,575*
Other	110,193	2,198	1,182	2.0	54	1.1	125	800
Latent	—	—	330	—	—	—	(303)	—
Total	286,200	7,357	4,037	2.6	55	1.4	(8)	4,110
Europe								
Personal - mortgages	13,908	2,550	844	18.3	33	6.1	(101)	135
- unsecured	775	49	45	6.3	92	5.8	(5)	12
Property and construction	1,993	1,008	966	50.6	96	48.5	(593)	3,539
of which: commercial real estate	*1,628*	*974*	*935*	*59.8*	*96*	*57.4*	*(688)*	*3,576*
Other	7,148	1,011	864	14.1	85	12.1	(8)	1,014
Latent	—	—	255	—	—	—	(103)	—
Total	23,824	4,618	2,974	19.4	64	12.5	(810)	4,700
Total banks	19,004	1	1	—	100	—	(4)	33

Note:
(1) Mortgages are reported in sectors other than personal mortgages by certain businesses based on the nature of the relationship with the customer.

Credit risk: balance sheet analysis continued

Risk elements in lending

The tables below analyse REIL by segment.

	2016									2015
	UK PBB £m	Ulster Bank RoI £m	Commercial Banking £m	Private Banking £m	RBS International £m	Capital Resolution £m	W&G £m	Central items & other £m	Total £m	Total £m
At 1 January	2,682	3,503	1,911	115	92	3,372	461	21	12,157	28,219
Inter segment transfers	(187)	1,404	496	—	—	(1,685)	(28)	—	—	—
Currency translation and other adjustments	—	557	—	—	9	445	—	2	1,013	(860)
Additions	877	1,326	1,149	25	51	1,685	193	—	5,306	4,250
Transfers between REIL and potential problem loans	(155)	—	9	(6)	6	—	(20)	—	(166)	(222)
Transfer to performing book	(290)	(454)	(158)	—	(14)	(5)	(39)	—	(960)	(1,120)
Repayments and disposals	(482)	(766)	(884)	(26)	(29)	(1,039)	(119)	—	(3,345)	(8,966)
Amounts written-off	(453)	(2,057)	(577)	(3)	(6)	(509)	(68)	(22)	(3,695)	(9,144)
At 31 December	1,992	3,513	1,946	105	109	2,264	380	1	10,310	12,157

The table below analyses REIL between UK and overseas, based on the location of the lending office.

	2016		2015	
	Impaired loans £m	Accruing past due £m	Impaired loans £m	Accruing past due £m
- UK	5,557	1,122	6,095	1,262
- overseas	3,308	323	4,775	25
Total	8,865	1,445	10,870	1,287

Notes:
(1) REIL are stated without giving effect to any security held that could reduce the eventual loss should it occur or to any provisions marked.
(2) For details on impairment methodology refer to Credit risk on page 212 and Accounting policy 15 Impairment of financial assets on page 302.

Credit risk: balance sheet analysis continued

Provisions

The tables below analyse provisions by segment.

	2016										2015
	UK PBB	Ulster Bank RoI	Commercial Banking	Private Banking	RBS International	NatWest Markets	Capital Resolution	W&G	Central items & other	Total	Total
	£m	£m	£m	£m	£m	£m	£m	£m	£m	£m	£m
At 1 January	1,847	1,911	749	37	31	1	2,266	275	22	7,139	18,040
Inter segment transfers	(173)	1,257	443	—	—	—	(1,527)	—	—	—	—
Currency translation and other adjustments	—	215	8	—	3	—	253	—	1	480	(562)
Repayments and disposals	—	—	—	—	—	—	—	—	—	—	(554)
Amounts written-off	(453)	(2,057)	(577)	(3)	(6)	—	(511)	(68)	(22)	(3,697)	(9,144)
Recoveries of amounts previously written-off	28	24	28	1	—	—	27	1	—	109	253
Charges/(releases) to income statement from continuing operations	83	(113)	206	(3)	10	—	312	42	—	537	(853)
Charges/(releases) to income statement from discontinued operations	—	—	—	—	—	—	—	—	—	—	103
Unwind of discount	(40)	(37)	(12)	(1)	—	—	(18)	(5)	—	(113)	(144)
At 31 December	1,292	1,200	845	31	38	1	802	245	1	4,455	7,139

Past due analysis

The table below shows loans and advances to customers that were past due at the balance sheet date but are not considered impaired.

	2016 £m	2015 £m
Past due 1-29 days	3,852	4,150
Past due 30-59 days	753	769
Past due 60-89 days	512	530
Past due 90 days or more	1,445	1,287
Total	6,562	6,736
Past due analysis by sector		
Personal	3,577	3,437
Property and construction	1,020	1,341
Financial institution	94	187
Other corporate	1,871	1,771
Total	6,562	6,736

*unaudited

Credit risk: balance sheet analysis continued

Securities and available-for-sale reserves

Debt securities

The table below analyses debt securities by issuer and IFRS measurement classifications. The other financial institutions category includes US government sponsored agencies and securitisation entities, the latter principally relating to asset-backed securities (ABS). Ratings are based on the lowest of Standard & Poor's, Moody's and Fitch.

	Central and local government				Other financial			Of which
2016	UK £m	US £m	Other £m	Banks £m	institutions £m	Corporate £m	Total £m	ABS £m
Held-for-trading (HFT)	2,615	4,133	14,087	821	2,299	549	24,504	886
Designated as at fair value (DFV)	—	—	25	—	2	—	27	—
Available-for-sale (AFS)	10,581	6,953	15,678	1,852	4,072	118	39,254	2,263
Loans and receivables (LAR)	—	—	—	—	3,774	194	3,968	3,814
Held-to-maturity (HTM)	4,769	—	—	—	—	—	4,769	—
Total	17,965	11,086	29,790	2,673	10,147	861	72,522	6,963
Of which US agencies	—	—	—	—	386	—	386	—
Short positions (HFT)	(2,644)	(4,989)	(13,346)	(334)	(640)	(121)	(22,074)	—
Ratings								
AAA	—	—	11,478	1,610	6,024	36	19,148	3,993
AA to AA+	17,965	11,086	5,533	481	720	34	35,819	244
A to AA-	—	—	9,727	238	2,128	150	12,243	1,627
BBB- to A-	—	—	2,737	155	698	378	3,968	645
Non-investment grade	—	—	315	69	458	31	873	381
Unrated	—	—	—	120	119	232	471	73
Total	17,965	11,086	29,790	2,673	10,147	861	72,522	6,963
Available-for-sale								
AFS reserves (gross of tax)	79	(66)	190	5	144	(6)	346	46
Gross unrealised gains	768	56	504	8	93	2	1,431	75
Gross unrealised losses	(16)	(123)	(13)	(1)	(43)	(2)	(198)	(32)
Of which:								
less than 12 months	(16)	(123)	(13)	(1)	(11)	(2)	(166)	(1)
more than 12 months	—	—	—	—	(32)	—	(32)	(31)

Credit risk: balance sheet analysis continued

2015	Central and local government UK £m	US £m	Other £m	Banks £m	Other financial institutions £m	Corporate £m	Total £m	Of which ABS £m
Held-for-trading (HFT)	4,107	4,627	22,222	576	3,689	636	35,857	707
Designated as at fair value (DFV)	—	—	111	—	—	—	111	—
Available-for-sale (AFS)	9,124	10,359	12,259	1,801	5,599	108	39,250	2,501
Loans and receivables (LAR)	—	—	—	1	2,242	144	2,387	2,222
Held-to-maturity (HTM)	4,911	—	—	—	—	—	4,911	—
Total	18,142	14,986	34,592	2,378	11,530	888	82,516	5,430
Of which US agencies	—	—	—	—	806	—	806	—
Short positions (HFT)	(4,697)	(3,347)	(11,796)	(391)	(411)	(165)	(20,807)	—
Ratings								
AAA	—	—	11,696	1,696	5,234	3	18,629	3,366
AA to AA+	18,142	14,986	6,879	119	1,611	66	41,803	261
A to AA-	—	—	8,880	420	1,991	147	11,438	445
BBB- to A-	—	—	6,785	79	1,460	301	8,625	363
Non-investment grade	—	—	352	32	526	200	1,110	446
Unrated	—	—	—	32	708	171	911	549
Total	18,142	14,986	34,592	2,378	11,530	888	82,516	5,430
Available-for-sale								
AFS reserves (gross of tax)	12	(78)	90	4	114	4	146	60
Gross unrealised gains	383	104	270	6	110	7	880	90
Gross unrealised losses	(7)	(62)	(9)	(1)	(58)	(3)	(140)	(42)
Of which:								
less than 12 months	(7)	(58)	(9)	(1)	(30)	(3)	(108)	(14)
more than 12 months	—	(4)	—	—	(28)	—	(32)	(28)

Credit risk: balance sheet analysis continued

Asset-backed securities

The table below summarises the ratings of asset-backed securities on the balance sheet.

