Risk Management

(Figures expressed in millions of Hong Kong dollars unless otherwise indicated)

All the Group's activities involve to varying degrees, the measurement, evaluation, acceptance and management of risk or combination of risks. As a provider of banking and financial services, we actively manage risk as a core part of our day-to-day activities. The principal types of risk faced by the Group are credit risk, liquidity and funding risk, market risk, insurance risk, operational risk and reputational risk.

Risk management framework

The Group's risk management policy is designed to identify and analyse risks, to set appropriate risk limits and to monitor these risks exposures continually by means of reliable and up-to-date management information systems. The Group's risk management framework/policies and risk appetite statement or major risk limits are approved by the Board of Directors and they are monitored and reviewed regularly by various Board or management committees, including the Executive Committee, Risk Committee, Asset and Liability Management Committee ("ALCO") and Risk Management Meeting ("RMM").

Robust risk governance and accountability are embedded throughout the Group through an established enterprise risk management framework that ensures appropriate oversight of and accountability for the effective management of risk at all levels of the organisation and across all risk types.

The Group has long recognised the importance of a strong risk culture, the fostering of which is a key responsibility of senior executives. We use clear and consistent employee communications on risk to convey strategic messages and set the tone from senior management. A suite of mandatory training on risk and compliance topics is deployed to embed skills and understanding in order to strengthen our risk culture and reinforce the attitude to risk in the behaviour expected of employees.

The Board has ultimate responsibility for approving the Group's risk appetite statement and the effective management of risk. The Risk Committee advises the Board on risk appetite and its alignment with strategy, risk governance and internal controls and high-level risk related matters.

The ongoing monitoring, assessment and management of the risk environment and the effectiveness of risk management policies resides with the Risk Management Meeting. It monitors risk inherent to the financial services business, receives reports, determines action to be taken and reviews the efficiency of the risk management framework.

Day-to-day responsibility for risk management is delegated to senior management with individual accountability. These managers are supported by functions by the "Three lines of defence" model on risk management described under Operational Risk section.

A Product Oversight Committee reporting to the RMM and comprising senior executives from Risk, Legal, Compliance, Finance, and Operations/IT, is responsible for reviewing and approving the launch of such new products and services. Each new service and product launch is also subject to an operational risk self-assessment process, which includes identification, evaluation and mitigation of risk arising from the new initiative. Internal Audit is consulted on the internal control aspect of new products and services in development prior to implementation.

Risk management tools

The Group uses a range of tools to identify, monitor and manage risk. The key tools are summarised below.

Risk appetite

The Group's Risk Appetite Statement ("RAS") sets out the type and quantum of risk that is willing to accept in achieving our medium and long-term strategic goals. Our risk appetite encapsulates consideration of both financial and non-financial risks and is expressed in both quantitative and qualitative terms. It is integrated with other risk management tools such as stress testing, top and emerging risks report, to ensure consistency in risk management practices. This is reviewed on a semi-annual basis, with formal approval from the Board on an annual basis on the recommendation of the Risk Committee.

The RMM regularly reviews the Group's actual risk appetite profile against the limits set out in the RAS on monthly basis to enable senior management to monitor the risk profile and guide business activities in order to balance risk and return. The actual risk appetite profile is also reported to the Risk Committee and Board by Chief Risk Officer including material deviation and related management mitigating actions.

Risk map

The Group uses a risk map to provide a point-in-time view of its residual risk profile across both financial and non-financial risks. This highlights the potential for these risks to materially affect our financial results, reputation or business sustainability on current and projected bases. Risk stewards assign current and projected risk ratings, supported by commentary. Risks that have an "Amber" or "Red" risk rating require monitoring and mitigating action plans being either in place or initiated to manage the risk down to acceptable levels.

Top and emerging risks

The Group uses a top and emerging risks analysis process to provide a forward-looking view of issues that are often large scale events or external circumstances, difficult to predict and are often beyond the Group's ability to directly control.

Top risk is defined as a thematic issue that may arise across any number of risk types, regions or global businesses which has the potential to have a material impact on the financial results, reputation or long term business model to the Group, and which may form and crystallise between 6 months and one year. The risk impact may be well understood by senior management, with some mitigating actions already in place. Stress tests of varying granularity may also have been carried out to assess impact.

An emerging risk is defined as a thematic issue that has large unknown components, which may form and crystallise beyond a one year time horizon. If these risks were to materialise, they could have a significant impact on a combination of the Group's long term strategy, profitability and reputation. Existing management action plans are likely to be minimal, reflecting the uncertain nature of these risks. Some high-level analysis or stress testing may have been carried out to try to assess and quantify impact.

Stress Testing

Stress testing and scenario analysis programme examines the sensitivities and resilience of our capital plan under adverse macroeconomic events to assess the sensitivities and resilience of capital adequacy. Action plans are developed to mitigate identified risks where needed. Reverse stress testing is conducted on Group level and is used to strengthen our resilience by identifying potential stresses and vulnerabilities which the Group might face and helping to inform early-warning triggers and design contingency plan to mitigate their effect were they to occur.

Independent risk function

The Group's Risk function, headed by the Group's Chief Risk Officer, is responsible for enterprise-wide risk oversight. This includes establishing and monitoring of risk profiles and forward-looking risk identification and management. The Group's Risk function is made up of sub-functions covering all risks to our operations and forms part of the second line of defence. They are independent from the sales and trading functions, ensuring the necessary balance in risk/return decisions.

Risks managed by the Group

The principal risks associated with our banking and insurance manufacturing operations are described in the tables below:

Description of risks – banking operations
(audited)

Risks	Arising from	Measurement, monitoring and management of risk
Credit risk		
Credit risk is the risk of financial loss if a customer or counterparty fails to meet an obligation under a contract.	Credit risk arises principally from direct lending, trade finance and leasing business, but also from certain other products such as guarantees and derivatives.	Credit risk is: – measured as the amount which could be lost if a customer or counterparty fails to make repayments; – monitored within limits, approved by individuals within a framework of delegated authorities; and – managed through a robust risk control framework which outlines clear and consistent policies, principles and guidance for risk managers.
Liquidity and funding risk		
Liquidity risk is the risk that the Group does not have sufficient financial resources to meet its obligations as they fall due or that it can only do so at an excessive cost. Funding risk is the risk that funding considered to be sustainable, and therefore used to fund assets, is not sustainable over time.	Liquidity risk arises from mismatches in the timing of cash flows. Funding risk arises when illiquid asset positions cannot be funded at the expected terms and when required.	Liquidity and funding risk is: – measured using a range of metrics including liquidity coverage ratio and net stable funding ratio; – assessed through the internal liquidity adequacy assessment process; – monitored against the Group's liquidity and funding risk framework; and – managed on a standalone basis with no reliance on any Group entity (unless pre-committed) or central bank unless this represents routine established business-as-usual market practice.
Market risk		
Market risk is the risk that movements in market factors, such as foreign exchange rates, interest rates, credit spreads, equity prices and commodity prices, will reduce our income or the value of our portfolios.	Exposure to market risk is separated into two portfolios: – Trading portfolios – Non-trading portfolios	Market risk is: – measured in terms of value at risk ("VaR"), which measures the potential losses on risk positions over a specified time horizon for a given level of confidence, and assessed using stress testing; – monitored using VaR, stress testing and other measures including the sensitivity of net interest income and the sensitivity of structural foreign exchange; and – managed using risk limits approved by the Group's Chief Risk Officer. These limits are allocated across business lines and to the Group's legal entities.

Description of risks – banking operations continued

Risks	Arising from	Measurement, monitoring and management of risk
Operational risk		
Operational risk is the risk to achieving our strategy or objectives as a result of inadequate or failed internal processes, people and systems or from external events.	Operational risk arises from day to day operations or external events, and is relevant to every aspect of our business. Regulatory compliance risk and financial crime risk are discussed below.	Operational risk is: – measured using the risk and control assessment process, which assesses the level of risk and effectiveness of controls; – monitored using key indicators and other internal control activities; and – primarily managed by business and functional managers. They identify and assess risks, implement controls to manage them and monitor the effectiveness of these controls utilising the operational risk management framework.
Regulatory compliance risk		
Regulatory compliance risk is the risk that we fail to observe the letter and spirit of all relevant laws, codes, rules, regulations and standards of good market practice, and incur fines and penalties and suffer damage to our business as a consequence.	Regulatory compliance risk is part of operational risk and arises from the provision of products and services to clients and counterparties.	Regulatory compliance risk is: – measured by reference to identified metrics, incident assessments, regulatory feedback and the judgement and assessment of our Regulatory Compliance teams; – monitored against our compliance risk assessments and metrics, the results of the monitoring and control activities of the second line of defence functions, and the results of internal and external audits and regulatory inspections; and – managed by establishing and communicating appropriate policies and procedures, training employees in them, and monitoring activity to assure their observance. Proactive risk control and/or remediation work is undertaken where required.
Financial crime risk		
Financial crime risk is the risk that we knowingly or unknowingly help parties to commit or to further potentially illegal activity through the Group.	Financial crime risk is part of operational risk and arises from day to day banking operations.	Financial crime risk is: – measured by reference to identified metrics, incident assessments, regulatory feedback and the judgement and assessment of our Financial Crime Compliance teams; – monitored against our financial crime risk appetite statements and metrics, the results of the monitoring and control activities of the second line of defence functions, and the results of internal and external audits and regulatory inspections; and – managed by establishing and communicating appropriate policies and procedures, training employees in them, and monitoring activity to assure their observance. Proactive risk control and/or remediation work is undertaken where required.

Description of risks – banking operations continued

Risks	Arising from	Measurement, monitoring and management of risk
Other material risks		
Reputational risk		
Reputational risk is the risk of failure to meet stakeholder expectations as a result of any event, behaviour, action or inaction, either by the Group itself, our employees or those with whom we are associated, that might cause stakeholders to form a negative view of the Group.	Primary reputational risks arise directly from an action or inaction by the Group, its employees or associated parties that are not the consequence of another type of risk. Secondary reputational risks are those arising indirectly and are a result of a failure to control any other risks.	Reputational risk is: – measured by reference to our reputation as indicated by our dealings with all relevant stakeholders, including media, regulators, customers and employees; – monitored through a reputational risk management framework, taking into account the results of the compliance risk monitoring activity; and – managed by every member of staff and is covered by a number of policies and guidelines. There is a clear structure of committees and individuals charged with mitigating reputational risk.
Pension risk		
Pension risk is the risk that the performance of assets held in pension funds is insufficient to cover existing pension liabilities resulting in an increase in obligation to support the plan.	Pension risk arises from investments delivering an inadequate return, adverse changes in interest rates or inflation, or members living longer than expected. Pension risk includes operational risks listed above.	Pension risk is: – measured in terms of the schemes' ability to generate sufficient funds to meet the cost of their accrued benefits; – monitored through the specific risk appetite; and – managed through the appropriate pension risk governance structure.
Sustainability risk		
Sustainability risk is the risk that financial services provided to customers by the Group indirectly result in unacceptable impacts on people or on the environment.	Sustainability risk arises from the provision of financial services to companies or projects which indirectly result in unacceptable impacts on people or on the environment.	Sustainability risk is: – measured by assessing the potential sustainability effect of a customer's activities and assigning a Sustainability Risk Rating to all high risk transactions; – monitored by the RMM and by group sustainability risk function; and – managed using sustainability risk policies covering project finance lending and sector-based sustainability policies for sectors and themes with potentially high environmental or social impacts.

Our insurance manufacturing subsidiary is separately regulated from our banking operations. Risks in the insurance entities are managed using methodologies and processes appropriate to insurance manufacturing operations, but remain subject to oversight at Group level. Our insurance operations are also subject to some of the same risks as our banking operations, which are covered by the Group's respective risk management processes.

Description of risks – insurance manufacturing operations

Risks	Arising from	Measurement, monitoring and management of risk
Insurance risk		
Insurance risk is the risk that, over time, the cost of acquiring and administering an insurance contract, and paying claims and benefits may exceed the total amount of premiums received and investment income.	The cost of claims and benefits can be influenced by many factors, including mortality and morbidity experience, lapse and surrender rates and, if the policy has a savings element, the performance of the assets held to support the liabilities.	Insurance risk is: – measured using an economic capital approach; – monitored according to a defined risk appetite, which is aligned to the Company's risk appetite and enterprise risk management framework, and overseen by the Risk Management Meeting of the Insurance operations; and – managed both centrally and locally using asset and liability management, product design, pricing and overall proposition management, underwriting policy, reinsurance and claims management process.
Financial risk		

Our ability to effectively match the liabilities arising under insurance contracts with the asset portfolios that back them are contingent on the management of financial risks such as market, credit and liquidity risks, and the extent to which these risks are not borne by the policyholders.
 	
Contracts with discretionary participating feature share the performance of the underlying assets between policyholders and the shareholder in line with the type of contract and the specific contract terms.
	Exposure to financial risks arises from:
	– market risk of changes in the fair values of financial assets or their future cash flows from fluctuations in variables such as interest rates, foreign exchange rates and equity prices;
	– credit risk and the potential for financial loss following the default of third parties in meeting their obligations; and
	– liquidity risk of entities not being able to make payments to policyholders as they fall due as there are insufficient assets that can be realised as cash within the required timeframe.
		Financial risk is:
		– measured separately for each type of risk:
		  – market risks are measured in terms of exposure to fluctuations in key financial variables;
		  – credit risk is measured as the amount which could be lost if counterparty fails to make required payments; and
		  – liquidity risk is measured using internal metrics including stressed operational cash flow projections;
		– monitored within limits approved by individuals within a framework of delegated authorities;
		– managed through a robust risk control framework which outlines clear and consistent policies, principles and guidance for risk managers. Subsidiary manufacturing products with guarantees are usually exposed to falls in market interest rates and equity prices to the extent that the market exposure cannot be managed by utilising any discretionary participation (or bonus) features within the policy contracts they issue; and
		– can be mitigated through sharing of risk with policyholders under the discretionary participation features for participating products.

The following information described the Group's management and control of risks, in particular, those associated with its use of financial instruments ("Financial risks"). Major types of risks to which the Group was exposed include credit risk, liquidity risk, market risk, insurance risk and operational risk.

(a) Credit Risk

(audited)

Credit risk is the risk that financial loss arises from the failure of a customer or counterparty to meet its obligations under a contract. It arises principally from lending, trade finance and leasing business, and also from certain other products, such as guarantees and derivatives. The Group has dedicated standards, policies and procedures in place to control and monitor risk from all such activities.