	RMBS (1)							
2016	Government sponsored or similar (2) £m	Prime £m	Non-conforming £m	Sub-prime £m	CMBS (1) £m	CDOs & CLOs £m	Other ABS £m	Total £m
AAA	—	654	—	—	—	23	3,316	3,993
AA to AA+	—	52	155	—	—	3	34	244
A to AA-	—	460	2	—	22	33	1,110	1,627
BBB- to A-	—	84	—	—	470	21	70	645
Non-investment grade (3)	—	182	1	8	15	121	54	381
Unrated (4)	—	5	—	—	—	19	49	73
Total	—	1,437	158	8	507	220	4,633	6,963
2015								
AAA	—	266	749	2	—	78	2,271	3,366
AA to AA+	—	2	150	—	1	12	96	261
A to AA-	109	4	24	5	13	9	281	445
BBB- to A-	—	13	144	20	21	121	44	363
Non-investment grade (3)	—	23	25	143	24	169	62	446
Unrated (4)	—	10	—	1	470	24	44	549
Total	109	318	1,092	171	529	413	2,798	5,430

Notes:

(1) Residential mortgage-backed securities (RMBS) and commercial mortgaged-backed securities (CMBS) are securities that represent an interest in a portfolio of residential and commercial mortgages respectively. Repayments made on the underlying mortgages are used to make payments to holders of the mortgage-backed securities (MBS). The risk of the MBS will vary primarily depending on the quality and geographic region in which the underlying mortgage assets are located and the credit enhancement of the securitisation structure. Several tranches of notes are issued, each secured against the same portfolio of mortgages, but providing differing levels of seniority to match the risk appetite of investors. The most junior (or equity) notes will suffer early capital and interest losses experienced by the referenced mortgage collateral, with each more senior note benefiting from the protection provided by the subordinated notes below. Additional credit enhancements may be provided to the holder of senior MBS notes.
The main categories of mortgages that serve as collateral to RMBS held by RBS are set out below and described in the Glossary on page 475. The US market has more established definitions of differing underlying mortgage quality and these are used as the basis for RBS's RMBS categorisation.

(2) Includes US agency and Dutch government guaranteed securities.

(3) Comprises HFT £282 million (2015 - £303 million), AFS £99 million (2015 - £106 million) and LAR nil (2015 - £37 million).

(4) Comprises HFT £25 million (2015 - £46 million), AFS nil (2015 - £28 million) and LAR £48 million (2015 - £475 million).

Credit risk: balance sheet analysis continued

Equity shares

The table below analyses holdings of equity shares for eurozone countries and other countries with balances of more than £50 million by country, issuer and measurement classification. The HFT positions are used mainly for economic hedging of debt issuances and equity derivatives. The AFS balances are individually small holdings in unlisted companies, mainly acquired through debt for equity transactions in Restructuring.

	2016									
	HFT				AFS/DFV (1)					
Countries	Banks £m	Other financial institutions (2) £m	Corporate £m	Total HFT £m	Banks £m	Other financial institutions (2) £m	Corporate £m	Total AFS/DFV £m	Total £m	AFS reserves £m
Luxembourg	—	91	—	91	—	—	—	—	91	—
Belgium	—	—	—	—	—	80	—	80	80	6
Netherlands	—	—	—	—	—	—	61	61	61	2
Other	—	8	11	19	—	5	3	8	27	—
Total eurozone	—	99	11	110	—	85	64	149	259	8
UK	10	32	11	53	—	284	9	293	346	(37)
US	—	1	—	1	—	53	2	55	56	12
Other	—	—	2	2	—	38	2	40	42	36
Total	10	132	24	166	—	460	77	537	703	19
2015										
Total	47	283	330	660	5	640	80	725	1,385	302

Notes:
(1) Designated as at fair value through profit or loss balances are £171 million (2015 - £147 million), of which £142 million are other financial institutions (2015 - £111 million) and £29 million are corporate (2015 - £36 million).
(2) Includes government sponsored entities.
(3) HFT short positions of £3 million (2015 - £2 million) did not relate to non-periphery eurozone countries.

Credit risk: balance sheet analysis continued

Derivatives

Summary and net uncollateralised exposures

The table below analyses derivatives by type of contract. The master netting agreements and collateral shown below do not result in a net presentation on the balance sheet under IFRS.

	2016							2015		
	Notional									
	GBP £bn	USD £bn	Euro £bn	Other £bn	Total £bn	Assets £m	Liabilities £m	Notional £bn	Assets £m	Liabilities £m
Interest rate	3,106	7,179	6,385	1,303	17,973	170,524	158,485	19,783	206,138	194,854
Exchange rate	418	1,969	856	1,208	4,451	75,442	77,148	3,702	54,938	58,243
Credit	—	22	20	—	42	682	557	67	909	840
Equity and commodity	4	7	12	2	25	333	285	18	559	796
Balance sheet	3,528	9,177	7,273	2,513	22,491	246,981	236,475	23,570	262,544	254,733
Counterparty mark-to-market netting						(197,288)	(197,288)		(214,800)	(214,800)
Cash collateral						(28,742)	(20,417)		(27,629)	(25,729)
Securities collateral						(8,435)	(11,048)		(7,535)	(8,213)
Net exposure						12,516	7,722		12,580	5,991
Banks (1)						830	1,061		1,011	1,311
Other financial institutions (2)						2,646	1,428		2,864	1,468
Corporate (3)						8,196	5,065		7,816	3,108
Government (4)						844	168		889	104
Net exposure						12,516	7,722		12,580	5,991
UK						7,329	2,300		6,270	1,199
Europe						3,300	2,485		4,069	2,408
US						757	1,738		639	714
RoW						1,130	1,199		1,602	1,670
Net exposure						12,516	7,722		12,580	5,991

Asset quality of uncollateralised derivative assets	2016 £m	2015 £m
AQ1	1,415	2,335
AQ2	582	829
AQ3	2,870	3,421
AQ4	4,908	3,923
AQ5	1,028	1,260
AQ6	449	275
AQ7	1,222	226
AQ8	25	39
AQ9	4	177
AQ10	13	95
Net exposure	12,516	12,580

Notes:
(1) Transactions with certain counterparties with whom RBS has netting arrangements but collateral is not posted on a daily basis; certain transactions with specific terms that may not fall within netting and collateral arrangements; derivative positions in certain jurisdictions for example China where the collateral agreements are not deemed to be legally enforceable.
(2) Transactions with securitisation vehicles and funds where collateral posting is contingent on RBS's external rating.
(3) Predominantly large corporate with whom RBS may have netting arrangements in place, but operational capability does not support collateral posting.
(4) Sovereigns and supranational entities with one way collateral agreements in their favour.
(5) The notional amount of interest rate derivatives include £9,724 billion (2015 - £11,555 billion) in respect of contracts cleared through central clearing counterparties. The associated derivatives assets and liabilities including variation margin reflect IFRS offset of £51 billion (2015 - £124 billion) and £51 billion (2015 - £118 billion) respectively.

Key point

- At Group level, derivative assets and liabilities reduced reflecting lower trading volumes of £34 billion, TriOptima tear-ups of £9 billion, partially offset by the impact of foreign exchange movements. Increases in trading activity in NatWest Markets of £15 billion was more than offset by disposals and run-off in Capital Resolution.

Credit risk: balance sheet analysis continued

Valuation reserves

When valuing financial instruments in the trading book, adjustments are made to mid-market valuations to cover bid-offer spread, liquidity and credit risk. The following table shows credit valuation adjustments (CVA) and other valuation reserves. CVA represents an estimate of the adjustment to fair value that a market participant would make to incorporate the risk inherent in derivative exposures. For details of CVA methodology, refer to Note 9 on the consolidated accounts: Financial instruments - valuation.

	2016 £m	2015 £m
Funding valuation adjustments (FVA)	936	752
Credit valuation adjustments (CVA)	618	774
Bid-offer reserves	334	304
Product and deal specific	643	660
Valuation reserves	2,531	2,490

The table below analyses CVA relating to counterparties by rating and sector.

	2016 £m	2015 £m
Ratings		
AAA	4	37
AA to AA+	22	66
A to AA-	52	49
BBB- to A-	388	293
Non-investment grade and unrated	152	329
	618	774
Counterparty		
Banks	22	18
Other financial institutions	70	126
Corporate	337	470
Government	189	160
	618	774

Key points

- FVA reserves increased by £184 million during 2016, primarily driven by interest rates tightening with the movements in the first half of the year partially reversing in the second half of 2016.
- The decrease in CVA reserves of £156 million, was driven by credit spreads tightening together with trade close-outs and novations.
- The increase in bid-offer reserves of £30 million mainly reflected sterling weakening against all major currencies.

Derivatives: settlement basis and central counterparties

The table below analyses the derivative notional and fair value by trading and settlement method.