There are dedicated functions, reported to Chief Risk Officer, responsible for centralised management of credit risk through:

- formulating credit policies on approval process, post disbursement monitoring, recovery process and large exposure;
- issuing guidelines on lending to specified market sectors, industries and products; the acceptability of specific classes of collateral or risk mitigations and valuation parameters for collateral;
- undertaking an independent review and objective assessment of credit risk for all commercial non-bank credit facilities in excess of designated amount prior to the facilities being committed to customers;
- controlling exposures to selected industries, counterparties, countries and portfolio types etc by setting limits;
- maintaining and developing credit risk rating/facility grading process to categorise exposures and facilitate focused management;
- reporting to senior executives and various committees on aspects of the Group's loan portfolio;
- managing and directing credit-related systems initiatives; and
- providing advice and guidance to business units on various credit-related issues.

Credit risk is the risk of financial loss if a customer or counterparty fails to meet an obligation under a contract. Credit risk arises principally from direct lending, trade finance and leasing business, but also from certain other products, such as guarantees and derivatives.

Credit risk in 2018

The Group has adopted the requirements of HKFRS 9 from 1 January 2018. Under HKFRS 9, the scope of impairment now covers amortised cost financial assets, loan commitments and financial guarantees, as well as debt instruments measured at Fair Value through Other Comprehensive Income ("FVOCI"). Impairment is calculated in three stages and financial instruments are allocated into one of the three stages where the transfer mechanism depends on whether there is a significant increase/decrease in credit risk in the relevant reporting period. After the allocation, the measurement of expected credit loss ("ECL"), which is the product of probability of default ("PD"), loss given default ("LGD") and exposure at default ("EAD"), will reflect the change in risk of default occurring over the remaining life of the instruments.

(a) Credit Risk continued

Summary of credit risk

The following tables analyse the financial instruments to which the impairment requirements of HKFRS 9 are applied and the related allowance for expected credit losses ("ECL").

Summary of financial instruments to which the impairment requirements in HKFRS 9 are applied

	Gross carrying/ nominal amount	Allowance for ECL[1]
Loans and advances to customers at amortised cost:	877,134	(2,678)
– personal	317,463	(1,023)
– corporate and commercial	540,530	(1,613)
– non-bank financial institutions	19,141	(42)
Placings with and advances to banks at amortised cost	70,608	(2)
Other financial assets measured at amortised costs:	142,834	(42)
– cash and sight balances at central banks	16,421	–
– reverse repurchase agreements – non-trading	–	–
– financial investments	99,389	(37)
– other assets[2]	27,024	(5)
Total gross carrying amount on balance sheet	1,090,576	(2,722)
Loans and other credit related commitments	314,620	(55)
Financial guarantee and similar contracts	4,168	(1)
Total nominal amount off balance sheet[3]	318,788	(56)
At 31 December 2018	1,409,364	(2,778)

	Fair value	Memorandum Allowance for ECL
At 31 December 2018		
Debt instruments measured at Fair Value through Other Comprehensive Income ("FVOCI")[4]	325,036	(5)

1 For retail unsecured revolving facilities, e.g. overdrafts and credit cards, the total ECL is recognised against the financial asset unless the total ECL exceeds the gross carrying amount of the financial asset, in which case the ECL is recognised against the loan commitments.

2 Includes only those financial instruments which are subject to the impairment requirements of HKFRS 9. "Other assets" as presented within the consolidated balance sheet includes both financial and non-financial assets.

3 The figure does not include some loan commitments and financial guarantee contracts not subject to impairment requirements under HKFRS 9. As such, the amount does not agree with the figure shown in note 45 of the financial statements, which represents the maximum amount at risk should the contracts be fully drawn upon and clients default.

4 For debt instruments measured at FVOCI, the allowance for ECL is a memorandum item and the debt instruments continue to be measured at fair value without netting off the ECL in the consolidated balance sheet.

5 The above table does not include balances due from HSBC Group companies.

(a) Credit Risk continued

The following table provides an overview of the Group's credit risk by stage and industry, and the associated ECL coverage. The financial assets recorded in each stage have the following characteristics:

Stage 1: Unimpaired and without significant increase in credit risk on which a 12-month allowance for ECL is recognised.

Stage 2: A significant increase in credit risk has been experienced since initial recognition on which a lifetime ECL is recognised.

Stage 3: Objective evidence of impairment, and are therefore considered to be in default or otherwise credit-impaired on which a lifetime ECL is recognised.

POCI: Purchased or originated at a deep discount that reflects the incurred credit losses on which a lifetime ECL is recognised.

Summary of credit risk (excluding debt instruments measured at FVOCI) by stage distribution and ECL coverage by industry sector

	Gross carrying/nominal amount					Allowance for ECL					ECL coverage %				
	Stage 1	Stage 2	Stage 3	POCI	Total	Stage 1	Stage 2	Stage 3	POCI	Total	Stage 1	Stage 2	Stage 3	POCI	Total
Loans and advances to customers at amortised cost:	826,192	48,782	2,154	6	877,134	(732)	(987)	(959)	–	(2,678)	0.09%	2.02%	44.52%	0.00%	0.31%
– Personal	306,695	10,207	561	–	317,463	(301)	(618)	(104)	–	(1,023)	0.10%	6.05%	18.54%	N/A	0.32%
– Corporate and commercial	502,839	36,092	1,593	6	540,530	(403)	(355)	(855)	–	(1,613)	0.08%	0.98%	53.67%	0.00%	0.30%
– non-bank financial institutions	16,658	2,483	–	–	19,141	(28)	(14)	–	–	(42)	0.17%	0.56%	N/A	N/A	0.22%
Placings with and advances to banks at amortised cost	70,409	199	–	–	70,608	(2)	–	–	–	(2)	0.00%	0.00%	N/A	N/A	0.00%
Other financial assets measured at amortised cost	141,889	944	1	–	142,834	(34)	(8)	–	–	(42)	0.02%	0.85%	0.00%	N/A	0.03%
Loans and other credit-related commitments	310,118	4,502	–	–	314,620	(42)	(13)	–	–	(55)	0.01%	0.29%	N/A	N/A	0.02%
– Personal	219,048	–	–	–	219,048	–	–	–	–	–	0.00%	N/A	N/A	N/A	0.00%
– Corporate and commercial	90,433	4,501	–	–	94,934	(42)	(13)	–	–	(55)	0.05%	0.29%	N/A	N/A	0.06%
– non-bank financial institutions	637	1	–	–	638	–	–	–	–	–	0.00%	0.00%	N/A	N/A	0.00%
Financial guarantee and similar contracts:	3,865	303	–	–	4,168	(1)	–	–	–	(1)	0.03%	0.00%	N/A	N/A	0.02%
– Personal	7	–	–	–	7	–	–	–	–	–	0.00%	N/A	N/A	N/A	0.00%
– Corporate and commercial	3,848	299	–	–	4,147	(1)	–	–	–	(1)	0.03%	0.00%	N/A	N/A	0.02%
– non-bank financial institutions	10	4	–	–	14	–	–	–	–	–	0.00%	0.00%	N/A	N/A	0.00%
At 31 December 2018	1,352,473	54,730	2,155	6	1,409,364	(811)	(1,008)	(959)	–	(2,778)	0.06%	1.84%	44.50%	0.00%	0.20%

Unless identified at an earlier stage, all financial assets are deemed to have suffered a significant increase in credit risk when they are 30 days past due ("DPD") and are transferred from stage 1 to stage 2. The disclosure below presents the aging of stage 2 loans and advances to customers by those less than 30 and greater than 30 days past due and therefore presents those amounts classified as stage 2 due to aging (30 days past due) and those identified at an earlier stage (less than 30 days past due).

(a) Credit risk continued

Stage 2 days past due analysis for loans and advances to customers at 31 December 2018

	Gross carrying amount			Allowance for ECL			ECL coverage %		
	Stage 2	Of which: 1 to 29 DPD	Of which: 30 and > DPD	Stage 2	Of which: 1 to 29 DPD	Of which: 30 and > DPD	Stage 2	Of which: 1 to 29 DPD	Of which: 30 and > DPD
Loans and advances to customers at amortised cost									
– Personal	10,207	1,287	457	(618)	(45)	(37)	6.05%	3.50%	8.10%
– Corporate and commercial	36,092	194	51	(355)	(17)	(21)	0.98%	8.76%	41.18%
– non-bank financial institutions	2,483	–	–	(14)	–	–	0.56%	N/A	N/A

Concentration of credit risk

Concentration of credit risk exists when changes in geographic, economic or industry factors similarly affect groups of counterparties whose aggregate credit exposure is material in relation to the Group's total exposures. The Group's portfolio of financial instrument is diversified along geographic, industry and product sectors. Analysis of geographical concentration of the Group's assets is disclosed in note 21 to the financial statements and credit risk concentration of respective financial assets is disclosed in notes 25, 26, 28 and 29.

(i) Maximum exposure to credit risk before collateral held or other credit enhancements *(audited)*

Our credit exposure is spread across a broad range of asset classes, including derivatives, trading assets, loans and advances to customers, loans and advances to banks and financial investments.

The following table presents the maximum exposure to credit risk from balance sheet and off-balance sheet financial instruments, before taking account of any collateral held or other credit enhancements (unless such credit enhancements meet accounting offsetting requirements). For financial assets recognised on the balance sheet, the maximum exposure to credit risk equals their carrying amount; for financial guarantees and similar contracts granted, it is the maximum amount that we would have to pay if the guarantees were called upon. For loan commitments and other credit-related commitments that are irrevocable over the life of the respective facilities, it is generally the full amount of the committed facilities.

	2018	2017
Cash and sight balances at central banks	16,421	21,718
Placings with and advances to banks	79,400	103,113
Trading assets	47,148	53,680
Financial assets designated and otherwise mandatorily measured at fair value/ financial assets designated at fair value	1,331	792
Derivative financial instruments	8,141	10,836
Loans and advances to customers	874,456	806,573
Financial investments	424,388	379,050
Other assets	27,019	18,913
Financial guarantees and other credit related contingent liabilities	4,167	3,409
Loan commitments and other credit related commitments	594,457	516,588
	2,076,928	1,914,672

(a) Credit risk continued

(ii) Measurement uncertainty and sensitivity analysis of ECL estimates

Expected credit loss impairment allowances recognised in the financial statements reflect the effect of a range of possible economic outcomes, calculated on a probability-weighted basis, based on the economic scenarios described below. The recognition and measurement of expected credit losses ("ECL") involves the use of significant judgement and estimation. It is necessary to formulate multiple forward-looking economic forecasts and incorporate them into the ECL estimates. The Group uses a standard framework to form economic scenarios to reflect assumptions about future economic conditions, supplemented with the use of management judgement, which may result in using alternative or additional economic scenarios and/or management adjustments.

Methodology

The Group has adopted the use of three scenarios, representative of our view of forecast economic conditions, sufficient to calculate unbiased expected loss in most economic environments. They represent a "most likely outcome" (the Central scenario), and two, less likely "outer" scenarios, referred to as the Upside and Downside scenarios. Each outer scenario is consistent with a probability of 10%, while the Central scenario is assigned the remaining 80%, according to the decision of the Group's senior management. This weighting scheme is deemed appropriate for the unbiased estimation of ECL in most circumstances. Key scenario assumptions are set using the average of forecasts of external economists, helping to ensure that the HKFRS 9 scenarios are unbiased and maximise the use of independent information. The Central, Upside and Downside scenarios selected with reference to external forecast distributions using the above approach are termed the "consensus economic scenarios".

For the Central scenario, the Group sets key assumptions such as GDP growth, inflation, unemployment and policy interest rates, using either the average of external forecasts (commonly referred to as consensus forecasts) for most economies, or market prices. An external provider's global macro model, conditioned to follow the consensus forecasts, projects the other paths required as inputs to credit models. This external provider is subject to the Group's risk governance framework, with oversight by a specialist internal unit.

The Upside and Downside scenarios are designed to be cyclical, in that GDP growth, inflation and unemployment usually revert back to the Central scenario after the first three years for major economies. The Group determines the maximum divergence of GDP growth from the Central scenario using the 10th and the 90th percentile of the entire distribution of forecast outcomes for major economies. While key economic variables are set with reference to external distributional forecasts, the Group also aligns the overall narrative of the scenarios to the macroeconomic risks described in the Group's "Top and emerging risks". This ensures that scenarios remain consistent with the more qualitative assessment of these risks. The Group projects additional variable paths using the external provider's global macro model.

The Group applies the following to generate the three economic scenarios:

- Economic risk assessment: The Group develops a shortlist of the upside and downside economic and political risks, most relevant to the Group and the HKFRS 9 measurement objective. These include local and global economic and political risks, which together affect economies that have a material effect on credit risk for the Group, namely Hong Kong, mainland China, US, UK and countries in the eurozone. The Group compiles this shortlist by monitoring developments in the global economy, by reference to our top and emerging risks, and by consulting external and internal subject matter experts.
- Scenario generation: For the Central scenario, the Group obtains a predefined set of economic paths from the average taken from the consensus survey of professional forecasters. Paths for the two outer scenarios are benchmarked to the Central scenario and reflect the economic risk assessment. The Group selects scenarios that in management's judgement are representative of the probability weighting scheme, informed by the current economic outlook, data analysis of past recessions, and transitions in and out of recession. The key assumptions made, and the accompanying paths, represent our "best estimate" of a scenario at a specified probability. Suitable narratives are developed for the Central scenario and the paths of the two outer scenarios.
- Variable enrichment: The Group expands each scenario through enrichment of variables. This includes the production of more than 400 variables that are required to calculate ECL. The external provider expands these scenarios by using as inputs the agreed scenario narratives and the variables aligned to these narratives. Scenarios, once expanded, continue to be benchmarked to latest events and information. Late breaking events could lead to revision of scenarios to reflect management judgement.

(a) Credit risk continued

(ii) Measurement uncertainty and sensitivity analysis of ECL estimates continued

Methodology continued

The Upside and Downside scenarios are generated at the year-end and are only updated during the year if economic conditions change significantly. The Central scenario is generated every quarter. In quarters where only the Central scenario is updated, outer scenarios for use in Wholesale are adjusted such that the relationship between the Central scenario and outer scenarios in the quarter is consistent with that observed at the last full scenario generation. In Retail, three scenarios are run annually to establish the effect of multiple scenarios for each portfolio. This effect is then applied in each quarter with the understanding that the non-linearity of response to economic conditions should not change, unless a significant change in economic conditions occurs.

The Group recognises that the consensus economic scenario approach, using three scenarios, will be insufficient in certain economic environments. Additional analysis may be requested at management's discretion. This may result in a change in the weighting scheme assigned to the three scenarios or the inclusion of extra scenarios. The Group anticipates that there will be only limited instances when the standard approach will not apply. We invoked this additional step during 2018, with an adjustment in respect of trade- and tariff-related tensions. See "Global Trade War scenario" below.