	Notional				Asset		Liability	
		Traded over the counter						
2016	Traded on recognised exchanges £bn	Settled by central counterparties £bn	Not settled by central counterparties £bn	Total £bn	Traded on recognised exchanges £m	Traded over the counter £m	Traded on recognised exchanges £m	Traded over the counter £m
Interest rate	2,849	9,724	5,400	17,973	—	170,524	—	158,485
Exchange rate	8	—	4,443	4,451	—	75,442	—	77,148
Credit	—	—	42	42	—	682	—	557
Equity and commodity	5	—	20	25	—	333	4	281
Total	2,862	9,724	9,905	22,491	—	246,981	4	236,471
2015								
Interest rate	2,761	11,585	5,437	19,783	—	206,138	2	194,852
Exchange rate	23	—	3,679	3,702	—	54,938	—	58,243
Credit	—	—	67	67	—	909	—	840
Equity and commodity	1	—	17	18	1	558	44	752
Total	2,785	11,585	9,200	23,570	1	262,543	46	254,687

Market risk

Definition

Market risk is the risk of losses arising from fluctuations in interest rates, credit spreads, foreign currency rates, equity prices, commodity prices and other factors, such as market-implied volatilities, that may lead to a reduction in earnings, economic value or both.

RBS is exposed to traded market risk through its trading activities and to non-traded market risk as a result of its banking activities. It manages its traded and non-traded market risk exposures separately, largely in line with the regulatory definitions of the trading and non-trading books.

The following disclosures in this section are audited:

- Traded market risk - Internal VaR
- Non-traded market risk:
  - Internal banking book VaR; and
  - Foreign exchange risk

Key developments in 2016*

Traded market risk:

- The year was characterised by higher market volatility. This was particularly notable during Q1 2016 - due to market concerns over the stability of the financial sector - and around key events, such as the UK referendum on EU membership in June and the US presidential election in November.
- NatWest Markets significantly reduced its traded market risk exposure in the run-up to these key events, reflecting market uncertainty. Value-at-Risk (VaR) fell as low as £11 million on 22 June, the day before the EU referendum, from £16 million at the start of that month. The focus of the risk reduction was in the Rates business.
- Market flows increased markedly following these events, supporting NatWest Markets' customer activity. Given the significant risk reduction achieved in recent years, notably in Capital Resolution, by year-end 2016 the Group's VaR profile was more reflective of NatWest Markets' areas of activity in line with its strategic focus.
- Total market risk RWAs fell 18% or £3.8 billion to £17.4 billion, driven by reductions under both the standardised approach and the internal model approach.
- The majority of the VaR back-testing exceptions by legal entity during the year were driven by the increased market volatility.

Non-traded market risk:

- The non-traded market risk appetite statement and metrics were revised in early 2016. The risk appetite metrics were enhanced to capture a combination of earnings-based and economic value-based metrics, as prescribed by regulatory guidelines. The appetite framework was also aligned to RBS's capital framework and directly supports the strategic risk objectives of maintaining capital adequacy and delivering stable earnings growth.
- Hedging activity aims to reduce RBS's sensitivity to potential adverse impacts of exchange rate and interest rate movements, in particular on its Common Equity Tier 1 ratio. Ahead of the EU referendum, the residual sensitivity of this ratio was low and no adverse impact from RBS's economic risk exposure resulted from the outcome of the vote. However, the sensitivity of interest income to a further downward shock in interest rates increased after the referendum as interest rates fell sharply, with the UK base rate cut from 0.5% to 0.25%. This reflected the limited ability of banks, including RBS, to pass on further rate cuts to customers that already receive low nominal returns on deposits. For more commentary on earnings sensitivity, refer to page 268.

Sources of risk*

Traded market risk

The majority of traded market risk exposure arises in NatWest Markets and Capital Resolution.

The primary objective of RBS's trading activities is to provide a range of financing, risk management and investment services to its customers - including major corporations and financial institutions around the world. From a market risk perspective, the trading activities are focused on the following markets: currencies; rates; securitised products; and traded credit.

RBS undertakes transactions in financial instruments including debt securities, loans, deposits and equities, as well as securities financing and derivatives.

Some of these transactions involve trading or clearing financial instruments on an exchange, including interest rate swaps, futures and options. Holders of these instruments provide margin on a daily basis with cash or other security at the exchange.

Other products are not transacted on an exchange. Of these over-the-counter transactions, those with standard terms may be cleared through central counterparties, while those that are more complex are settled directly with the counterparty and may give rise to counterparty credit risk. For more information on the management of counterparty credit risk, refer to the Credit risk section on page 211.

Non-traded market risk

The majority of RBS's non-traded market risk exposure arises from retail and commercial banking activities in all franchises from assets and liabilities that are not classified as held for trading.

Non-traded market risk is largely managed in line with the following key categories: interest rate risk; credit spread risk; foreign exchange risk; equity risk; and accounting volatility risk.

*unaudited

Market risk continued

Interest rate risk

Non-traded interest rate risk (NTIRR) arises from the provision to customers of a range of banking products that have differing interest rate characteristics. When aggregated, these products form portfolios of assets and liabilities with varying degrees of sensitivity to changes in market interest rates. Mismatches in these characteristics can give rise to volatility in net interest income as interest rates vary.

NTIRR comprises three primary risk factors: gap risk, basis risk and option risk. For more information, refer to page 268.

Credit spread risk

Credit spread risk arises from the potential adverse economic impact of a move in the spread between bond yields and swap rates, where the bond portfolios are accounted at fair value in the non-trading book.

Foreign exchange risk

Non-traded foreign exchange risk exposures arise from two main sources:

- *Structural foreign exchange risk* - arising from the capital deployed in foreign subsidiaries, branches and joint arrangements and related currency funding where it differs from sterling.
- *Non-trading book foreign exchange risk* - arising from customer transactions and profits and losses that are in a currency other than the functional currency of the transacting operation.

Equity risk

Non-traded equity risk is the potential variation in income and reserves arising from changes in the values of non-trading book equity positions. Equity exposures may arise through strategic acquisitions, venture capital investments and certain restructuring arrangements.

Accounting volatility risk

Accounting volatility risk arises when a non-trading book exposure is accounted for at amortised cost but economically hedged by a derivative that is accounted for at fair value. Although this is not an economic risk, the difference in accounting between the exposure and the hedge creates volatility in the income statement.

Pension risk

Pension-related activities also give rise to market risk. Refer to page 205 for more information on risk related to pensions.

*unaudited

Market risk continued

Risk governance*

RBS manages the key categories of traded and non-traded market risk separately. Each category is discussed in dedicated sections below.

Responsibility for identifying, measuring, monitoring and controlling the market risk arising from trading or non-trading activities lies with the relevant trading or non-trading business, with second-line-of-defence oversight provided by the Market Risk function, headed by the Director of Market Risk.

Market risk positions are reported monthly to the Executive Risk Forum (ERF) and quarterly to the Board Risk Committee. In addition, traded market risk positions are reported monthly to the Treasury and Market Risk Committee and non-traded market risk positions are reported to the ALCo (monthly in the case of interest rate, credit spread and accounting volatility risks and quarterly in the case of foreign exchange and equity risks).

The ERF approves market risk frameworks. Market risk policy statements set out the governance and risk management framework through effective identification, measurement, reporting, mitigation, monitoring and control.

RBS's policy is to manage risk exposures within an appetite that is set by the ERF and, in the case of non-traded market risk, endorsed by the ALCo. This appetite is expressed in the form of exposure limits.

Risk appetite*

RBS's qualitative market risk appetite is set out in policy statements.

Its quantitative market risk appetite is expressed in terms of limits for the trading and non-trading activities that are consistent with business plans.

The Market Risk Committee cascades the limits further down the organisation as required. For each trading business, a document known as a dealing authority compiles details of all applicable limits and trading restrictions.

The limit framework at RBS level comprises VaR, stressed value-at-risk (SVaR) and sensitivity and stress limits (for more details on VaR and SVaR, refer to pages 263 to 266). The limit framework at trading unit level also comprises additional metrics that are specific to the market risk exposures within its scope. These additional metrics aim to control various risk dimensions such as product type, exposure size, aged inventory, currency and tenor.

The limits are reviewed to reflect changes in risk appetite, business plans, portfolio composition and the market and economic environments.

To ensure approved limits are not breached and that RBS remains within its risk appetite, triggers at RBS and lower levels have been set such that if exposures exceed a specified level, action plans are developed by the front office, Market Risk and Finance.

For further information on risk appetite, refer to page 165.

*unaudited

Risk controls and assurance

For information on risk controls and assurance, refer to page 169.

Traded market risk

Risk identification and assessment

Identification and assessment of traded market risk is achieved through gathering, analysing, monitoring and reporting market risk information by business line or at a consolidated level. Industry expertise, continued system developments and techniques such as stress testing are also used to enhance the effectiveness of the identification and assessment of all material market risks.

This is complemented by the New Product Risk Assessment process, which requires market risk teams to assess and quantify the market risk associated with all proposed new products.

Risk monitoring*

Traded market risk exposures are monitored against limits and analysed daily by market risk reporting and control functions. A daily report that summarises market risk exposures against the limits set by the ERF is sent to the Chief Risk Officer and market risk managers across the function.

A risk review of trading businesses is undertaken weekly with senior risk and front office staff. This includes a review of profit and loss drivers, notable position concentrations and other positions of concern.

Businesses' profit and loss performance is monitored automatically via loss triggers which, if breached, require a remedial action plan to be agreed with the Market Risk function. The loss triggers are set using both a fall-from-peak approach and an absolute loss level.

The Market Risk function also prepares daily risk reports that detail exposures against a more granular set of limits and triggers.

Limit reporting is supplemented with regulatory capital and stress testing information as well as ad hoc reporting.

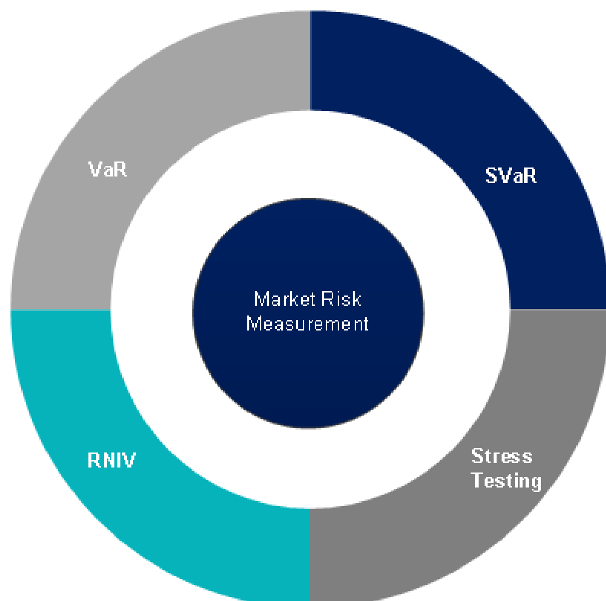
In addition, as noted under Risk governance above, regular updates on traded market risk positions are provided to the ERF, the Board Risk Committee, Treasury and the Market Risk Committee.

The reporting and updates facilitate frequent reviews and discussions of traded market risk exposures and related issues between the market risk functions, senior management and the front office.

Market risk continued

Risk measurement

RBS uses a comprehensive set of methodologies and techniques to measure traded market risk.



The main risk measurement methods are VaR, SVaR and the incremental risk charge. Risks that are not adequately captured by VaR or SVaR are captured by the Risks not in VaR (RNIV) framework to ensure that RBS is adequately capitalised for market risk. In addition, stress testing is used to identify any vulnerabilities and potential losses in excess of VaR and SVaR.

The key inputs into these measurement methods are market data and risk factor sensitivities. Sensitivities refer to the changes in deal or portfolio value that result from small changes in market parameters that are subject to the market risk limit framework. Revaluation ladders are used in place of sensitivities to capture the impact on the income statement of large moves in risk factors or the joint impact of two risk factors.

These methods have been designed to capture correlation effects and allow RBS to form an aggregated view of its traded market risk across risk types, markets and business lines while also taking into account the characteristics of each risk type.

Value-at-risk*

VaR is a statistical estimate of the potential change in the market value of a portfolio (and, thus, the impact on the income statement) over a specified time horizon at a given confidence level.

For internal risk management purposes, VaR assumes a time horizon of one trading day and a confidence level of 99%. The VaR model is based on a historical simulation, utilising market data from the previous 500 days on an equally weighted basis.

The internal traded VaR model captures all trading book positions including those products approved by the regulator. For an explanation of the distinction between internal VaR and regulatory VaR, refer to page 267.

*unaudited

The internal VaR model captures the potential impact of the following risk factors:

- General interest rate risk - which arises from the impact of changes in interest rates and volatilities on cash instruments and derivatives. This includes interest rate tenor basis risk and cross-currency basis risk.
- Specific interest rate risk - which arises from the impact of changes in the credit spreads of sovereign bonds, corporate bonds, securitised products and credit derivatives.
- Currency risk - which arises from the impact of changes in currency rates and volatilities.
- Equity risk - which arises from the impact of changes in equity prices, volatilities and dividend yields.
- Commodity risk - which arises from the impact of changes in commodity prices and volatilities.

When simulating potential movements in risk factors, a combination of absolute and relative returns is used, depending on the risk factor.

The following types of risk - which are components of the above-mentioned factors - are also considered:

- Basis risk - which is the risk that imperfect correlation between two instruments in a hedging strategy creates the potential for excess gains or losses, thus adding risk to the position;
- Prepayment risk - which is the risk associated with early unscheduled return of principal on a fixed rate security; and
- Inflation risk - which is the risk of a decrease in the value of instruments as a result of changes in inflation rates and associated volatilities.

VaR limitations*

Historical VaR and RBS's implementation of this risk measurement methodology have a number of known limitations, as summarised below, and VaR should be interpreted in light of these. RBS's approach is to supplement VaR with other risk metrics that address these limitations to ensure appropriate coverage of all material market risks.

Historical simulation VaR may not provide the best estimate of future market movements. It can only provide a forecast of portfolio losses based on events that occurred in the past. The RBS model uses the previous 500 days of data; this period represents a balance between model responsiveness to recent shocks and risk factor data coverage.

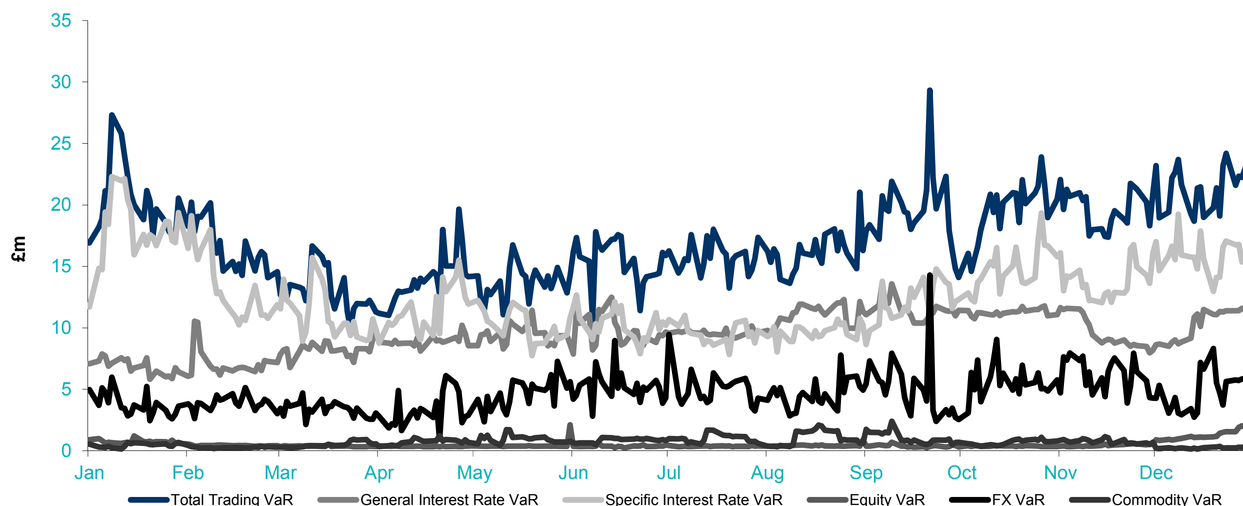
Market data time series are updated on a daily basis, with a ten-working-day time lag.

The use of a 99% confidence level VaR statistic does not provide information about losses beyond this level, usually referred to as 'tail' risks. These risks are more appropriately assessed using measures such as SVaR and stress testing.

Finally, where market data time series are not appropriate (due to poor quality or a lack of liquidity in the market), RBS uses proxy time series or excludes the risk factor from its VaR model and capitalises the risk through its RNIV framework.

Market risk continued

1-Day 99% traded internal VaR 2016



The table below analyses 1-day 99% internal VaR for RBS's trading portfolios, segregated by type of market risk exposure.

	2016				2015			
Traded VaR (1-day 99%)	Average £m	Period end £m	Maximum £m	Minimum £m	Average £m	Period end £m	Maximum £m	Minimum £m
General interest rate	12.5	16.9	22.3	7.8	14.5	12.8	29.8	9.5
Specific interest rate	9.5	9.7	13.7	5.8	10.1	7.1	16.4	6.5
Currency	4.6	5.4	14.3	1.0	4.9	5.0	8.9	1.9
Equity	0.5	1.9	2.1	0.2	1.6	0.8	6.1	0.4
Commodity	0.7	0.3	2.4	0.2	0.4	0.5	2.2	0.2
Diversification (1)		(10.4)				(9.1)		
Total	17.0	23.8	29.3	9.9	18.9	17.1	30.1	12.1

Note:
(1) RBS benefits from diversification as it reduces risk by allocating positions across various financial instrument types, currencies and markets. The extent of the diversification benefit depends on the correlation between the assets and risk factors in the portfolio at a particular time. The diversification factor is the sum of the VaR on individual risk types less the total portfolio VaR.

Key points

- On an average basis, total traded VaR decreased in 2016 by 10%. The reduction was mainly driven by lower risk positions during Q1 2016, with reduced market activity reflecting concerns over the stability of the financial sector. Stronger client flows later in the year, mainly in NatWest Markets' strategic Rates and Currencies businesses, resulted in a risk increase in the second half of 2016.
- On a period end basis, total traded VaR increased in 2016 by 39%. The increase was mainly driven by the Rates business.
- VaR fluctuated throughout 2016, reflecting developments in US and the eurozone and other macroeconomic factors. These included, but were not limited to, the US presidential elections, the EU referendum in the UK and central bank actions. However, total traded VaR was managed within risk appetite.