Description of Consensus Economic Scenarios

The economic assumptions presented in this section have been formed internally by the Group specifically for the purpose of calculating expected credit loss.

The consensus Central scenario

The Group's central scenario is one of moderate growth over the forecast period 2019–2023. GDP growth is expected to be 2.6% on average over the period, which is marginally higher than the average growth rate over the period 2013–2017. Across the key markets, we note:

- Expected average rates of GDP growth over the 2019–2023 period are lower than average growth rates achieved over the 2013–2017 period for mainland China and Hong Kong. For mainland China, it is consistent with the theme of ongoing rebalancing from an export-oriented economy to deeper domestic consumption.
- The average unemployment rate over the projection horizon is expected to remain at or below the averages observed in the 2013–2017 period across all of our major markets.
- Inflation is expected to be stable despite steady GDP growth and strong labour markets and will remain close to central bank targets in our core markets over the forecast period.
- Major central banks are expected to gradually raise their main policy interest rate. The US Federal Reserve Board ("FRB") will continue to reduce the size of its balance sheet and the European Central Bank is expected to raise interest rates from the second half of 2019. The Chinese Central Bank is expected to continue to rely on its toolkit of measures to control capital flows and manage domestic credit growth.
- The West Texas Intermediate oil price is forecast to average US$63 per barrel over the projection period.

(a) Credit risk continued

(ii) Measurement uncertainty and sensitivity analysis of ECL estimates continued

The consensus Central scenario continued

Key macroeconomic variables are shown in the table below:

Central scenario (average 2019–2023)

	Hong Kong	Mainland China
GDP growth rate (%)	2.6	5.9
Inflation (%)	2.3	2.5
Unemployment (%)	3.1	4.0
Short term interest rate (%)	2.6	4.0
10Y treasury bond yield (%)	3.1	N/A
Property price growth (%)	1.0	5.8
Equity price growth (%)	3.8	9.6

The consensus Upside scenario

Globally, real GDP growth rises in the first two years of the Upside scenario before converging to the Central scenario. Increased confidence, de-escalation of trade tensions and removal of trade barriers, expansionary fiscal policy, positive resolution of economic uncertainty in the UK, stronger oil prices as well as calming of geopolitical tensions are the risk themes that support the 2018 year-end Upside scenario.

Key macroeconomic variables are shown in the table below:

Upside scenario (average 2019–2023)

	Hong Kong	Mainland China
GDP growth rate (%)	2.9	6.1
Inflation (%)	2.6	2.7
Unemployment (%)	2.9	3.7
Short term interest rate (%)	2.6	4.1
10Y treasury bond yield (%)	3.3	N/A
Property price growth (%)	1.4	7.3
Equity price growth (%)	7.1	13.6

(a) Credit risk continued

(ii) Measurement uncertainty and sensitivity analysis of ECL estimates continued

The Downside scenario

The consensus Downside scenarios

Globally, real GDP growth declines for two years in the Downside scenario before recovering to the Central scenario. House price growth either stalls or contracts and equity markets correct abruptly in our major markets. The global slowdown in demand drives commodity prices lower and results in an accompanying fall in inflation. Central Banks remain accommodative. This is consistent with the key risk themes of the downside, such as an intensification of global protectionism and trade barriers, faster than expected tightening of Fed policy rate, a worsening of economic uncertainty in the UK, China choosing to rebalance with stringent measures, and weaker commodity prices.

Key macroeconomic variables are shown in the table below:

Downside scenario (average 2019–2023)

	Hong Kong	Mainland China
GDP growth rate (%)	2.2	5.8
Inflation (%)	1.9	2.2
Unemployment (%)	3.5	4.2
Short term interest rate (%)	0.6	3.6
10Y treasury bond yield (%)	1.6	N/A
Property price growth (%)	(0.8)	3.3
Equity price growth (%)	(1.6)	2.0

Global trade war Downside scenario

Continued escalation of trade- and tariff-related tensions throughout 2018 resulted in management modelling deeper effects of a trade war scenario than currently captured by the consensus Downside scenario for key Asia-Pacific economies. This additional trade war scenario models the effects of a significant escalation in global tensions, stemming from trade disputes but going beyond increases in tariffs to affect non-tariff barriers, cross-border investment flows and threatens the international trade architecture. This scenario assumes actions that lie beyond currently enacted and proposed tariffs and has been modelled as an addition to the three consensus-driven scenarios for these economies.

Key macroeconomic variables are shown in the table below:

Global Trade War scenario (average 2019–2023)

	Hong Kong	Mainland China
GDP growth rate (%)	1.5	5.4
Inflation (%)	1.6	2.1
Unemployment (%)	4.7	4.3
Short term interest rate (%)	1.0	3.1
10Y treasury bond yield (%)	2.0	N/A
Property price growth (%)	(2.0)	2.9
Equity price growth (%)	(3.5)	1.1

The conditions that resulted in departure from the consensus economic forecasts will be reviewed regularly as economic conditions change in future to determine whether these adjustments continue to be necessary. The tables above show the five-year average of GDP growth rate.

(a) Credit risk continued

(ii) Measurement uncertainty and sensitivity analysis of ECL estimates continued

How economic scenarios are reflected in the wholesale calculation of ECL

The Group has developed a globally consistent methodology for the application of forward economic guidance into the calculation of ECL by incorporating forward economic guidance into the estimation of the term structure of probability of default ("PD") and loss given default ("LGD"). For PDs, we consider the correlation of forward economic guidance to default rates for a particular industry in a country. For LGD calculations, we consider the correlation of forward economic guidance to collateral values and realisation rates for a particular country and industry. PDs and LGDs are estimated for the entire term structure of each instrument.

For impaired loans, LGD estimates take into account independent recovery valuations provided by external consultants where available, or internal forecasts corresponding to anticipated economic conditions and individual company conditions. In estimating the ECL on impaired loans that are individually considered not to be significant, the Group incorporates forward economic guidance proportionate to the probability-weighted outcome and the Central scenario outcome for non-stage 3 populations.

How economic scenarios are reflected in the retail calculation of ECL

The Group has developed and implemented a globally consistent methodology for incorporating forecasts of economic conditions into ECL estimates. The impact of economic scenarios on PD is modelled at a portfolio level. Historic relationships between observed default rates and macro-economic variables are integrated into HKFRS 9 ECL estimates by leveraging economic response models. The impact of these scenarios on PD is modelled over a period equal to the remaining maturity of underlying asset or assets. The impact on LGD is modelled for mortgage portfolios by forecasting future loan-to-value ("LTV") profiles for the remaining maturity of the asset by leveraging national level forecasts of the house price index and applying the corresponding LGD expectation.

Economic scenarios sensitivity analysis of ECL estimates

The ECL outcome is sensitive to judgement and estimations made with regards to the formulation and incorporation of multiple forward-looking economic conditions described above. As a result, management assessed and considered the sensitivity of the ECL outcome against the forward-looking economic conditions as part of the ECL governance process by recalculating the ECL under each scenario described above for selected portfolios, applying a 100% weighting to each scenario in turn. The weighting is reflected in both the determination of significant increase in credit risk as well as the measurement of the resulting ECL.

The economic scenarios are generated to capture the Group's view of a range of possible forecast economic conditions that is sufficient for the calculation of unbiased and probability-weighted ECL. Therefore, the ECL calculated for each of the scenarios represent a range of possible outcomes that have been evaluated to estimate ECL. As a result, the ECL calculated for the Upside and Downside scenarios should not be taken to represent the lower and upper limits of possible actual ECL outcomes. There is a high degree of estimation uncertainty in numbers representing tail risk scenarios when assigned a 100% weighting, and an indicative range is provided for the tail risk sensitivity analysis. A wider range of possible ECL outcomes reflects uncertainty about the distribution of economic conditions and does not necessarily mean that credit risk on the associated loans is higher than for loans where the distribution of possible future economic conditions is narrower. The recalculated ECL for each of the scenarios should be read in the context of the sensitivity analysis as a whole and in conjunction with the narrative disclosures provided below.

ECL under each scenario is given as a percentage of the probability-weighted ECL impairment allowance as at 31 December 2018.

(a) Credit risk continued

(ii) Measurement uncertainty and sensitivity analysis of ECL estimates continued

Wholesale analysis

HKFRS 9 ECL sensitivity to future economic conditions[1]

	Hong Kong %	Mainland China %
Reported ECL coverage	0.06	0.34
Consensus central scenario	0.06	0.34
Consensus upside scenario	0.06	0.32
Consensus downside scenario	0.06	0.37
Trade war	0.27	0.90

1 Excludes ECL and drawn amounts related to defaulted obligors

ECL coverage rates reflect the underlying observed credit defaults, the sensitivity to economic environment, extent of security and the effective maturity of the book. Hong Kong is typically a short-dated book with low defaults, which is reflected in the low ECL coverage ratio.

Retail analysis

The geographies below were selected based on contribution to overall ECL within our retail lending business.

HKFRS 9 ECL sensitivity to future economic conditions[1]

	Hong Kong %	Mainland China %
Reported ECL coverage	0.40	0.08
Consensus central scenario	0.40	0.08
Consensus upside scenario	0.37	0.08
Consensus downside scenario	0.41	0.10
Trade war	0.47	0.10

1 ECL sensitivities exclude portfolios utilising less complex modelling approaches

Under certain economic conditions, economic factors can influence ECL in counter-intuitive ways (for example an increase in GDP growth accompanied by rising interest rates resulting in an increase in PDs) and it may be necessary to apply management judgement to the output, which following management review of the calculated ECL sensitivities, may require modelled output adjustments.

For all the above sensitivity analyses, as the level of uncertainty, economic forecasts, historical economic variable correlations or credit quality changes, corresponding changes in the ECL sensitivity would occur.

(a) Credit risk continued

(iii) Reconciliation of changes in gross carrying/nominal amount and allowances for loans and advances to banks and customers

The table below provides a reconciliation of the Group's gross carrying/nominal amount and allowances for placings with and advances to banks and loans and advances to customers, including loan commitments and financial guarantees.

The transfers of financial instruments represents the impact of stage transfers upon the gross carrying/nominal amount and associated allowance for ECL. The net remeasurement of ECL arising from stage transfers represents the increase in ECL due to these transfers.

Reconciliation of gross exposure and allowances/provision for loans and advances to banks and customers including loan commitments and financial guarantees
(audited)

	Non credit – impaired				Credit – impaired				Total	
	Stage 1		Stage 2		Stage 3		POCI[1]			
	Gross exposure	Allowance/ provision for ECL	Gross exposure	Allowance/ provision for ECL	Gross exposure	Allowance/ provision for ECL	Gross exposure	Allowance/ provision for ECL	Gross exposure	Allowance/ provision for ECL
At 1 January 2018	1,110,402	(692)	77,109	(1,175)	2,001	(745)	173	(18)	1,189,685	(2,630)
Transfers of financial instruments:										
– transfers from Stage 1 to Stage 2	(31,781)	61	31,781	(61)	–	–	–	–	–	–
– transfers from Stage 2 to Stage 1	44,845	(427)	(44,845)	427	–	–	–	–	–	–
– transfers to Stage 3	(880)	2	(526)	7	1,406	(9)	–	–	–	–
– transfers from Stage 3	–	–	22	–	(22)	–	–	–	–	–
Net remeasurement of ECL arising from transfer of stage	–	286	–	(219)	–	(5)	–	–	–	62
Changes due to modifications not derecognised	–	–	–	–	–	–	–	–	–	–
Net new and further lending/(repayments)	93,785	(65)	(7,898)	206	(226)	109	(159)	10	85,502	260
Changes to risk parameters (model inputs)	–	54	–	(191)	–	(1,313)	–	2	–	(1,448)
Changes to model used for ECL calculation	–	–	–	–	–	–	–	–	–	–
Assets written off	–	–	–	–	(999)	999	(6)	6	(1,005)	1,005
Foreign exchange and others	(5,787)	4	(1,857)	6	(6)	5	(2)	–	(7,652)	15
At 31 December 2018	**1,210,584**	**(777)**	**53,786**	**(1,000)**	**2,154**	**(959)**	**6**	**–**	**1,266,530**	**(2,736)**

	Total
Change in ECL in income statement (charge)/release for the year	(1,126)
Add: Recoveries	143
Add/(less): Others	(13)
Total ECL (charge)/release for the year	(996)

	At 31 December 2018		For the year ended 31 December 2018
	Gross carrying/ nominal amount	Allowance for ECL	ECL (charge)/release
Placings with and advances to banks and loans and advances to customers, including loan commitments and financial guarantees	1,266,530	(2,736)	(996)
Other financial assets measured at amortised cost	142,834	(42)	2
Summary of financial instruments to which the impairment requirements in HKFRS 9 are applied/Summary consolidated income statement	1,409,364	(2,778)	(994)
Debt instruments measured at FVOCI[3]	325,191	(5)	–
Performance and other guarantees	12,046	(2)	(2)
Total allowance for ECL/total income statement ECL charge for the year	1,746,601	(2,785)	(996)

1 Purchased or originated credit-impaired ("POCI") represented distressed restructuring.
2 The above table does not include balances due from HSBC Group companies.
3 For the purposes of this disclosure, gross carrying value is defined as the amortised cost of a financial asset, before adjusting for any loss allowance. As such, the gross carrying value of debt instruments at FVOCI as presented above will not reconcile to the Consolidated Balance Sheet as it excludes fair value gains and losses.

(a) Credit risk continued

(iv) Credit quality of financial instruments

(audited)

We assess the credit quality of all financial instruments that are subject to credit risk. The credit quality of financial instruments is a point in time assessment of the probability of default of financial instruments, whereas HKFRS 9 stages 1 and 2 are determined based on relative deterioration of credit quality since initial recognition. Accordingly, for non-credit impaired financial instruments, there is no direct relationship between the credit quality assessments and HKFRS 9 stages 1 and 2, though typically the lowered credit quality bands exhibit a higher proportion in Stage 2.

Five broad classifications describe the credit quality of the Group's lending and debt securities portfolios. These classifications each encompass a range of more granular, internal credit rating grades assigned to wholesale and retail lending business, as well as the external ratings attributed by external agencies to debt securities. For debt securities and certain other financial instruments, external ratings have been aligned to five credit quality classifications based on the mapping of related customer risk ratings ("CRR") to external credit ratings. The mapping is reviewed on a regular basis.

There is no direct correlation between the internal and external ratings at granular level, except insofar as both fall within one of the five classifications.

Under HKAS 39, retail lending credit quality was disclosed based on expected-loss percentages. Under HKFRS 9 retail lending credit quality is now disclosed based on a 12-month probability-weighted PD. The credit quality classifications for wholesale lending are unchanged and are based on internal credit risk ratings.

	Debt securities and other bills	Wholesale lending		Retail lending	
Credit quality classification	External credit rating	Internal credit rating	12-month Basel probability of default %	Internal credit rating	12-month probability-weighted PD %
Strong	A- and above	CRR 1 to CRR 2	0–0.169	Band 1–2	0–0.500
Good	BBB+ to BBB-	CRR 3	0.170–0.740	Band 3	0.501–1.500
Satisfactory	BB+ to B, and unrated	CRR 4 to CRR 5	0.741–4.914	Band 4–5	1.501–20.000
Sub-standard	B- to C	CRR 6 to CRR 8	4.915–99.999	Band 6	20.001–99.999
Credit-impaired	Default	CRR 9 to CRR 10	100	Band 7	100

Quality classification definitions:

- Strong: Exposures demonstrate a strong capacity to meet financial commitments, with negligible or low probability of default.
- Good: Exposures demonstrate a good capacity to meet financial commitments, with low default risk.
- Satisfactory: Exposures require closer monitoring and demonstrate an average to fair capacity to meet financial commitments, with moderate default risk.
- Sub-standard: Exposures require varying degrees of special attention and default risk of greater concern.
- Credit-impaired: Exposures have been assessed as impaired.

(a) Credit risk continued

(iv) Credit quality of financial instruments continued

(audited)

Distribution of financial instruments by credit quality

	Gross carrying/notional amount							
	Strong	Good	Satisfactory	Sub-standard	Credit impaired	Total	Allowance for ECL	Net
In-scope for HKFRS 9 impairment								
Loans and advances to customers at amortised cost	434,917	217,902	219,602	2,553	2,160	877,134	(2,678)	874,456
– personal	297,151	11,696	7,851	204	561	317,463	(1,023)	316,440
– corporate and commercial	135,183	196,474	204,925	2,349	1,599	540,530	(1,613)	538,917
– non-bank financial institutions	2,583	9,732	6,826	–	–	19,141	(42)	19,099
Placings with and advances to banks at amortised cost	69,493	1,111	4	–	–	70,608	(2)	70,606
Cash and sight balances at central banks	16,421	–	–	–	–	16,421	–	16,421
Financial investments measured at amortised cost	83,590	12,054	3,745	–	–	99,389	(37)	99,352
Other assets	18,369	4,667	3,986	1	1	27,024	(5)	27,019
Debt instruments measured at fair value through other comprehensive income[1]	324,037	1,154	–	–	–	325,191	(5)	325,186
	946,827	236,888	227,337	2,554	2,161	1,415,767	(2,727)	1,413,040
Out-of-scope for HKFRS 9 impairment								
Trading assets	47,148	–	–	–	–	47,148	–	47,148
Other financial assets designated and otherwise mandatorily measured at fair value through profit or loss	300	1,031	–	–	–	1,331	–	1,331
Derivative financial instruments	4,460	1,603	125	26	–	6,214	–	6,214
	51,908	2,634	125	26	–	54,693	–	54,693
At 31 December 2018	998,735	239,522	227,462	2,580	2,161	1,470,460	(2,727)	1,467,733
Percentage of total credit quality	68%	16%	16%	0%	0%	100%		
Loan and other credit – related commitments[2]	256,094	32,083	25,954	489	–	314,620	(55)	314,565
Financial guarantee and similar contracts[2]	745	2,845	568	10	–	4,168	(1)	4,167

1 For the purposes of this disclosure, gross carrying value is defined as the amortised cost of a financial asset, before adjusting for any loss allowance. As such, the gross carrying value of debt instruments at FVOCI as presented above will not reconcile to the Consolidated Balance Sheet as it excludes fair value gains and losses.

2 Figures do not include commitments and financial guarantee contracts not subject to impairment requirements under HKFRS 9. As such, the amounts do not agree with the figures shown in note 45 on the consolidated financial statements.

3 The above table does not include balances due from HSBC Group companies.

(a) Credit risk continued

(iv) Credit quality of financial instruments continued

(audited)

Distribution of financial instruments to which the impairment requirements in HKFRS 9 are applied, by credit quality and stage distribution

	Gross carrying/notional amount							
	Strong	Good	Satisfactory	Sub-standard	Credit impaired	Total	Allowance for ECL	Net
Placings with and advances to banks at amortised cost	69,493	1,111	4	–	–	70,608	(2)	70,606
– stage 1	69,421	984	4	–	–	70,409	(2)	70,407
– stage 2	72	127	–	–	–	199	–	199
– stage 3	–	–	–	–	–	–	–	–
– POCI	–	–	–	–	–	–	–	–
Loans and advances to customers at amortised cost	434,917	217,902	219,602	2,553	2,160	877,134	(2,678)	874,456
– stage 1	432,339	206,471	186,749	633	–	826,192	(732)	825,460
– stage 2	2,578	11,431	32,853	1,920	–	48,782	(987)	47,795
– stage 3	–	–	–	–	2,154	2,154	(959)	1,195
– POCI	–	–	–	–	6	6	–	6
Other financial assets measured at amortised cost	118,380	16,721	7,731	1	1	142,834	(42)	142,792
– stage 1	117,878	16,384	7,627	–	–	141,889	(34)	141,855
– stage 2	502	337	104	1	–	944	(8)	936
– stage 3	–	–	–	–	1	1	–	1
– POCI	–	–	–	–	–	–	–	–
Loan and other credit-related commitments[2]	256,094	32,083	25,954	489	–	314,620	(55)	314,565
– stage 1	256,094	30,267	23,494	263	–	310,118	(42)	310,076
– stage 2	–	1,816	2,460	226	–	4,502	(13)	4,489
– stage 3	–	–	–	–	–	–	–	–
– POCI	–	–	–	–	–	–	–	–
Financial guarantees and similar contracts[2]	745	2,845	568	10	–	4,168	(1)	4,167
– stage 1	745	2,765	355	–	–	3,865	(1)	3,864
– stage 2	–	80	213	10	–	303	–	303
– stage 3	–	–	–	–	–	–	–	–
– POCI	–	–	–	–	–	–	–	–
At 31 December 2018	879,629	270,662	253,859	3,053	2,161	1,409,364	(2,778)	1,406,586
Debt instruments at FVOCI [1]								
– stage 1	324,037	1,154	–	–	–	325,191	(5)	325,186
– stage 2	–	–	–	–	–	–	–	–
– stage 3	–	–	–	–	–	–	–	–
– POCI	–	–	–	–	–	–	–	–
At 31 December 2018	324,037	1,154	–	–	–	325,191	(5)	325,186

1 For the purposes of this disclosure, gross carrying value is defined as the amortised cost of a financial asset, before adjusting for any loss allowance. As such, the gross carrying value of debt instruments at FVOCI as presented above will not reconcile to the Consolidated Balance Sheet as it excludes fair value gains and losses.

2 Figures do not include commitments and financial guarantee contracts not subject to impairment requirements under HKFRS 9. As such, the amounts do not agree with the figures shown in note 45 on the consolidated financial statements.

3 The above table does not include balances due from HSBC Group companies.

(a) Credit risk continued

(v) Collateral and other credit enhancements

Loans and advances

(audited)

Although collateral can be an important mitigant of credit risk, it is the Group's practice to lend on the basis of the customer's ability to meet their obligations out of their cash flow resources rather than rely on the value of security offered. Depending on the customer's standing and the type of product, facilities may be provided unsecured. However, for certain lending decisions a charge over collateral is usually obtained, and is important for the credit decision and pricing, and it is the Bank's practice to obtain that collateral and sell it in the event of default as a source of repayment. Such collateral has a significant financial effect and the objective of the disclosure below is to quantify these forms. We may also manage our risk by employing other types of collateral and credit risk enhancements, such as second charges, other liens and unsupported guarantees, but the valuation of such mitigants is less certain and their financial effect has not been quantified in the loans shown below.

We have quantified below the value of fixed charges we hold over a specific asset (or assets) of a borrower for which we have a practical ability and history of enforcing in satisfying a debt in the event of a borrower failing to meet their contractual obligations and where the asset is cash or can be realised in the form of cash by sale in an established market.

Personal lending

(audited)

For personal lending the collateral held has been analysed below separately for residential mortgages and other personal lending due to the different nature of collateral held on the portfolios.

(a) Credit risk continued

(v) Collateral and other credit enhancements continued

Residential mortgages

(audited)

The following table shows residential mortgage lending including off-balance sheet loan commitments by level of collateralisation.

Residential mortgages including loan commitments by level of collateral

	Gross carrying/ nominal amount	ECL	ECL coverage %
Stage 1			
Fully collateralised	244,155	(1)	0.00
LTV ratio:			
– Less than 70%	225,705	(1)	0.00
– 71% to 90%	13,968	(0)	0.00
– 91% to 100%	4,482	(0)	0.00
Partially collateralised (A)	17	(0)	0.01
Total	244,172	(1)	0.00
– *Collateral value on A*	16	–	–
Stage 2			
Fully collateralised	4,533	(1)	0.01
LTV ratio:			
– Less than 70%	4,397	(0)	0.01
– 71% to 90%	126	(0)	0.01
– 91% to 100%	10	–	–
Partially collateralised (B)	–	–	–
Total	4,533	(1)	0.01
– *Collateral value on B*	–	–	–
Stage 3			
Fully collateralised	185	(8)	4.45
LTV ratio:			
– Less than 70%	183	(8)	4.48
– 71% to 90%	–	–	–
– 91% to 100%	2	–	–
Partially collateralised (C)	–	–	–
Total	185	(8)	4.45
– *Collateral value on C*	–	–	–
POCI			
Fully collateralised	–	–	–
LTV ratio:			
– Less than 70%	–	–	–
– 71% to 90%	–	–	–
– 91% to 100%	–	–	–
Partially collateralised (D)	–	–	–
Total	–	–	–
– *Collateral value on D*	–	–	–
At 31 December 2018	248,890	(10)	0.00

(a) Credit risk continued

(v) Collateral and other credit enhancements continued

The collateral included in the table above consists of fixed first charges on residential real estate.

The loan-to-value ("LTV") ratio in the table above is calculated as the gross on-balance sheet carrying amount of the loan and any off-balance sheet loan commitment at the balance sheet date as a percentage of the current value of collateral. The current value of collateral is determined through a combination of professional valuations, physical inspections or house price indices. The collateral valuation excludes any adjustments for obtaining and selling the collateral.

Other personal lending
(audited)

The remainder of our personal lending consists primarily of credit cards, instalment loan, overdraft or revolving loan. Credit cards are generally unsecured. Instalment loan, overdraft and revolving loan could be partially secured by cash or marketable securities.

Corporate and commercial and financial (non-bank) lending
(audited)

For corporate and commercial and financial (non-bank) lending, the collateral held has been analysed below separately for commercial real estate and other corporate and commercial and financial (non-bank) lending due to the different nature of collateral held on the portfolios.

Commercial real estate
(audited)

Commercial real estate lending includes the financing of corporate and institutional customers who are investing primarily in income-producing assets and, to a lesser extent, in their construction and development. The Group has aligned the definition of commercial real estate to reflect the internal risk management view, and the comparatives presented under Credit Risk (vi), have been restated.

(a) Credit risk continued

(v) Collateral and other credit enhancements continued

Commercial real estate continued

(audited)

The following table shows commercial real estate lending including off-balance sheet loan commitments by level of collateralisation.

Commercial real estate loans and advances including loan commitments by level of collateral

	Gross carrying/ nominal amount	ECL	ECL coverage %
Stage 1			
Not collateralised	103,278	(32)	0.03
Fully collateralised	150,255	(80)	0.05
Partially collateralised (A)	11,540	(9)	0.07
Total	265,073	(121)	0.05
– *Collateral value on A*	8,107	–	–
Stage 2			
Not collateralised	2,391	(12)	0.49
Fully collateralised	10,259	(69)	0.67
Partially collateralised (B)	87	(0)	0.37
Total	12,737	(81)	0.64
– *Collateral value on B*	24	–	–
Stage 3			
Not collateralised	–	–	–
Fully collateralised	76	–	–
Partially collateralised (C)	–	–	–
Total	76	–	–
– *Collateral value on C*	–	–	–
POCI			
Not collateralised	–	–	–
Fully collateralised	–	–	–
Partially collateralised (D)	–	–	–
Total	–	–	–
– *Collateral value on D*	–	–	–
At 31 December 2018	277,886	(202)	0.07

The collateral included in the table above consists of fixed first charges on real estate and charges over cash for the commercial real estate sector. The table includes lending to major property developers which is typically secured by guarantees or is unsecured.

The value of commercial real estate collateral is determined through a combination of professional and internal valuations and physical inspection. Due to the complexity of collateral valuations for commercial real estate, local valuation policies determine the frequency of review based on local market conditions. Revaluations are sought with greater frequency where, as part of the regular credit assessment of the obligor, material concerns arise in relation to the transaction which may reflect on the underlying performance of the collateral, or in circumstances where an obligor's credit quality has declined sufficiently to cause concern that the principal payment source may not fully meet the obligation (i.e. the obligor's credit quality classification indicates it is at the lower end e.g. sub-standard, or approaching impaired).

(a) Credit risk continued

(v) Collateral and other credit enhancements continued

Other corporate and commercial and financial (non-bank) lending

(audited)

The following table shows corporate, commercial and financial (non-bank) lending including off-balance sheet loan commitments by level of collateralisation.

Other corporate, commercial and non-bank financial institutions loans and advances including loan commitment by level of collateral

	Gross carrying/ nominal amount	ECL	ECL coverage %
Stage 1			
Not collateralised	284,966	(196)	0.07
Fully collateralised	144,968	(119)	0.08
Partially collateralised (A)	55,215	(38)	0.07
Total	485,149	(353)	0.07
– *Collateral value on A*	24,860	–	–
Stage 2			
Not collateralised	19,253	(154)	0.80
Fully collateralised	13,591	(123)	0.90
Partially collateralised (B)	7,377	(24)	0.32
Total	40,221	(301)	0.75
– *Collateral value on B*	3,283	–	–
Stage 3			
Not collateralised	987	(647)	65.78
Fully collateralised	380	(21)	5.61
Partially collateralised (C)	225	(187)	83.10
Total	1,592	(855)	53.82
– *Collateral value on C*	27	–	–
POCI			
Not collateralised	6	–	–
Fully collateralised	–	–	–
Partially collateralised (D)	–	–	–
Total	6	–	–
– *Collateral value on D*	–	–	–
At 31 December 2018	526,968	(1,509)	0.29

The collateral used in the assessment of the above primarily includes first legal charges over real estate and charges over cash in the commercial and industrial sector and charges over cash and marketable financial instruments in the financial sector. Government sector lending is typically unsecured.