Market risk continued

*VaR validation**

In addition to being a key risk management measure used by Market Risk in its second-line-of-defence oversight of the risk arising from trading activities, VaR is also used as one of the components of RBS's market risk regulatory capital requirements (refer to page 267 for more information).

Therefore, VaR is subject not only to model management review and validation but also to regulation compliance, which includes (but is not restricted to) regulator-prescribed back-testing.

The performance and adequacy of the VaR model are tested on a regular basis through the following processes:

- Back-testing - Internal and regulatory back-testing is conducted on a daily basis.
- Ongoing model validation - VaR model performance is assessed both regularly and on an ad-hoc basis if market conditions or book constitution change significantly.
- RNIV framework - The RNIV framework ensures that all material risks outside the internal VaR models are captured by, if necessary, developing an RNIV calculation to manage the risk (refer to page 266).
- Model Risk Management review - As part of the model lifecycle, all risk models (including the VaR model) are independently reviewed to ensure that the model is still fit for purpose given current market conditions and book constitution (refer to page 169).

VaR back-testing*

The main approach employed to assess the ongoing performance of the VaR model is back-testing, which counts the number of days when a loss exceeds the corresponding daily VaR estimate, measured at a 99% confidence level.

Two types of profit and loss (P&L) are used in back-testing comparisons: Actual P&L and Hypothetical (Hypo) P&L.

The Actual P&L for a particular business day is the firm's actual P&L for that day in respect of the trading activities within the scope of the firm's regulatory VaR model, including any intraday activities, adjusted by stripping out fees and commissions, brokerage, and additions to and releases from reserves that are not directly related to market risk.

The Hypo P&L reflects the firm's Actual P&L excluding any intra-day activities.

A portfolio is said to produce a back-testing exception when the Actual or Hypo P&L exceeds the VaR level on a given day. Such an event may be caused by a large market movement or may highlight issues such as missing risk factors or inappropriate time series. Any such issues identified are analysed and addressed through taking appropriate remediation or development action. RBS monitors both Actual and Hypo back-testing exceptions.

The table below shows internal back-testing exceptions for a period of 250 days for 1-day 99% traded internal VaR vs. Actual and Hypo P&L for major NatWest Markets businesses.

	Back-testing exceptions	
Description	Actual	Hypo
Rates	2	4
Credit	3	4
Currencies	—	9
Securitised products	3	2

Key points

- Statistically RBS would expect to see back-testing exceptions 1% of the time over the 250-day period.
- The top-level businesses presented in the table above are subject to quarterly review by the PRA. For these businesses, exceptions were noted during the period and analysis conducted as explained below.
- The exceptions in the Rates business were driven by rates and volatility changes adversely affecting the desk.
- The exceptions in the Credit business were mainly driven by mark-downs and changes in credit default swap spreads.
- The exceptions in the Currencies business were mainly driven by the increased volatility connected with the large market movements in the run-up to and following the EU referendum. In addition, a small number of exceptions were driven in part by movements in the independent price verification reserve.
- The exceptions in the Securitised Products business were mainly due to mark-downs and tightening in credit default swap spreads.

*unaudited

Market risk continued

*Stressed VaR (SVaR)**

As with VaR, the SVaR technique produces estimates of the potential change in the market value of a portfolio, over a specified time horizon, at a given confidence level. SVaR is a VaR-based measure using historical data from a one-year period of stressed market conditions.

The risk system simulates 99% VaR on the current portfolio for each 250-day period from 2005 to the current VaR date, moving forward one day at a time. The SVaR is the worst VaR outcome of the simulated results.

This is in contrast with VaR, which is based on a rolling 500-day historical data set. For the purposes of both internal risk management and regulatory SVaR calculation, a time horizon of ten trading days is assumed with a confidence level of 99%.

The internal traded SVaR model captures all trading book positions, including not only those products, locations and legal entities approved by the regulator.

*10-day 99% trading internal SVaR**

	2016 £m	2015 £m
Total RBS	161	145

Key point

- Total traded SVaR was broadly unchanged in 2016 compared to 2015, although it fluctuated during the year.

*Risks not in VaR (RNIVs)**

The RNIV framework is used to identify and quantify market risks that are inadequately captured by the internal VaR and SVaR models.

The need for an RNIV calculation is typically identified in one of the following three circumstances: (i) as part of the New Product Risk Assessment process, when a risk manager determines that the associated risk is not adequately captured by the VaR model or system; (ii) when risks are mapped to time series that are deemed to be inadequate (for example, due to data quality problems or proxy series usage); or (iii) as a result of a recommendation made during the ongoing model validation or by Model Risk Management during its annual review of the VaR model.

RNIVs that are related specifically to instruments that have level 3 valuation hierarchy assumptions (refer to page 336) are mainly included in the following categories: proxied sensitivities or risk factors, higher-order sensitivity terms, and static pricing parameters.

RBS adopts two approaches for the quantification of RNIVs:

- A VaR/SVaR approach. Under this approach, two values are calculated: (i) the VaR RNIV; and (ii) the SVaR RNIV.
- A stress-scenario approach. Under this approach, an assessment of ten-day extreme, but plausible, market moves is used in combination with position sensitivities to give a stress-type loss number - the stress-based RNIV value.

*unaudited

In each of these approaches, potential diversification benefits between RNIVs are ignored.

The RNIV calculations provide the additional capital required to capture the market risks not captured in the internal VaR model and are regularly reported to senior management and the regulator and discussed with them. The methodology used in the material RNIV calculations is internally reviewed by Model Risk Management. Where appropriate, risk managers set sensitivity limits to monitor specific risk factors. RNIV calculations form an integral part of RBS's ongoing model and data improvement efforts to capture all market risks in scope for model approval in VaR and SVaR.

*Stress testing**

RBS undertakes daily market risk stress testing to identify vulnerabilities and potential losses in excess of or not captured in VaR. The calculated stresses measure the impact of changes in risk factors on the fair values of the trading and available-for-sale portfolios.

RBS conducts historical, macroeconomic and vulnerability-based stress testing.

Historical stress testing is a measure that is used for internal management. Using the historical simulation framework employed for VaR, the current portfolio is stressed using historical data since 1 January 2005. The methodology simulates the impact of the 99.9 percentile loss that would be incurred by historical risk factor movements over the period, assuming variable holding periods specific to the risk factors and the businesses.

Historical stress tests form part of the market risk limit framework and their results are reported daily to senior management

Macroeconomic stress tests are carried out periodically as part of the firm-wide, cross-risk capital planning process. The scenario narratives are translated into risk factor shocks using historical events and insights by economists, risk managers and the front office. Market risk stress results are combined with those for other risks into the capital plan that is presented to the Board. The cross-risk capital planning process is conducted once a year, in September/October, with a planning horizon of five years. The scenario narratives cover both regulatory scenarios and macroeconomic scenarios identified by the firm.

Vulnerability-based stress testing begins with the analysis of a portfolio and expresses the key vulnerabilities of the portfolio in terms of plausible, so-called vulnerability scenarios under which the portfolio would suffer material losses. These scenarios can be historical, macroeconomic or forward-looking/hypothetical. Vulnerability-based stress testing is used for internal management information and is not subject to limits. However, the results for relevant scenarios are reported to senior management.

Market risk continued

*Economic capital**

The market risk economic capital framework uses models to calculate the market and default risk in the trading book which are aligned with other models that are used for limit setting and market risk management. The results are annualised to be consistent with the other economic capital models to permit consolidation of all risk types as part of the RBS-wide economic capital programme.

Market risk regulatory capital*

Regulatory treatment

The market risks subject to capital requirements under Pillar 1 are primarily interest rate, credit spread and equity risks in the trading book and foreign exchange and commodity risks in both the trading and non-trading books. Interest rate and equity risks are split between general and specific risks. General risks represent market risks due to a move in a market as a whole, such as a main index or yield curve, while specific risks represent market risks arising from events particular to an underlying issuer.

The aggregation approach taken for general and specific risks is as follows:

- General risks are aggregated at the simulation level, adding P&L forecasts generated by the VaR model before statistics such as VaR and SVaR are extracted.
- Specific equity risks are aggregated with general risks using the simulation-level approach.
- Specific interest rate risks have both a systematic component and an idiosyncratic component. The systematic component captures the risk in market movements of credit spreads (across sectors, geographic locations and ratings) while the idiosyncratic component captures the credit spread variability of the underlying entity. The systematic components of specific interest rate risks are aggregated at the simulation level, while the idiosyncratic components are calculated as a standalone charge.

RBS uses two broad methodologies to calculate its market risk capital charge: (i) the standardised or non-modelled approach, whereby regulator-prescribed rules are applied, and (ii) the internal model approach, where, subject to regulatory approval, a model such as VaR is used to calculate the capital charge.

VaR and SVaR capture general and specific risks using a single model but not risks arising from the impact of defaults and rating changes associated with traded credit products and their derivatives. For these risks, two product-dependent approaches are used:

- The incremental risk charge model captures risks arising from rating migration and default events for the more liquid traded credit instruments and their derivatives.
- Securitisation and re-securitisation risks in the trading book are treated with the non-trading book non-modelled capitalisation approach.