It should be noted that the table above excludes other types of collateral which are commonly taken for corporate and commercial lending such as unsupported guarantees and floating charges over the assets of a customer's business. While such mitigants have value, often providing rights in insolvency, their assignable value is insufficiently certain. They are assigned no value for disclosure purposes.

(a) Credit risk continued

(v) Collateral and other credit enhancements continued

Other corporate and commercial and financial (non-bank) lending continued

(audited)

As with commercial real estate the value of real estate collateral included in the table above is generally determined through a combination of professional and internal valuations and physical inspection. The frequency of revaluation is undertaken on a similar basis to commercial real estate loans and advances; however, for financing activities in corporate and commercial lending that are not predominantly commercial real estate-oriented, collateral value is not as strongly correlated to principal repayment performance. Collateral values will generally be refreshed when an obligor's general credit performance deteriorates and it is necessary to assess the likely performance of secondary sources of repayment should reliance upon them prove necessary. For this reason, the table above reports values only for customers with CRR 8 to 10, reflecting that these loans and advances generally have valuations which are of comparatively recent vintage. For the purposes of the table above, cash is valued at its nominal value and marketable securities at their fair value.

Placings with and advances to banks

(audited)

Placings with and advances to banks are typically unsecured. At 31 December 2018, HK$79,400m (2017: HK$103,113m) of placings with and advances to banks rated CRR 1 to 5, including loan commitments, are uncollateralised.

Derivatives

(audited)

The International Swaps and Derivatives Association ("ISDA") Master Agreement is our preferred agreement for documenting derivatives activity. It provides the contractual framework within which dealing activity across a full range of over the counter ("OTC") products is conducted, and contractually binds both parties to apply close-out netting across all outstanding transactions covered by an agreement if either party defaults or another pre-agreed termination event occurs. It is common, and the Group's preferred practice, for the parties to execute a Credit Support Annex ("CSA") in conjunction with the ISDA Master Agreement. Under a CSA, collateral is passed between the parties to mitigate the counterparty risk inherent in outstanding positions. The majority of our CSAs are with financial institutional clients.

Other credit risk exposures

(audited)

In addition to collateralised lending described above, other credit enhancements are employed and methods used to mitigate credit risk arising from financial assets. These are described in more detail below.

Government, bank and other financial institution issued securities may benefit from additional credit enhancement, notably through government guarantees that reference these assets. Corporate issued debt securities are primarily unsecured. Debt securities issued by banks and financial institutions include covered bonds, which are supported by underlying pools of financial assets.

Trading assets include loans and advances held with trading intent, the majority of which consist of reverse repos and securities borrowing which by their nature are collateralised. Collateral accepted as security that the Group is permitted to sell or repledge under these arrangements is described in Note 30 "Assets transferred, assets charged as security for liabilities, and collateral accepted as security for assets".

The Group's maximum exposure to credit risk includes financial guarantees and similar arrangements that it issues or enters into, and loan commitments to which it is irrevocably committed. Depending on the terms of the arrangement, the Bank may have recourse to additional credit mitigation in the event that a guarantee is called upon or a loan commitment is drawn and subsequently defaults. The risks and exposures from these are captured and managed in accordance with the Group's overall credit risk management policies and procedures.

Collateral and other credit enhancements obtained

(audited)

The Group obtained assets by taking possession of collateral held as security, or calling other credit enhancement. The nature of these assets held as at 31 December 2018 are residential properties with carrying amount of HK$18m (2017: residential properties of HK$42m).

(a) Credit risk continued

(vi) Selected 2017 credit risk disclosures

The disclosures below were included in our 2017 external reports and do not reflect the adoption of HKFRS 9. As these tables are not directly comparable to the current 2018 credit risk tables, which are disclosed on an HKFRS 9 basis, these 2017 disclosures have been shown below and not adjacent to 2018 tables.

Distribution of financial instruments by credit quality

	Neither past due nor impaired							
	Strong	Good	Satisfactory	Sub-standard	Past due but not impaired	Impaired	Impairment allowances	Total
2017								
Items in the course of collection from other banks	6,157	–	307	–	–	–	–	6,464
Trading assets:								
– treasury bills	33,066	–	–	–	–	–	–	33,066
– debt securities	18,509	–	–	–	–	–	–	18,509
– loans and advances to banks	2,011	84	–	–	–	–	–	2,095
– loans and advances to customers	10	–	–	–	–	–	–	10
	53,596	84	–	–	–	–	–	53,680
Financial assets designated at fair value:								
– treasury bills	400	–	–	–	–	–	–	400
– debt securities	390	–	2	–	–	–	–	392
	790	–	2	–	–	–	–	792
Derivatives	8,375	1,745	554	162	–	–	–	10,836
Loans and advances held at amortised cost:								
– sight balances at central banks	14,309	–	–	–	–	–	–	14,309
– placings with and advances to banks	98,511	3,761	841	–	–	–	–	103,113
– loans and advances to customers	382,207	215,556	201,116	2,869	4,452	1,970	(1,597)	806,573
	495,027	219,317	201,957	2,869	4,452	1,970	(1,597)	923,995
Financial investments:								
– treasury and similar bills	154,292	–	–	–	–	–	–	154,292
– debt securities	210,120	10,255	4,383	–	–	–	–	224,758
	364,412	10,255	4,383	–	–	–	–	379,050
Other assets:								
– acceptances and endorsements	373	2,266	2,430	39	–	–	–	5,108
– other	3,081	412	3,763	7	78	–	–	7,341
	3,454	2,678	6,193	46	78	–	–	12,449

(a) Credit risk continued

(vi) Selected 2017 credit risk disclosures continued

Aging analysis of financial instruments which were past due but not impaired

The amounts in the following table reflect exposures designated as past due but not impaired. Examples of exposures designated past due but not impaired include loans that have missed the most recent payment date but on which there is no evidence of impairment; short-term trade facilities past due more than 90 days for technical reasons such as delays in documentation, but where there is no concern over the creditworthiness of the counterparty.

	Up to 29 days	30–59 days	60–89 days	90–180 days	Over 180 days	Total
2017						
Loans and advances to customers held at amortised cost[#]	4,031	338	83	–	–	4,452
Other assets	12	4	16	1	45	78
	4,043	342	99	1	45	4,530

[#] The majority of the loans and advances to customers that are operating within revised terms following restructuring are excluded from this table.

Residential mortgages

(audited)

The following table shows residential mortgage lending including off-balance sheet loan commitments by level of collateralisation.

Residential mortgages	2017
Unimpaired loans	
Fully collateralised	223,528
Impaired loans	
Fully collateralised	128
– Less than 70% LTV	124
– 71% to 90% LTV	4
– 91% to 100% LTV	–
Total	223,656

The collateral included in the table above consists of fixed first charges on residential real estate.

(a) Credit risk continued

(vi) Selected 2017 credit risk disclosures continued

Corporate and commercial and financial (non-bank) lending

Commercial real estate loans and advances (restated)	2017
Rated – CRR/EL 1 to 7	
Not collateralised	93,947
Fully collateralised	121,359
Partially collateralised (A)	6,489
– Collateral value on A	2,800
	221,795
Rated – CRR/EL 8	
Fully collateralised	1
	1
Rated – CRR/EL 9 to 10	
Fully collateralised	78
	78
Total	221,874

Other corporate, commercial and financial (non-bank) loans and advances (restated)	2017
Rated – CRR/EL 8	
Not collateralised	9
Fully collateralised	1
	10
Rated – CRR/EL 9 to 10	
Not collateralised	766
Fully collateralised	602
Partially collateralised (A)	136
– Collateral value on A	72
	1,504
Total	1,514

(b) Liquidity and funding risk

(audited)

The purpose of liquidity and funding management is to ensure sufficient cash flows to meet all financial commitment and to capitalise on opportunities for business expansion. This includes the Group's ability to meet deposit withdrawals either on demand or at contractual maturity, to repay borrowings as they mature, to comply with the statutory liquidity ratio, and to make new loans and investments as opportunities arise. The Group maintains a stable and diversified funding base of core retail and corporate customer deposits as well as portfolios of high-quality liquid assets.

As part of our Asset, Liability and Capital Management structure, we have established Asset and Liability Management Committee ("ALCO") at Group level and in major operating entities. The terms of reference of all ALCOs include the monitoring and control of liquidity and funding. Management of liquidity is carried out both at Group and Bank levels as well as in individual branches and subsidiaries. The Group requires branches and subsidiaries to maintain a strong liquidity position and to manage the liquidity structure of their assets, liabilities and commitments so that cash flows are approximately balanced and all funding obligations are met when due.

It is the responsibility of the Group's management to ensure compliance with local regulatory requirements and limits set by the Risk Management Meeting ("RMM") and approved by the Board. Liquidity is managed on a daily basis by the Bank's treasury functions and overseas treasury sites.

The Board is ultimately responsible for determining the types and magnitude of liquidity risk that the Group is able to take and ensuring that there is an appropriate organisation structure for managing this risk. Under authorities delegated by the Executive Committee, the Group ALCO is responsible for managing all Asset, Liability and Capital Management issues including liquidity and funding risk management.

The Group ALCO delegates to the Group Tactical Asset and Liability Management Committee ("TALCO") the task of reviewing various analyses of the Group pertaining to liquidity and funding. TALCO's primary responsibilities include but are not limited to:

- reviewing the funding structure of operating entities and the allocation of liquidity among them; and
- monitoring liquidity and funding limit breaches and providing direction to those operating entities that have not been able to rectify breaches on a timely basis.

Compliance with liquidity and funding requirements is monitored by the ALCO and is reported to the RMM, Executive Committee, Risk Committee and the Board of Directors on a regular basis. This process includes:

- maintaining compliance with relevant regulatory requirements of the reporting entity;
- projecting cash flows under various stress scenarios and considering the level of liquid assets necessary in relation thereto;
- monitoring liquidity and funding ratios against internal and regulatory requirements;
- maintaining a diverse range of funding sources with adequate back-up facilities;
- managing the concentration and profile of term funding;
- managing contingent liquidity commitment exposures within pre-determined limits;
- maintaining debt financing plans;
- monitoring of depositor concentration in order to avoid undue reliance on large individual depositors and ensuring a satisfactory overall funding mix; and
- maintaining liquidity and contingency funding plans. These plans identify early indicators of stress conditions and describe actions to be taken in the event of difficulties arising from systemic or other crises, while minimising adverse long-term implications for the business.

(b) Liquidity and funding risk continued

The Group has an internal liquidity and funding risk management framework ("LFRF") which aims to allow it to withstand very severe liquidity stresses. It is designed to be adaptable to changing business models, markets and regulations.

The key aspects of LFRF which is used to ensure that the Group maintains an appropriate overall liquidity risk profile are:

- standalone management of liquidity and funding by operating entity;
- minimum liquidity coverage ratio ("LCR") requirement;
- minimum net stable funding ratio ("NSFR") requirement;
- depositor concentration limit;
- three-month and twelve-month cumulative rolling term contractual maturity limits covering deposits from banks, deposits from non-bank financial institutions and securities issued;
- minimum LCR requirement by currency;
- intraday liquidity management;
- liquidity funds transfer pricing;
- forward-looking funding assessments; and
- annual Individual Liquidity Adequacy Assessment Process ("ILAAP").

Major operating entities are required to prepare an Individual Liquidity Adequacy Assessment ("ILAA") document, in order to ensure that:

- liquidity resources are adequate, both as to the amount and quality;
- there is no significant risk that liabilities cannot be met as they fall due;
- a prudent structural funding profile is maintained;
- adequate liquidity resources continue to be maintained; and
- the operating entity's liquidity risk framework is adequate and robust.

The key objectives of the ILAA process are to:

- demonstrate that all material liquidity and funding risks are captured within the internal framework; and
- validate the risk tolerance and risk appetite by demonstrating that reverse stress testing scenarios are acceptably remote; and vulnerabilities have been assessed through the use of severe stress scenarios.

The management of liquidity and funding risk
Liquidity coverage ratio
(unaudited)

The LCR aims to ensure that a bank has sufficient unencumbered high-quality liquid assets ("HQLA") to meet its liquidity needs in a 30-calendar-day liquidity stress scenario. HQLA consist of cash or assets that can be converted into cash at little or no loss of value in markets.

As at 31 December 2018, all the Group's operating entities were within the LCR risk tolerance level established by the Board and applicable under the LFRF.

Net stable funding ratio
(unaudited)

The NSFR measures stable funding relative to required stable funding, and reflects a bank's long-term funding profile (funding with a term of more than a year). It is designed to complement the LCR.

As at 31 December 2018, all the Group's operating entities were within the NSFR risk tolerance level established by the Board and applicable under the LFRF.

(b) Liquidity and funding risk continued

Depositor concentration and term funding maturity concentration

(unaudited)

The LCR and NSFR metrics assume a stressed outflow based on a portfolio of depositors within each deposit segment. The validity of these assumptions is challenged if the portfolio of depositors is not large enough to avoid depositor concentration. Operating entities are exposed to term re-financing concentration risk if the current maturity profile results in future maturities being overly concentrated in any defined period.

As at 31 December 2018, all the Group's operating entities were within the risk tolerance levels set for depositor concentration and term funding maturity concentration. These risk tolerances were established by the Board and applicable under the LFRF.

Sources of funding

(unaudited)

Our primary sources of funding are customer deposits. We issue wholesale securities to supplement our customer deposits and change the currency mix or maturity profile of our liabilities.

Currency mismatch

(unaudited)

The Group allows currency mismatches to provide some flexibility in managing the balance sheet structure and to carry out foreign exchange trading, on the basis that there is sufficient liquidity in the swap market to support currency conversion in periods of stress. The Group sets limits on LCR by currency for all material currencies based on liquidity in the swap markets. These limits are approved and monitored by ALCO.

Additional contractual obligations

(unaudited)

Under the terms of our current collateral obligations under derivative contracts (which are ISDA compliant CSA contracts), the additional collateral required to post in the event of one-notch and two-notch downgrade in credit ratings is immaterial.

Liquidity regulation

(unaudited)

The Banking (Liquidity) Rules ("BLR") were introduced by the HKMA in 2014 and became effective from 1 January 2015. The Group is required to calculate its LCR on a consolidated basis in accordance with rule 11(1) of the BLR. During 2018 the Group was required to maintain a LCR of not less than 90%, increasing to not less than 100% by 1 January 2019.