Regulatory VaR

The PRA renewed RBS's Internal Model Approach (IMA) permission with effect from 30 November 2016, incorporating changes to the legal entity coverage of the permission (removal of RBSSI) and minor revisions to its product and trading location coverage.

*unaudited

The changes were requested by RBS, reflecting the continued simplification of its operations. RBS has IMA permission for the following material legal entities: RBS plc and NatWest Plc.

While internal VaR provides a measure of the economic risk, regulatory VaR is one of the measures of regulatory capital requirements by legal entity.

The calculation of regulatory VaR differs from that of the internal VaR as it takes into account only regulator-approved products, locations and legal entities. In addition, it is based on a directly modelled ten-day holding period, rather than a scaled one-day holding period, for market risk capital calculations.

The PRA approval covers general market risk in interest rate, foreign exchange, equity and commodity products and specific market risk in interest rate and equity products.

*Regulatory SVaR**

RBS's SVaR model has also been approved by the PRA for use in the capital requirement calculation. The distinction between regulatory SVaR and internal SVaR is the same as that between regulatory VaR and internal VaR.

Risks not in VaR

As discussed earlier, RBS has an established RNIV framework that ensures that the risks not captured in VaR are adequately covered by its capital. In line with regulatory guidelines for external reporting, VaR RNIV values are reported as a subset of the VaR-based regulatory capital charge, whereas SVaR RNIV and stress-based RNIV values are reported as subsets of the SVaR-based charge.

*Incremental risk charge (IRC)**

The IRC model quantifies the impact of rating migration and default events on the market value of instruments with embedded credit risk (in particular, bonds and credit default swaps) that are held in the trading book. It further captures basis risk between different instruments, maturities and reference entities. Following the internal ratings-based approach for credit risk, the IRC is calculated over a one-year capital horizon with a 99.9% confidence level. The dependency of positions is modelled using a single-factor Gaussian copula.

The IRC is mainly driven by three-month credit rating transition, default and correlation parameters. The portfolio impact of correlated defaults and rating changes is assessed by observing changes in the market value of positions using stressed recovery rates and modelled credit spread changes. Revaluation matrices are used to capture any non-linear behaviour.

The transition matrix is estimated using Moody's history of issuer ratings.

The average liquidity horizon by position (weighted by materiality) at the year end was 3.2 months (2015 - 3.2 months). The horizon is determined based on issuer liquidity, position concentration, product type and maturity.

Market risk continued

Market risk RWAs and minimum capital requirements*

At 31 December 2016, total market risk RWAs were £17 billion (31 December 2015 - £21 billion). Minimum capital requirements, which represent 8% of RWAs, were £1.4 billion (31 December 2015 - £1.7 billion).

By regulatory approach, the internal model approach accounted for 80% of the total (2015 - 78%). By legal entity, RBS plc accounted for 90% of the total (2015 - 90%).

Model validation*

RBS uses a variety of models to manage and measure market risk. These include pricing models (used for valuation of positions) and risk models (for risk measurement and capital calculation purposes). They are developed in both RBS-level and lower-level functions and are subject to independent review and sign-off.

For general information on the independent model validation carried out by Model Risk Management (MRM), which applies also to market risk models (including VaR models), refer to page 169. Additional details relating to pricing and market risk models are presented below.

Pricing models

Pricing models are developed by a dedicated front office quantitative team, in conjunction with the trading desk. They are used for the valuation of positions for which prices are not directly observable and for the risk management of the portfolio.

Any pricing models that are used as the basis for valuing books and records are subject to approval and oversight by asset-level modelled product review committees.

These committees comprise representatives of the major stakeholders in the valuation process - trading, finance, market risk, model development and model review functions.

The review process comprises the following steps:

- The committees prioritise models for review by MRM, considering the materiality of the risk booked against the model and an assessment of the degree of model risk, that is the valuation uncertainty arising from the choice of modelling assumptions.
- MRM quantifies the model risk by comparing front office model outputs with those of alternative models independently developed by MRM.
- The sensitivities derived from the pricing models are validated.
- The conclusions of the review are used by MRM to inform risk limits and by Finance to inform model reserves.

*unaudited

Risk models

All model changes are approved through model governance committees at franchise level. Changes to existing models are subject to MRM review and RBS follows regulatory guidance for assessing the materiality of extensions and changes to the internal model approach for market risk.

MRM's independent oversight provides additional assurance that RBS holds appropriate capital for the market risk to which it is exposed.

In addition to MRM's independent oversight, the model testing team monitors the model performance for market risk through back-testing, which is discussed in more detail on page 265, and other processes.

Non-traded market risk

As noted earlier, RBS largely manages the key categories of non-traded market risk separately. The categories are: interest rate risk; credit spread risk; foreign exchange risk; equity risk; and accounting volatility risk.

Risk assessment, monitoring and mitigation

Interest rate risk*

Non-traded interest rate risk (NTIRR) factors are grouped into the following categories:

- Gap risk - which arises from the timing of rate changes in non-trading book instruments. The extent of gap risk depends on whether changes to the term structure of interest rates occur consistently across the yield curve (parallel risk) or differentially by period (non-parallel risk).
- Basis risk - which captures the impact of relative changes in interest rates for financial instruments that have similar tenors but are priced using different interest rate indices, or on the same interest rate indices but with different tenors.
- Option risk - which arises from option derivative positions or from optional elements embedded in assets, liabilities and/or off-balance sheet items, where RBS or its customer can alter the level and timing of their cash flows. Option risk can be further characterised into automatic option risk and behavioural option risk. One example of behavioural option risk is pipeline risk. This is the risk of loss arising from personal customers owning an option to draw down a loan (typically a mortgage loan) at a committed rate. Changes in interest rates can result in greater or fewer customers than anticipated taking up the committed offer. The risk depends on customer behaviour as the option will not automatically be exercised.

Due to the long-term nature of many non-trading book portfolios and their varied interest rate repricing characteristics and maturities, it is likely that net interest income will vary from period to period, even if interest rates remain the same. New business originated in any period will alter RBS's interest rate sensitivity if the resulting portfolio differs from portfolios originated in prior periods, depending on the extent to which exposure has been hedged.

Market risk continued

In order to manage exposures within these limits, RBS aggregates its interest rate positions and hedges them externally using cash and derivatives, primarily interest rate swaps.

This task is primarily carried out by RBS Treasury, to which all businesses except NatWest Markets transfer most of their NTIRR. The main exposures and limit utilisations are reported to the ALCo and the ERF monthly and to the Board Risk Committee quarterly.

Credit spread risk

The bond portfolios in the non-trading book are high-quality securities that are primarily maintained as a liquidity buffer to ensure RBS can continue to meet its obligations in the event that access to wholesale funding markets is restricted. Additionally other high-quality bond portfolios are held for collateral purposes and to support payment systems.

Credit spread risk is monitored daily through sensitivities and VaR measures. The dealing authorities in place for the bond portfolios further mitigate the risk by imposing constraints by duration, asset class and credit rating. Exposures and limit utilisations are reported to senior management on a daily basis as well as to the Executive Risk Forum monthly and to the Board Risk Committee quarterly.

Foreign exchange risk

The only material non-traded open currency positions are the structural foreign exchange exposures arising from investments in foreign subsidiaries, branches and associates and their related currency funding. These exposures are assessed and managed by RBS Treasury to predefined risk appetite levels under delegated authority from the ALCo. Treasury seeks to limit the potential volatility impact on RBS's CET1 ratio from exchange rate movements by maintaining a structural open currency position. Gains or losses arising from the retranslation of net investments in overseas operations are recognised in equity reserves and reduce the sensitivity of capital ratios to foreign exchange rate movements primarily arising from the retranslation of non-sterling-denominated RWAs. Sensitivity is minimised where, for a given currency, the ratio of the structural open position to RWAs equals RBS's CET1 ratio. The sensitivity of the CET1 capital ratio to exchange rates is monitored monthly and reported to the ALCo at least quarterly.

Foreign exchange exposures arising from customer transactions are sold down by businesses on a regular basis in line with RBS policy.

Equity risk

Non-traded equity risk is the potential variation in the income and reserves arising from changes in non-trading book equity valuations. Any such risk is identified prior to any investments and then mitigated through a framework of controls.

Investments, acquisitions or disposals of a strategic nature are referred to RBS's Acquisitions and Disposals Committee (ADCo). Once approved by ADCo for execution, such transactions are referred for approval to the Board, the Executive Committee, the Chief Executive, the Chief Financial Officer or as otherwise required. Decisions to acquire or hold equity positions in the non-trading book that are not of a strategic nature, such as customer restructurings, are taken by authorised persons with delegated authority under the credit approval framework.

Accounting volatility risk

Accounting volatility can be mitigated through hedge accounting whereby RBS can mitigate the profit and loss impact of the derivatives by marking the exposure to market. However, volatility will remain in cases where accounting rules mean that hedge accounting is not an option. Accounting volatility is reported to the ALCo monthly and capitalised as part of the Internal Capital Adequacy Assessment Process.

Market risk continued

Risk measurement

The market risk exposures that arise as a result of RBS's retail and commercial banking activities are measured using a combination of value-based metrics (VaR and sensitivities) and earnings-based metrics, as explained in greater detail for each of the key non-traded risk exposure types disclosed in this section.

Following the approval of an enhanced non-traded market risk appetite framework in early 2016, VaR disclosures reflect a more complete economic risk measure for the banking book.

The following table presents 1-day internal banking book VaR at a 99% confidence level, analysed by type of risk.

	2016				2015 (1)*
	Average £m	Maximum £m	Minimum £m	Period end £m	Period end £m
Interest rate	10	19	5	18	19
Euro	3	4	2	4	4
Sterling	10	24	5	21	14
US dollar	3	5	2	2	5
Other	2	2	1	1	2
Credit spread	57	67	42	63	31
Structural FX rate	13	20	10	10	11
Pipeline risk	1	1	—	—	1
Diversification (2)	—	—	—	(19)	(29)
Total	57	72	41	72	33

Notes:
(1) Certain 2015 year end numbers have been restated for comparison purposes in light of the enhancement of the risk appetite framework in 2016.
(2) RBS benefits from diversification across various financial instrument types, currencies and markets. The extent of the diversification benefit depends on the correlation between the assets and risk factors in the portfolio at a particular time. The diversification factor is the sum of the VaR on individual risk types less the total portfolio VaR.

Key points

- Total internal non-traded VaR rose from £33 million to £72 million on a period end basis, primarily driven by credit spread risk, which remains the largest contributor to the total VaR.
- The rise in credit spread VaR reflected the increase in the proportion of bonds held within Treasury's liquidity portfolio and the increased volatility in the market data captured in the VaR. (For more information on the liquidity bond portfolio, refer to the Liquidity and funding risk section.)
- Interest rate risk mainly arises from the structural hedges carried out by Treasury. It rose towards the end of the year as the equity structural hedging strategy was adjusted in anticipation of future conduct fines.

*unaudited

Market risk continued

Interest rate risk*

NTIRR can be measured from either an economic value-based or earnings-based perspective, or a combination of the two. Value-based approaches measure the change in value of the balance sheet assets and liabilities over a longer timeframe, including all cash flows. Earnings-based approaches measure the potential short-term (generally one-year) impact on the income statement of changes in interest rates.

RBS uses both approaches to quantify its interest rate risk: VaR as its value-based approach and sensitivity of net interest income (NII) as its earnings-based approach.

These two approaches provide different yet complementary views of the impact of interest rate risk on the balance sheet at a point in time. The scenarios employed in the NII sensitivity approach incorporate business assumptions and simulated modifications in customer behaviour as interest rates change. In contrast, the VaR approach assumes static underlying positions and therefore does not provide a dynamic measurement of interest rate risk. In addition, while the NII sensitivity calculations are measured to a 12-month horizon and thus provide a shorter-term view of the risks on the balance sheet, the VaR approach can identify risks not captured in the sensitivity analysis, in particular the impact of duration and repricing risk on earnings beyond 12 months.

*Value-at-risk**

RBS's standard VaR metrics - which assume a time horizon of one trading day and a confidence level of 99% - are based on interest rate repricing gaps at the reporting date. Daily rate moves are modelled using observations over the last 500 business days. These incorporate customer products plus associated funding and hedging transactions as well as non-financial assets and liabilities such as property, plant and equipment, capital and reserves. Behavioural assumptions are applied as appropriate.

The non-traded interest rate risk VaR metrics for RBS's retail and commercial banking activities are included within the non-traded VaR table above. The VaR captures the risk resulting from mismatches in the repricing dates of assets and liabilities. It includes any mismatch between structural hedges and stable non and low interest-bearing liabilities such as equity and money transmission accounts as regards their interest rate repricing behavioural profile.

Sensitivity of net interest income*

Earnings sensitivity to rate movements is derived from a central forecast over a 12-month period. A simplified scenario is shown based on the period-end balance sheet assuming that non-interest rate variables remain constant. Market implied forward rates are used to generate a base case earnings forecast, which is then subjected to interest rate shocks. The variance between the central forecast and the shock gives an indication of underlying sensitivity to interest rate movements.

The following table shows the sensitivity of net interest income, over the next 12 months, to an immediate upward or downward change of 25 and 100 basis points to all interest rates. All yield curves are expected to move in parallel with the exception that interest rates are assumed to floor at zero per cent or, for euro rates, at the current negative rate.

The main driver of earnings sensitivity relates to interest rate pass-through assumptions on customer products. The scenario also captures the impact of the reinvestment of maturing structural hedges at higher or lower rates than the base case earnings sensitivity and mismatches in the repricing dates of loans and deposits.

Multi-year forward projections would increase the negative impact of a downward change in rates or, conversely, the benefit of an immediate upward change in interest rates to current market rates. This is because, over time a greater proportion of maturing structural hedges will be reinvested at prevailing rates which may be higher or lower. Also, in the absence of dynamic assumptions relating to further management actions, the variance to the base case income forecast arising from margin compression or expansion on managed rate products will continue to accrue.

However, reported sensitivities should not be considered predictive of future performance. They do not capture potential management action in response to sudden changes in the interest rate environment. Actions that could reduce the net interest income sensitivity and mitigate adverse impacts are changes in pricing strategies on both customer loans and deposits as well as hedging. Management action may also be targeted at stabilising total income taking into account non-interest income in addition to net interest income.

*unaudited

Market risk continued

2016	Euro £m	Sterling £m	US dollar £m	Other £m	Total £m
+ 25 basis point shift in yield curves	4	79	11	2	96
− 25 basis point shift in yield curves	(1)	(222)	(11)	(2)	(236)
+ 100 basis point shift in yield curves	9	436	42	13	500
− 100 basis point shift in yield curves	(2)	(337)	(30)	(9)	(378)
2015					
+ 25 basis point shift in yield curves	(6)	48	25	1	68
− 25 basis point shift in yield curves	(7)	(66)	(24)	1	(96)
+ 100 basis point shift in yield curves	(17)	385	94	7	469
− 100 basis point shift in yield curves	(7)	(345)	(79)	2	(429)

Key points

- Interest rate exposure remains asset-sensitive, so that rising interest rates will have a positive impact on net interest income.
- The largest change in net interest income sensitivity in 2016 related to the negative impact of a 0.25% fall in interest rates from the base case. Sensitivity increased from £96 million to £236 million, primarily due to lower customer deposit interest rates. When interest rates are already at very low levels, it is assumed that further interest rate cuts will not be passed through to customer depositors and, therefore, net interest income falls.
- Structural hedges reduce income sensitivity to interest rate shocks over a 12-month period because only a relatively small amount of the hedge matures and rolls forward at the lower rate. For example, one-fifth of a five-year hedging programme will mature over a 12-month period.
- Assumptions relating to customer pricing are kept under review and may vary at different levels of interest rates. As a result, the increase in sensitivity between 25 basis points and 100 basis points is not linear.
- Changes in pricing assumptions and increased hedging of customer deposits are the key actions in personal and commercial banking that may reduce interest rate sensitivity.

*unaudited

Market risk continued

Structural hedging*

RBS has the benefit of a significant pool of stable, non and low interest bearing liabilities, principally comprising equity and money transmission accounts. These balances are usually hedged, either by investing directly in longer-term fixed rate assets or by the use of interest rate swaps, in order to provide a consistent and predictable revenue stream.

After hedging the net interest rate exposure of the bank externally, RBS Treasury allocates income to products or equity in structural hedges by reference to the relevant interest rate swap curve. Over time, the hedging programme has built up a portfolio that provides a basis for stable income attribution to the product and equity structural hedges.

*Product structural hedging**

Product structural hedges are used to minimise the volatility on earnings related to specific products, primarily customer deposits. The balances are primarily hedged with medium-term interest rate swaps, so that reported income is less sensitive to movements in short-term interest rates. The size and term of the hedge are based on the stability of the underlying portfolio.

The table below shows the impact on net interest income associated with product hedges managed by RBS Treasury. These relate to the main UK banking businesses except Private Banking and RBS International. RBS Treasury allocates income to products or equity in structural hedges by reference to the relevant interest rate swap curve after hedging the net interest rate exposure of the bank externally. This internal allocation has been developed over time alongside the bank's external hedging programme and provides a basis for stable income attribution to the product and equity hedges.

Net interest income - impact of product structural hedging	2016 £m	2015 £m
UK Personal & Business Banking	346	373
Commercial Banking	235	256
Capital Resolution	10	21
Williams & Glyn	44	45
Total	635	695

Key points

- The incremental impact of product hedges on net interest income above 3-month LIBOR remained positive in 2016. The average size of the hedge increased from £72 billion in 2015 to £90 billion, split by business broadly in line with the proportion of income as shown above. The increase largely reflected growth in hedged product balances and increased hedging of rate-on sensitive customer deposits. During the year, interest rates remained at or close to historical low levels, as a result of which the average book yield (including 3-month LIBOR) fell from 1.48% to 1.20%. This reflects the impact of maturing hedges being reinvested at lower rates and new hedges added during the year at lower market rates.
- At 31 December 2016, the 5-year swap rate was 0.74% compared with 1.45% one year previously. The market rate matching the amortising structure of the hedge was 0.60%.