The average LCRs for the periods are as follows:

	Quarter ended							
	31 Dec 2018	**30 Sep 2018**	**30 Jun 2018**	**31 Mar 2018**	31 Dec 2017	30 Sep 2017	30 Jun 2017	31 Mar 2017
Average LCR	**209.1%**	**208.2%**	**209.6%**	**207.0%**	209.5%	242.3%	256.7%	267.7%

The liquidity position of the Group remained strong and stable in 2018. The average LCR ranged from 207.0% to 209.6% for the reportable quarters. The LCR at 31 December 2018 was 214.7% (232.3% at 31 December 2017).

(b) Liquidity and funding risk continued

Liquidity regulation continued

(unaudited)

The composition of the Group's high quality liquid assets ("HQLA") as defined under Schedule 2 of the BLR is shown as below. The majority of the HQLA held by the Group are Level 1 assets which consist mainly of government debt securities.

	Weighted amount (average value) at quarter ended							
	31 Dec 2018	**30 Sep 2018**	**30 Jun 2018**	**31 Mar 2018**	31 Dec 2017	30 Sep 2017	30 Jun 2017	31 Mar 2017
Level 1 assets	**281,615**	**268,842**	**262,800**	**265,754**	261,705	269,223	283,481	295,635
Level 2A assets	**10,920**	**10,786**	**11,615**	**12,866**	15,520	16,748	14,980	13,669
Level 2B assets	**546**	**549**	**551**	**552**	563	393	528	766
Total	**293,081**	**280,177**	**274,966**	**279,172**	277,788	286,364	298,989	310,070

In accordance with the Banking (Liquidity) Rules, the Net Stable Funding Ratio ("NSFR") was implemented in Hong Kong with effect from 1 January 2018. The Group is required to calculate NSFR in a consolidated basis and maintain a NSFR of not less than 100%.

The NSFRs for the reportable periods are as follows:

	At quarter ended			
	31 Dec 2018	**30 Sep 2018**	**30 Jun 2018**	**31 Mar 2018**
Net stable funding ratio	**154.0%**	**150.5%**	**153.6%**	**152.9%**

The funding position of the Group remained strong and stable in 2018.

To comply with the Banking (Disclosure) Rules, the details of liquidity information can be found in the Regulatory Disclosures section of our website www.hangseng.com.

The below tables are an analysis of undiscounted cash flows on the Group's financial liabilities including future interest payments on the basis of their earliest possible contractual maturities.

The balances in the below tables will not agree with the balances in the balance sheet as the tables incorporate, on an undiscounted basis, all cash flows relating to principal and all future coupon payments (except for trading liabilities and trading derivatives). Also, loan commitments and financial guarantee contracts are generally not recognised on the balance sheet. Trading liabilities and trading derivatives have been included in the "On demand" time bucket, and not by contractual maturity, because trading liabilities are typically held for short periods of time. The undiscounted cash flows on hedging derivative liabilities are classified according to their contractual maturities.

(b) Liquidity and funding risk continued

Cash flows payable in respect of customer accounts are primarily contractually repayable on demand or at short notice. However, in practice, short-term deposit balances remain stable as inflows and outflows broadly match and a significant portion of loan commitments expire without being drawn upon. The undiscounted cash flows potentially payable under loan commitments and financial guarantee are classified on the basis of the earliest date they can be called.

	Repayable on demand	Three months or less but not on demand	Over three months but within one year	Over one year but within five years	Over five years	Total
At 31 December 2018						
Current, savings and other deposit accounts	821,474	247,579	86,342	1,068	–	1,156,463
Repurchase agreements – non-trading	–	410	–	–	–	410
Deposits from banks	1,978	734	–	–	–	2,712
Financial liabilities designated at fair value	–	20,857	9,881	2,606	445	33,789
Trading liabilities	33,649	–	–	–	–	33,649
Derivative financial instruments	7,538	303	141	151	–	8,133
Certificates of deposit and other debt securities in issue	–	3,770	–	–	–	3,770
Other financial liabilities	10,839	29,080	2,074	448	–	42,441
	875,478	302,733	98,438	4,273	445	1,281,367
Loan commitments	378,183	89,502	–	–	–	467,685
Financial guarantee and credit risk related guarantee contracts	16,388	–	–	–	–	16,388
	394,571	89,502	–	–	–	484,073
At 31 December 2017						
Current, savings and other deposit accounts	882,027	154,921	39,564	1,430	–	1,077,942
Repurchase agreements – non-trading	–	2,389	–	–	–	2,389
Deposits from banks	1,738	1,938	–	–	–	3,676
Financial liabilities designated at fair value	3	3	8	517	551	1,082
Trading liabilities	88,270	–	–	–	–	88,270
Derivative financial instruments	10,008	157	401	680	5	11,251
Certificates of deposit and other debt securities in issue	–	603	–	–	–	603
Other financial liabilities	7,545	10,964	1,414	4	–	19,927
	989,591	170,975	41,387	2,631	556	1,205,140
Loan commitments	353,925	84,216	–	–	–	438,141
Financial guarantee and credit risk related guarantee contracts	15,239	88	1	–	–	15,328
	369,164	84,304	1	–	–	453,469

(c) Market risk

(audited)

Market risk is the risk that movements in market factors, including foreign exchange rates and commodity prices, interest rates, credit spreads and equity prices, will reduce our income or the value of our portfolios.

There were no significant changes to our policies and practices for the management of market risk in 2018.

Exposure to market risk is separated into two portfolios:

– Trading portfolios comprise positions arising from market-making and warehousing of customer-derived positions.

– Non-trading portfolios comprise positions that primarily arise from the interest rate management of our retail and commercial banking assets and liabilities, and financial investments designated as fair value through other comprehensive income.

The diagram below illustrates the major trading and non-trading market risk types and market risk measures used to monitor and limit exposures.

	Trading Risk	Non-Trading Risk
Risk Type	– Foreign exchange & Commodities – Interest rates – Credit spreads	– Structural foreign exchange – Interest rates – Credit spreads
Risk Measure	Value at risk / Sensitivity analysis / Stress testing	Value at risk / Sensitivity analysis / Stress testing

Where appropriate, the Group applies similar risk management policies and measurement techniques to both trading and non-trading portfolios. The Group's objective is to manage and control market risk exposures in order to optimise return on risk while maintaining a market profile consistent with the status as a professional banking and financial services organisation.

The nature of the hedging and risk mitigation strategies range from the use of traditional market instruments, such as interest rate swaps, to more sophisticated hedging strategies to address a combination of risk factors arising at portfolio level.

Market risk governance

(audited)

Market risk is managed and controlled through limits approved by the Group's Chief Risk Officer, noting the support of Risk Management Meeting ("RMM"). These limits are allocated across business lines and to the Group's legal entities, including Hang Seng Bank (China) Limited.

The management of market risk is principally undertaken in Global Markets using risk limits allocated from the risk appetite, which is subject to the Board's approval. Limits are set for portfolios, products and risk types where appropriate, with market liquidity and business need being primary factors in determining the level of limits set.

An independent market risk management and control function is responsible for measuring, monitoring and reporting market risk exposures against the prescribed limits on a daily basis.

Market risks arising on each product are transferred to Global Markets for management. Our aim is to ensure that all market risks are consolidated within operations that have the necessary skills, tools, management and governance to manage them.

(c) Market risk continued

Market risk governance continued
(audited)

Model risk is governed through Model Oversight Committee ("MOC") at the Wholesale Credit and Market Risk ("WCMR") level. The MOC has direct oversight and approval responsibility on traded risk models utilised for risk measurement and management and stress testing to ensure that they remain within our risk appetite and business plans. The WCMR MOC reports into the Group's RMM, which oversees all risk types at Group level.

Our control of market risk in the trading and non-trading portfolios is based on a policy of restricting trading within a list of permissible instruments authorised for each business lines, of enforcing new product approval procedures, and of restricting trading in the more complex derivative products only to business lines with appropriate levels of product expertise and robust control systems.

Market risk measures
(unaudited)

Monitoring and limiting market risk exposures
The Group's objective is to manage and control market risk exposures while maintaining a market profile consistent with the Group's risk appetite. The Group uses a range of tools to monitor and limit market risk exposures including sensitivity analysis, value at risk ("VaR"), and stress testing.

Sensitivity analysis
(unaudited)

Sensitivity analysis measures the impact of individual market factor movements on specific instruments or portfolios including interest rates, foreign exchange rates and equity prices. The Group uses sensitivity measures to monitor the market risk positions within each risk type, for example, the present value of a basis point movement in interest rates for interest rate risk.

Sensitivity limits are set for portfolios, products and risk types, with the depth of the market being one of the principal factors in determining the level of limits set.

Value at risk ("VaR")
VaR is a technique that estimates the potential losses on risk positions as a result of movements in market rates and prices over a specified time horizon and to a given level of confidence. The use of VaR is integrated into market risk management and is calculated for all trading positions regardless of how the Group capitalises those exposures. Where there is no approved internal model, the Group uses the appropriate local rules to capitalise exposures.

In addition, the Group calculates VaR for non-trading portfolios in order to have a complete picture of market risk. Where VaR is not calculated explicitly, alternative tools are used.

Standard VaR is calculated at a 99% confidence level for a one-day holding period while Stressed VaR uses a 10-day holding period and a 99% confidence interval based on a continuous one-year historical significant stress period. The VaR models used by the Group are predominantly based on historical simulation which incorporate the following features:

- historical market rates and prices are calculated with reference to foreign exchange rates and commodity prices, interest rates, equity prices and the associated volatilities;
- potential market movements utilised for Standard VaR are calculated with reference to data from the past two years; and
- Standard VaR is calculated to a 99% confidence level and use a one-day holding period.

The models also incorporate the effect of the option features on the underlying exposures. The nature of the VaR models means that an increase in observed market volatility will lead to an increase in VaR without any changes in the underlying positions.

(c) Market risk continued

VaR model limitations

Although a valuable guide to risk, VaR should always be viewed in the context of its limitations. For example:

– the use of historical data as a proxy for estimating future events may not encompass all potential events, particularly those which are extreme in nature;

– the use of a holding period assumes that all positions can be liquidated or the risks offset during that period. This may not fully reflect the market risk arising at times of severe illiquidity, when the holding period may be insufficient to liquidate or hedge all positions fully;

– the use of a 99% confidence level, by definition does not take into account losses that might occur beyond this level of confidence; and

– VaR is calculated on the basis of exposures outstanding at the close of business and therefore does not necessarily reflect intra-day exposures.

Risk not in VaR ("RNIV") framework

(unaudited)

The RNIV framework aims to manage and capitalise material market risks that are not adequately covered in the VaR model. In such instances the RNIV framework uses stress tests to quantify the capital requirement. On average in 2018, the capital requirement derived from these stress tests represented 1.85% of the total internal model-based market risk requirement. RNIV is not viewed as being a material component of the Group's market risk capital requirement.

Risk factors are reviewed on a regular basis and either incorporated directly in the VaR models, where possible, or quantified through the VaR-based RNIV approach or a stress test approach within the RNIV framework.

Stress testing

(audited)

Stress testing is an important tool that is integrated into the Group's market risk management framework to evaluate the potential impact on portfolio values of more extreme, although plausible, events or movements in a set of financial variables. In such abnormal scenarios, losses can be much greater than those predicted by VaR modelling.

Stress testing is implemented at the legal entity and the overall Group levels. Scenarios are tailored in order to capture the relevant events or market movements. A scoring framework is in place for management to effectively assess the severity of the potential stress losses and the likelihood of occurrence of the stress scenarios. The risk appetite around potential stress losses for the Group is set and monitored against referral limits.

Market risk reverse stress tests are undertaken based upon the premise that there is a fixed loss. The stress test process identifies which scenarios lead to this loss. The rationale behind the reverse stress test is to understand scenarios which are beyond normal business settings that could have contagion and systemic implications.

Stressed VaR and stress testing, together with reverse stress testing, provide management with insights regarding the "tail risk" beyond VaR for which the Group appetite is limited.

(c) Market risk continued

Trading portfolios

(audited)

Value at risk of the trading portfolios

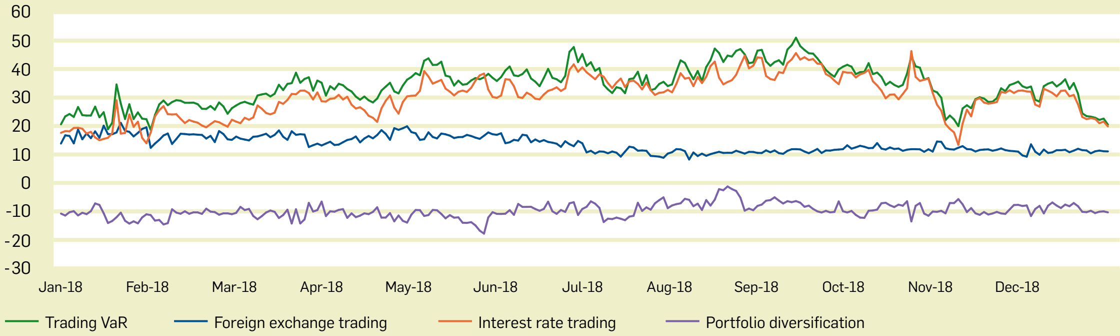
Trading VaR predominantly resides within Global Markets. The VaR at 31 December 2018 remained steady when compared against 31 December 2017. In average terms, the VaR level was higher in 2018 mainly driven by interest rate trading positions.

The daily levels of total trading VaR over the last year are set out in the graph below.

Daily VaR (trading portfolios), 99% 1 day (HK$m)

(unaudited)

Daily VaR (trading portfolios), 99% 1 day (HK$m)



The Group's trading VaR for the year is shown in the table below.

Trading, 99% 1 day

(audited)

	At 31 December 2018	Minimum during the year	Maximum during the year	Average for the year
VaR				
Trading	20	19	51	34
Foreign exchange trading	11	8	21	14
Interest rate trading	20	13	46	30
Portfolio diversification	(11)	–	–	(10)

	At 31 December 2017	Minimum during the year	Maximum during the year	Average for the year
VaR				
Trading	21	17	41	24
Foreign exchange trading	11	8	23	15
Interest rate trading	18	10	27	18
Portfolio diversification	(8)	–	–	(9)

1 Trading portfolios comprise positions arising from the market-making and warehousing of customer-derived positions.

2 Portfolio diversification is the market risk dispersion effect of holding a portfolio containing different risk types. It represents the reduction in unsystematic market risk that occurs when combining a number of different risk types, for example, interest rate and foreign exchange, together in one portfolio. It is measured as the difference between the sum of the VaR by individual risk type and the combined total VaR. A negative number represents the benefit of portfolio diversification. As the maximum and minimum occur on different days for different risk types, it is not meaningful to calculate a portfolio diversification benefit for these measures.