*unaudited

Market risk continued

*Equity structural hedging**

Equity structural hedges are used to minimise the volatility on earnings arising from returns on equity. The hedges managed by Treasury relate mainly to the UK banking businesses (PBB and CPB) and contributed £0.6 billion to these businesses in 2016 (2015 - £0.7 billion), which is an incremental benefit relative to short-term wholesale cash rates. The average size of the hedge was £33 billion in 2016, lower than in 2015 (£41 billion), primarily reflecting the payment of £4.2 billion into the pension fund, an additional £3.1 billion provision for various investigations and litigation matters relating to RBS's issuance and underwriting of residential mortgage-backed securities (RMBS) and the £1.2 billion payment of the final Dividend Access Share (DAS) dividend.

The equity hedge also aims broadly to track a time series of medium-to-longer-term swap rates. Other factors, such as the impact of the sale of fixed-rate securities or additional hedging activity, are not captured in the equity yield. The average book yield (including 3-month LIBOR) rose from 2.3% to 2.4%.

At 31 December 2016, the 10-year swap rate was 1.1% compared with 1.9% one year previously. The market rate matching the amortising structure of the equity hedge was 0.9%.

Sensitivity of available-for-sale and cashflow hedging reserves to interest rate movements*

The table below shows the estimated sensitivity of equity reserves to interest rate movements, on a pre-tax basis. The scenarios shown are simplified scenarios in which all rates across the yield curve have been moved up or down instantaneously by 25 basis points and 100 basis points and taxation effects have not been estimated. In this analysis, interest rates have not been floored at zero. Note that a movement in the AFS reserve would have an impact on CET1 capital but a movement in the cash flow hedge reserve would not be expected to do so. Volatility in both reserves affects tangible net asset value.

2016	+25 basis points £m	-25 basis points £m	+100 basis points £m	-100 basis points £m
Available-for-sale reserve	(36)	35	(150)	135
Cashflow hedge reserve	(417)	422	(1,641)	1,714
Total	(453)	457	(1,791)	1,849
2015				
Available-for-sale reserve	(63)	63	(255)	255
Cashflow hedge reserve	(462)	467	(1,817)	1,896
Total	(525)	530	(2,072)	2,151

Key points

- The asymmetry in results between the upward and downward interest rate shocks reflects the changing sensitivity of derivative valuations to the same interest rate movement at different levels of interest rates (i.e. convexity).
- The reduction in the sensitivity of the available-for-sale reserve primarily results from the reduction of Capital Resolution exposures.

*unaudited

Market risk continued

Foreign exchange risk

The table below shows structural foreign currency exposures.

2016	Net investments in foreign operations £m	Non-controlling interests (NCI) £m	Net investments in foreign operations excluding NCI (1) £m	Net investment hedges £m	Structural foreign currency exposures pre-economic hedges £m	Economic hedges (2) £m	Residual structural foreign currency exposures £m
US dollar	(595)	—	(595)	(28)	(623)	—	(623)
Euro	6,085	(4)	6,089	(582)	5,507	(2,289)	3,218
Other non-sterling	3,366	761	2,605	(1,491)	1,114	(625)	489
Total	8,856	757	8,099	(2,101)	5,998	(2,914)	3,084
2015							
US dollar	1,172	—	1,172	(134)	1,038	(1,038)	—
Euro	6,562	(127)	6,435	(573)	5,862	(1,963)	3,899
Other non-sterling	3,599	(524)	3,075	(2,364)	711	—	711
Total	11,333	(651)	10,682	(3,071)	7,611	(3,001)	4,610

Notes:
(1) Non-controlling interests (NCI) represents the structural foreign exchange exposure not attributable to owners' equity.
(2) Economic hedges mainly represent US dollar and euro preference shares in issue that are treated as equity under IFRS and do not qualify as hedges for accounting purposes. They provide an offset to structural foreign exchange exposures to the extent that there are net assets in overseas operations available.

Key points

- Structural foreign currency exposure at 31 December 2016 was £6 billion before and £3 billion after economic hedges, respectively, £1.6 billion and £1.5 billion lower than at 31 December 2015.
- The reduction in the residual structural foreign currency exposure was driven by provisions for RMBS and dividends received from EU subsidiaries. These reductions were partly offset by appreciation of the US dollar and the euro against sterling in 2016.
- Changes in foreign currency exchange rates affect equity in proportion to structural foreign currency exposure. For example, a 5% strengthening in foreign currencies against sterling would result in a gain of £0.3 billion in equity (2015 - a £0.5 billion gain). A 5% weakening in foreign currencies against sterling would result in a loss of £0.3 billion in equity (2015 - a £0.4 billion loss).

Equity risk

Equity positions are carried at fair value on the balance sheet based on available market prices where possible. In the event that market prices are not available, fair value is based on appropriate valuation techniques or management estimates.

The table below shows the balance sheet carrying value of non-traded book equity positions.

	2016 £m	2015 £m
Exchange-traded equity	33	25
Private equity	357	534
Other	146	136
	536	695

The exposures may take the form of (i) equity shares listed on a recognised exchange, (ii) private equity shares defined as unlisted equity shares with no observable market parameters or (iii) other unlisted equity shares.

	2016 £m	2015 £m
Net realised gains arising from disposals	295	60
Unrealised gains included in Tier 1 or Tier 2 capital	53	301

Note:
(1) Includes gains or losses on available-for-sale instruments only.

Market risk continued

Structured credit portfolio

The structured credit portfolio is no longer material.

Calculation of regulatory capital*

RBS capitalises non-traded market risk as part of the Pillar 2A Internal Capital Adequacy Assessment Process (ICAAP). The approach combines both earnings based and economic value based methodologies, in accordance with regulatory guidelines. The calculation captures the principal sources of non-traded market risk – interest rate risk, credit spread risk, structural foreign exchange risk and accounting volatility risk.

Pillar 1 capital must be held for non-trading book foreign exchange exposures, as outlined under CRR Articles 455 and 92(3)c. Structural foreign exchange exposures are excluded from the calculations as outlined under CRR Article 352(2); such exposures are considered under Pillar 2A.

Non-traded equity risk is captured in credit risk RWAs.

The capital calculations under ICAAP are also used for economic capital purposes.

Linkage to balance sheet*

The table below analyses RBS's balance sheet by trading and non-trading business.

	2016			2015			
	Total £bn	Trading business (1) £bn	Non-trading business (2) £bn	Total £bn	Trading business (1) £bn	Non-trading business (2) £bn	Primary risk factor
Assets							
Cash and balances at central banks	74.3	0.1	74.2	79.9	—	79.9	Interest rate
Net loans and advances to banks	17.3	6.9	10.4	19.0	11.2	7.8	Interest rate
Net loans and advances to customers	323.0	18.1	304.9	308.0	17.4	290.6	Interest rate
Reverse repos	41.8	37.7	4.1	39.9	38.6	1.3	Interest rate
Debt securities	72.5	24.5	48.0	82.5	35.9	46.6	Interest rate, credit spreads
Equity shares	0.7	0.2	0.5	1.4	0.7	0.7	Equities
Derivatives	247.2	244.2	3.0	262.5	260.0	2.5	Interest rate, credit spreads
Settlement balances	5.5	5.4	0.1	4.1	3.9	0.2	Settlement risk
Other assets	16.4	—	16.4	18.1	—	18.1	
Total assets	798.7	337.1	461.6	815.4	367.7	447.7	
Liabilities							
Deposits by banks	33.3	20.7	12.6	28.1	20.0	8.1	Interest rate
Customer deposits	353.9	13.2	340.7	346.0	11.4	334.6	Interest rate
Repos	32.3	27.3	5.0	37.4	35.2	2.2	Interest rate
Debt securities in issue	27.3	4.4	22.9	31.1	7.1	24.0	Interest rate
Settlement balances	3.6	3.5	0.1	3.4	3.3	0.1	Settlement risk
Short positions	22.1	22.1	—	20.8	20.8	—	Interest rate, credit spreads
Derivatives	236.5	234.6	1.9	254.7	252.4	2.3	Interest rate, credit spreads
Subordinated liabilities	19.4	—	19.4	19.8	—	19.8	Interest rate
Other liabilities	20.9	—	20.9	20.0	—	20.0	
Total liabilities	749.3	325.8	423.5	761.3	350.2	411.1	

Notes:
(1) Trading businesses are entities that primarily have exposures that are classified as trading book under regulatory rules. For these exposures, the main methods used by RBS to measure market risk are detailed under traded market risk measurement on page 263.
(2) Non-trading businesses are entities that primarily have exposures that are not classified as trading book. For these exposures, with the exception of pension-related activities, the main measurement methods are sensitivity analysis of net interest income, internal non-traded VaR and fair value calculations. For more information refer to pages 270 to 275.
(3) Foreign exchange risk affects all non-sterling denominated exposures on the balance sheet across trading and non-trading businesses, and therefore has not been listed in the above tables.

*unaudited