(c) Market risk continued

Backtesting

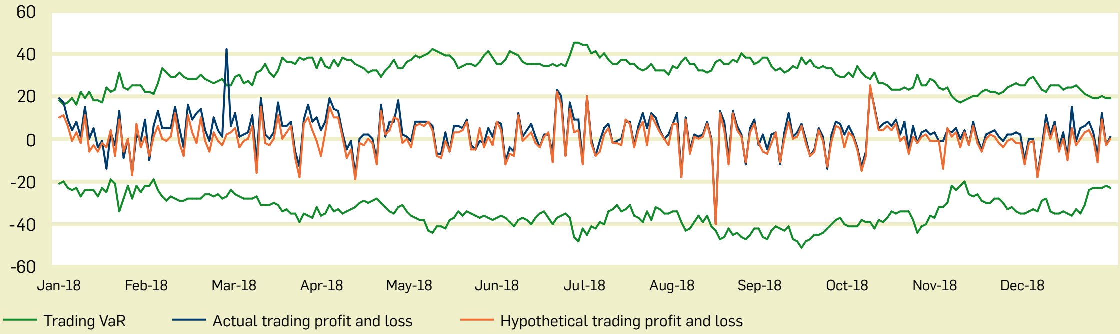
(unaudited)

In 2018, there were three profit exceptions at the Group consolidated level.

The profit side exceptions were identified for actual profit and loss and those were mainly driven by intraday profit arising from trading activities.

The graph below shows the daily trading VaR against actual and hypothetical profit and loss for the Group during 2018.

Backtesting of trading VaR against actual and hypothetical profit and loss for 2018 (HK$m)



The Group routinely validates the accuracy of the VaR models by back-testing both actual and hypothetical profit and loss against the trading VaR numbers. Hypothetical profit and loss excludes non-modelled items such as fees, commissions and revenues of intra-day transactions.

The Group would expect on average to see two to three profits, and two or three losses, in excess of VaR at the 99% confidence level over a one-year period. The actual number of profits or losses in excess of VaR over this period can therefore be used to gauge how well the models are performing. VaR backtesting is performed at Group consolidated and solo levels, including entities that do not have local permission to use VaR for regulatory purposes.

Non-trading portfolios

(unaudited)

Non-traded interest rate risk is the risk of an adverse impact to earnings or capital due to changes in market interest rates. The risk arises from timing mismatches in the re-pricing of non-traded assets and liabilities and is the potential adverse impact of changes in interest rates on earnings and capital.

In its management of the risk, the Group aims to mitigate the impact of future interest rate movements which could reduce future net interest income, while balancing the cost of hedging activities to the current revenue stream. Monitoring the sensitivity of projected net interest income under varying interest rate scenarios is a key part of this.

In order to manage structural interest rate risk, non-traded assets and liabilities are transferred to Balance Sheet Management ("BSM") based on their re-pricing and maturity characteristics. For assets and liabilities with no defined maturity or re-pricing characteristics, behaviouralisation is used to assess the interest rate risk profile. BSM manages the banking book interest rate positions transferred to it within the approved limits. The Asset, Liability and Capital Management Committee ("ALCO") is responsible for monitoring and reviewing its overall structural interest rate risk position. Interest rate behaviouralisation policies have to be formulated in line with the Group's behaviouralisation policies and approved at least annually by ALCO.

(c) Market risk continued

Sensitivity of net interest income

(audited)

A principal part of the Group's management of non-traded interest rate risk is to monitor the sensitivity of projected net interest income at least quarterly under varying interest rate scenarios (simulation modelling), where all other economic variables are held constant.

The table below sets out the effect on future net interest income of incremental 100 basis points parallel rises or falls in all yield curves at the beginning of year from 1 January 2019 and incremental 25 basis points parallel rises or falls in all yield curves at the beginning of each quarter during the 12 months from 1 January 2019.

Assuming no management actions and all other non-interest rate risk variables remain constant, such a series of incremental parallel rises in all yield curves would increase projected net interest income for the year ending 31 December 2019 by HK$3,142m for 100 basis points case and by HK$1,294m for 25 basis points case, while such a series of incremental parallel falls in all-in yield curves would decrease planned net interest income by HK$3,857m for 100 basis points case and by HK$1,242m for 25 basis points case.

The sensitivity of projected net interest income is described as follows:

	100bp parallel increase	100bp parallel decrease	25bp increase at the beginning of each quarter	25bp decrease at the beginning of each quarter
Change in 2019 projected net interest income				
– HKD	**2,247**	**(2,448)**	**879**	**(882)**
– USD	**356**	**(809)**	**220**	**(220)**
– other	**539**	**(600)**	**195**	**(140)**
Total	**3,142**	**(3,857)**	**1,294**	**(1,242)**
Change in 2018 projected net interest income				
– HKD	2,045	(3,858)	515	(893)
– USD	555	(1,154)	135	(281)
– other	716	(601)	189	(146)
Total	3,316	(5,613)	839	(1,320)

The interest rate sensitivities set out in the table above represent the effect of the pro forma movements in projected yield curves based on a static balance sheet size and structure assumption. This effect, however, does not incorporate actions which would probably be taken by BSM or in the business units to mitigate the effect of interest rate risk. In reality, BSM proactively seeks to change the interest rate risk profile to optimise net revenues. The net interest income sensitivity calculations assume that interest rates of all maturities move by the same amount in the "up-shock" scenario. Rates are not assumed to become negative in the "down-shock" scenario unless the central bank rate is already negative and then not assumed to go further negative, which may, in certain currencies, effectively result in non-parallel shock. In addition, the net interest income sensitivity calculations take into account of the effect on net interest income of anticipated differences in changes between interbank interest rates and interest rates over which the entity has discretion in terms of the timing and extent of rate changes.

Key assumptions used in the measurement of interest rate sensitivities include business line interest rate pass-on assumptions, re-investment of maturing assets and liabilities at market rates per shock scenario and prepayment risk. BSM is modelled based on no management actions i.e. the risk profile at the month end is assumed to remain constant throughout the forecast horizon. The projections make other assumptions, including that contractually fixed term positions run to maturity, managed rate products and non-interest bearing balances, such as interest-free current accounts, are subject to interest rate risk behaviouralisation.

(c) Market risk continued

Sensitivity of reserves

The Group measures the potential downside risk to the CET1 ratio due to interest rate and credit spread risk in the Hold to Collect and Sell ("HTC&S") portfolio by the portfolio's stressed VaR, using 99% confidence level and an assumed holding period of one quarter. At 31 December 2018, the stressed VaR of the portfolio was HK$1,022m.

The Group monitors the sensitivity of reported cash flow hedge reserves to interest rate movements on a semi-annually basis by assessing the expected reduction in valuation of cash flow hedge due to parallel movements of plus or minus 100bps in all yield curves. These particular exposures form only a part of the Group's overall interest rate risk exposures.

The following table describes the sensitivity of reported cash flow hedge reserves to the stipulated movements in yield curves. The sensitivities are indicative and based on simplified scenarios.

	At 31 December 2018	Maximum impact	Minimum impact
+ 100 basis points parallel move in all yield curves	(139)	(198)	(139)
As a percentage of shareholders' equity at 31 December 2018 (%)	(0.09)	(0.12)	(0.09)
– 100 basis points parallel move in all yield curves	259	361	259
As a percentage of shareholders' equity at 31 December 2018 (%)	0.16	0.22	0.16

	At 31 December 2017	Maximum impact	Minimum impact
+ 100 basis points parallel move in all yield curves	(114)	(114)	(94)
As a percentage of shareholders' equity at 31 December 2017 (%)	(0.08)	(0.08)	(0.06)
– 100 basis points parallel move in all yield curves	274	274	52
As a percentage of shareholders' equity at 31 December 2017 (%)	0.18	0.18	0.03

Foreign exchange exposures

(audited)

The Group's foreign exchange exposures mainly comprise foreign exchange dealing by Global Markets and currency exposures originated by its banking business. The latter are transferred to Global Markets where they are centrally managed within foreign exchange position limits approved by the Group's Chief Risk Officer, noting the support of Risk Management Meeting ("RMM"). The net options position is calculated on the basis of delta-weighted positions of all foreign exchange options contracts.

The Group's structural foreign exchange exposure, monitored using sensitivity analysis, represents the Group's foreign currency investments in subsidiaries, branches and associates, and the fair value of the Group's long-term foreign currency equity investments. The Group's structural foreign exchange exposures are managed by the Group's ALCO with the primary objective of ensuring, where practical, that the Group's and the Bank's capital ratios are largely protected from the effect of changes in exchange rates.

The Group's foreign exchange exposures are prepared in accordance with the HKMA "Return of Foreign Currency Position -(MA(BS)6)".

At 31 December 2018, the US dollar, Chinese renminbi and New Zealand dollar were the currencies in which the Group had non-structural foreign currency positions that were not less than 10% of the total net position in all foreign currencies. The Group also had a Chinese renminbi structural foreign currency position, which was not less than 10% of the total net structural position in all foreign currencies.

For details of the Group's non-structural and structural foreign currency positions, please refer to the Banking Disclosure Statements that will be available in the "Regulatory Disclosure" section of the Bank's website.

(c) Market risk continued

Equities exposures

(audited)

The Group's equities exposures in 2018 and 2017 are mainly long-term equity investments which are reported as "Financial investments" set out in note 29 to the financial statements. Equities held for trading purpose are included under "Trading assets" set out in note 25 to the financial statements. These are subject to trading limit and risk management control procedures and other market risk regime.

(d) Insurance risk

(audited)

Risk management objectives and policies for management of insurance risk

The majority of the risk in the insurance business derives from manufacturing activities and can be categorised as insurance risk and financial risk. Financial risks include market risk, credit risk and liquidity risk. Insurance risk is the risk, other than financial risk, of loss transferred from the holder of the insurance contract to the insurer.

Group's bancassurance model

We operate an integrated bancassurance model which provides insurance products principally for customers with whom we have a banking relationship. The insurance contracts we sell relate to the underlying needs of our banking customers, which we can identify from our point-of-sale contacts and customer knowledge. The majority of sales are of savings and investment products.

By focusing largely on personal and SME lines of business we are able to optimise volumes and diversify individual insurance risks.

We choose to manufacture these insurance products in a Group subsidiary based on an assessment of operational scale and risk appetite. Manufacturing insurance allows us to retain the risks and rewards associated with writing insurance contracts by keeping part of the underwriting profit and investment income within the Group. It also reduces distribution costs for our products by using our established branch network, and enables us to control the quality of the sale process and the products themselves to ensure our customers receive products which address their specific needs at the best value.

Where we do not have the risk appetite or operational scale to be an effective insurance manufacturer, we engage with a handful of leading external insurance companies in order to provide insurance products to our customers through our banking network and direct channels. These arrangements are generally structured with our exclusive strategic partners and earn the Group a combination of commissions, fees and a share of profits. We distribute insurance products in Hong Kong, China and Macau.

Insurance products are sold through all global businesses, but predominantly by RBWM and CMB through our branches and direct channels.

Governance

Insurance risks are managed to a defined risk appetite, which is aligned to the Group's risk appetite and enterprise risk management framework (including the three lines of defence model). The Insurance Risk Management Meeting oversees the control framework and is accountable to the Group Risk Management Meeting on risk matters relating to insurance business.

The monitoring of the risks within the insurance operations is carried out by the Insurance Risk teams. Specific risk functions, including wholesale market risk, operational risk, information security risk and financial crime compliance, support Insurance Risk teams in their respective areas of expertise.

Measurement

The risk profile of our insurance manufacturing businesses is measured using an economic capital ("EC") approach. Assets and liabilities are measured on a market value basis and a capital requirement is defined to ensure that there is a less than 1 in 200 chance of insolvency over a one year time horizon, given the risks that the businesses are exposed to. The methodology for the economic capital calculation is largely aligned to the pan-European Solvency II insurance capital regulations. The EC coverage ratio (economic net asset value divided by the economic capital requirement) is a key risk appetite measure. The business has a current appetite to remain above 135% with a tolerance of 110%. In addition to EC, the regulatory solvency ratio is also a metric used to manage risk appetite on an entity basis.

(d) Insurance risk continued

The following table shows the composition of assets and liabilities by contract type.

Balance sheet of insurance subsidiaries by type of contract

	Linked contracts[1]	Non-linked contracts[1]	Other assets and liabilities[2]	Total
2018				
Financial assets:				
– financial assets designated and otherwise mandatorily measured at fair value	186	12,652	–	12,838
– derivative financial instruments	–	219	–	219
– financial investments	–	92,044	7,467	99,511
– other financial assets	13	5,414	519	5,946
Total financial assets	199	110,329	7,986	118,514
Reinsurance assets	–	9,575	–	9,575
Present value of in-force long-term insurance contracts	–	–	15,910	15,910
Other assets	–	6,202	1,471	7,673
Total assets	199	126,106	25,367	151,672
Liabilities under investment contracts designated at fair value	132	316	–	448
Liabilities under insurance contracts	61	120,134	–	120,195
Deferred tax	–	6	2,727	2,733
Other liabilities	–	–	2,478	2,478
Total liabilities	193	120,456	5,205	125,854
Shareholders' equity	–	–	25,818	25,818
Total liabilities and shareholders' equity	193	120,456	31,023	151,672
2017				
Financial assets:				
– financial assets designated at fair value	263	9,050	–	9,313
– derivative financial instruments	–	683	–	683
– financial investments	–	92,675	6,563	99,238
– other financial assets	9	5,478	520	6,007
Total financial assets	272	107,886	7,083	115,241
Reinsurance assets	–	8,342	–	8,342
Present value of in-force long-term insurance contracts	–	–	14,574	14,574
Other assets	–	5,687	1,315	7,002
Total assets	272	121,915	22,972	145,159
Liabilities under investment contracts designated at fair value	196	358	–	554
Liabilities under insurance contracts	81	115,464	–	115,545
Deferred tax	–	–	2,378	2,378
Other liabilities	–	1,811	1,706	3,517
Total liabilities	277	117,633	4,084	121,994
Shareholders' equity	–	–	23,165	23,165
Total liabilities and shareholders' equity	277	117,633	27,249	145,159

1 Comprises life insurance contracts and investment contracts
2 Comprises shareholder assets and liabilities

(d) Insurance risk continued

Stress and Scenario Testing

Stress testing forms a key part of the risk management framework for the Insurance business. We participate in local and group-wide regulatory stress tests.

These have highlighted that a key risk scenario for the Insurance business is a prolonged low interest rate environment. In order to mitigate the impact of this scenario, the insurance operations have a range of strategies that could be employed including the hedging of investment risk, a dynamic approach of re-pricing the products to reflect lower interest rates, diversification of product offerings with less sensitivity to interest rate levels, risk transfer to third parties, and yield enhancement investment strategies to optimise the expected returns against the cost of economic capital.

Key Risk Types

The key risks for the insurance operations are market risks (in particular interest rate and equity), credit risks and liquidity risks, followed by insurance underwriting risk and operational risks.

Market risk (insurance)

Market risk is the risk of changes in market factors affecting the Group's capital or profit. Market factors include interest rates, equity and growth assets, spread risk and foreign exchange rates.

Our exposure varies depending on the type of contract issued. Our most significant life insurance products are insurance contracts with discretionary participating features ("DPF") issued in Hong Kong. These products typically include some form of capital guarantee or guaranteed return, on the sums invested by the policyholders, to which discretionary bonuses are added if allowed by the overall performance of the funds. These funds are primarily invested in bonds with a proportion allocated to other asset classes, to provide customers with the potential for enhanced returns.

DPF products expose the Group to the risk of variation in asset returns, which will impact our participation in the investment performance. In addition, in some scenarios the asset returns can become insufficient to cover the policyholders' financial guarantees, in which case the shortfall has to be met by the Group. Allowances are made against the cost of such guarantees, calculated by stochastic modelling.

For unit-linked contracts, market risk is substantially borne by the policyholder, but some market risk exposure typically remains as fees earned are related to the market value of the linked assets.

Our insurance manufacturing subsidiary has market risk mandates which specify the investment instruments in which they are permitted to invest and the maximum quantum of market risk which they may retain. They manage market risk by using, amongst others, some or all of the techniques listed below, depending on the nature of the contracts written:

- for products with DPF, adjusting dividends to manage the liabilities to policyholders. The effect is that a significant portion of the market risk is borne by the policyholders;
- asset and liability matching where asset portfolios are structured to support projected liability cash flows. The Group manages its assets using an approach that considers asset quality, diversification, cash flow matching, liquidity, volatility and target investment return. It is not always possible to match asset and liability durations due to uncertainty over the receipt of all future premiums and the timing of claims; and also because the forecast payment dates of liabilities may exceed the duration of the longest dated investments available. We use models to assess the effect of a range of future scenarios on the values of financial assets and associated liabilities;
- using derivatives to protect against adverse market movements or better match liability cash flows;
- for new products with investment guarantees, considering the cost when determining the level of premiums or the price structure;
- periodically reviewing products identified as higher risk, which contain investment guarantees and embedded optionality features linked to savings and investment products for active management;
- designing new products to mitigate market risk, such as those with terminal bonus feature so as to spread out the volatility of return over a longer period of time;
- exiting, to the extent possible, investment portfolios whose risk is considered unacceptable; and
- repricing premiums charged to policyholders.

(d) Insurance risk continued

Market risk (insurance) continued

The following table illustrates the effects of selected interest rate, equity price and foreign exchange rate scenarios on our profit for the year and the total shareholders' equity of our insurance operation.

	2018		2017	
	Impact on profit after tax for the year	Impact on shareholders' equity	Impact on profit after tax for the year	Impact on shareholders' equity
+ 100 basis points shift in yield curves	(69)	(69)	(109)	(273)
– 100 basis points shift in yield curves	4	4	(50)	136
10 per cent increase in equity prices	306	306	290	399
10 per cent decrease in equity prices	(252)	(252)	(263)	(371)
10% increase in USD exchange rate compared to all currencies	120	120	176	176
10% decrease in USD exchange rate compared to all currencies	(120)	(120)	(176)	(176)

Where appropriate, the effects of the sensitivity tests on profit after tax and total equity incorporate the impact of the stress on the PVIF. The relationship between the profit and total equity and the risk factors is non-linear and nonsymmetrical, therefore the results disclosed should not be extrapolated to measure sensitivities to different levels of stress. The sensitivities reflect the established risk sharing mechanism with policyholders for participating products, and are stated before allowance for management actions which may mitigate the effect of changes in the market environment. The sensitivities presented do not allow for adverse changes in policyholder behaviour that may arise in response to changes in market rates.

Credit risk (insurance)

Credit risk is the risk of financial loss if a customer or counterparty fails to meet their obligation under a contract. It arises in two main areas for our insurance manufacturers:

- risk associated with credit spread volatility and default by debt security counterparties after investing premiums to generate a return for policyholders and shareholders; and
- risk of default by reinsurance counterparties and non-reimbursement for claims made after ceding insurance risk.

The amounts outstanding at the balance sheet date in respect of these items are shown in the table of “Balance sheet of insurance subsidiaries by type of contract” under “Insurance risk” section.

Our insurance manufacturing subsidiary is responsible for the credit risk, quality and performance of their investment portfolios. Our assessment of the creditworthiness of issuers and counterparties is based primarily upon internationally recognised credit ratings and other publicly available information. Investment credit exposures are monitored against limits by our local insurance manufacturing subsidiary, and are aggregated and reported to Group Insurance Credit Risk and Group Credit Risk Functions. Stress testing is performed on the investment credit exposures using credit spread sensitivities and default probabilities is included in the stress and scenario testing as described above.

We use tools to manage and monitor credit risk. These include a credit report which contains a watch-list of investments with current credit concerns to identify investments which may be at risk of future impairment or where high concentrations to counterparties are present in the investment portfolio. The report is circulated quarterly to senior management in Group Insurance Credit Risk and the Chief Risk Officer of the insurance manufacturing subsidiary to identify investments which may be at risk of future impairment.

For debt securities and accreting loans measured at amortised cost and FVOCI, the Company has adopted the HKFRS 9 requirements on impairment from 1 January 2018. Impairment is calculated in three stages and financial assets are allocated into one of the three stages where the transfer mechanism depends on whether there is a significant increase in credit risk between its first recognition and the relevant reporting period. After the allocation, the measurement of ECL, which is the product of PD, LGD and EAD, will reflect the change in risk of default occurring over the remaining life of the instruments. Note 2(j) set out the details on related accounting policy.

(d) Insurance risk continued

Credit risk (insurance) continued

Credit risk on assets supporting unit-linked liabilities is predominantly borne by the policyholders; therefore our exposure is primarily related to liabilities under non-linked insurance and investment contracts and shareholders' funds.

The credit quality of the reinsurers' share of liabilities under insurance contracts is primarily assessed as "Strong" or "Good" (as defined on "Credit quality classification" under "Credit risk" section), with 100% of the exposure being neither past due nor impaired (2017: 100%).

Liquidity risk (insurance)

Liquidity risk is the risk that an insurance operation, though solvent, either does not have sufficient financial resources available to meet its obligations when they fall due, or can secure them only at excessive cost.

Risk is managed by cashflow matching and maintaining sufficient cash resources; investing in high-credit-quality investments with deep and liquid markets, monitoring investment concentrations and restricting them where appropriate and establishing committed contingency borrowing facilities.

Our insurance manufacturing subsidiary is required to complete quarterly liquidity risk reports for Group Insurance Risk function and an annual review of the liquidity risks to which they are exposed.

The following table shows the expected undiscounted cash flows for insurance contract liabilities at 31 December 2018. The liquidity risk exposure is wholly borne by the policyholder in the case of unit-linked business and is shared with the policyholder for DPF products.

Expected maturity of insurance contract liabilities

	Expected cash flows (undiscounted)				
	Within 1 year	Over 1 year but within 5 years	Over 5 years but within 15 years	Over 15 years	Total
2018					
Non-linked insurance	**14,625**	**47,534**	**73,485**	**93,516**	**229,160**
Linked insurance	**10**	**39**	**64**	**36**	**149**
	14,635	**47,573**	**73,549**	**93,552**	**229,309**
2017					
Non-linked insurance	15,367	46,253	72,133	78,814	212,567
Linked insurance	14	51	86	56	207
	15,381	46,304	72,219	78,870	212,774

The remaining contractual maturity of investment contract liabilities is included in the table on note 22 of the financial statements.

Insurance risk

Insurance risk is the loss through adverse experience, in either timing or amount, of insurance underwriting parameters (non-economic assumptions). These parameters include mortality, morbidity, longevity, lapses and unit costs. The principal risk we face is that, over time, the cost of the contract, including claims and benefits may exceed the total amount of premiums and investment income received. The table of "Balance sheet of insurance subsidiaries by type of contract" under "Insurance risk" section analyses our life insurance risk exposures by type of business.

The Group primarily manages its insurance risk through asset and liability management, product design, pricing and overall proposition management (e.g. lapses management by introducing surrender charges), underwriting policy, claims management process and reinsurance which cedes risks above our acceptable thresholds to an external reinsurer thereby limiting our exposure.

(d) Insurance risk continued

Present value of in-force long-term insurance business ("PVIF")

In calculating PVIF, expected cash flows are projected after adjusting for a variety of assumptions made by insurance operation to reflect local market conditions and management's judgement of future trends, and after applying risk margins to reflect any uncertainty in the underlying assumptions. Variations in actual experience and changes to assumptions can contribute to volatility in the results of the insurance business.

Actuarial Control Committee meets on a quarterly basis to review and approve assumptions proposed for use in the determination of the PVIF. All changes to non-economic assumptions, economic assumptions that are not observable and model methodology must be approved by the Actuarial Control Committee.

Economic assumptions are either set in a way that is consistent with observable market values or, in certain markets use is made of long-term economic assumptions. Setting such assumptions involves the projection of long-term interest rates and the time horizon over which observable market rates trend towards these long-term assumptions. The assumptions are informed by relevant historical data and by research and analysis performed by internal and external experts, including regulatory bodies. The valuation of PVIF will be sensitive to any changes in these long-term assumptions in the same way that it is sensitive to observed market movements, and the impact of such changes is included in the sensitivities presented below.

The Group sets the risk discount rate applied to the PVIF calculation by starting from a risk-free rate curve and adding explicit allowances for risks not reflected in the best estimate cash flow modelling. Where shareholders provide options and guarantees to policyholders the cost of these options and guarantees is an explicit reduction to PVIF.

The following table shows the impact on the PVIF at balance sheet date of reasonably possible changes in the main economic and business assumptions:

	2018	2017
+ 100 basis points shift in yield curves	(46)	(108)
– 100 basis points shift in yield curves	1,375	188

The impact on PVIF shown above, as well as the impact on profit after tax and net assets shown below, are illustrative only and employ simplified scenarios. It should be noted that the effects may not be linear and therefore the results cannot be extrapolated. The sensitivities reflect the established risk sharing mechanism with policyholders for participating products, but do not incorporate other actions that could be taken by management to mitigate effects nor do they take into account the consequential changes in policyholders' behaviour.

Non-economic assumptions

The sensitivity of profit for the year and total equity to reasonably possible changes in assumptions used in respect of insurance businesses is as follows:

	Impact on 2018 results		Impact on 2017 results	
	Profit for the year	Net assets	Profit for the year	Net assets
10 per cent increase in mortality and/or morbidity rates	(48)	(48)	(43)	(43)
10 per cent decrease in mortality and/or morbidity rates	46	46	39	39
10 per cent increase in lapse rates	(44)	(44)	(29)	(29)
10 per cent decrease in lapse rates	48	48	32	32
10 per cent increase in expense rates	(57)	(57)	(55)	(55)
10 per cent decrease in expense rates	57	57	53	53

(d) Insurance risk continued

Non-economic assumptions continued

Mortality and morbidity risk is typically associated with life insurance contracts. The effect on profit of an increase in mortality or morbidity depends on the type of business being written.

Sensitivity to lapse rates depends on the type of contracts being written. In general, for life insurance contracts a policy lapse has two offsetting effects on profits, which are the loss of future income on the lapsed policy and the existence of surrender charge recouped at policy lapse. The net impact depends on the relative size of these two effects which varies with the type of contracts.

Expense rates risk is the exposure to a change in the cost of administering insurance contracts. An increase in expense rates will have a negative effect on our profits.

Process used to determine assumptions for long-term insurance contracts

The process used to determine the assumptions is intended to result in stable and prudent estimates of future outcome. This is achieved by adopting relatively conservative assumptions which can withstand a reasonable range of fluctuation of actual experience. Annual review of the relevant experience is performed to assess the adequacy of margin between the assumptions adopted and the best estimate of future outcome. The assumptions that are considered include expenses and the probability of claims. Both risk discount rate and investment return assumptions are set on active basis with reference to market risk free yields.

For non-linked life business, the policy reserve is generally calculated on a modified net premium basis. The net premium is the level of premium payable over the premium payment period whose discounted value at the outset of the policy would be sufficient to exactly cover the discounted value of the original guaranteed benefits at maturity or at death if earlier. The net premium is then modified to allow for deferral of acquisition costs. The policy reserve is then calculated by subtracting the present value of future modified net premiums from the present value of the benefits guaranteed at maturity or death up to the balance sheet date, subject to a floor of the cash value. The modified net premium basis makes no allowance for voluntary discontinuance by policyholders as this would generally result in a reduced level of policy reserve.

For linked life business, the policy reserve is generally determined as the total account balance of all in-force policies with an additional provision for the unexpired insurance risk.

Assumptions

The principal assumptions underlying the calculation of the long-term insurance business provision are:

(i) Mortality

A base mortality table which is most appropriate for each type of contract is selected. An adjustment is included to reflect the Group's own experience with an annual investigation performed to ascertain the appropriateness of overall assumption.

(ii) Morbidity

The morbidity incidence rates, which mainly cover major illness and disability, are generally derived from the reinsurance costs which also form the pricing basis. A loading is generally added as a provision for adverse deviation. An annual investigation is performed to ascertain the appropriateness with the Group's insurance subsidiary's actual experience.

(d) Insurance risk continued

Assumptions continued

(iii) Discount rates

Rate of interest

	2018	2017
Policies denominated in HKD	1.8%, 2.22% and 2.65%	1.8%, 2.22% and 2.55%
Policies denominated in USD	3.4%, 3.45% and 3.5%	3.0% and 3.45%
Policies denominated in RMB	2.32%, 2.9%, 3.32% and 3.45% as varies by product	2.32%, 2.9%, 3.0%, 3.3% and 3.32% as varies by product

Under the modified net premium method, the long-term business provision is sensitive to the interest rate used when discounting.

Sensitivity to changes in variables

The Group's insurance company re-runs its valuation models on various bases. An analysis of sensitivity around various scenarios provides an insight to the key risks which the Group's insurance company is exposed to. The table presented below demonstrates the sensitivity of insured liability estimates to particular movements in assumptions used in the estimation process. Certain variables can be expected to impact on life insurance liabilities more than others, and consequently a greater degree of sensitivity to these variables may be expected.

Impact on reported profit to changes in key variable

	Change in variable	Change in liabilities	
	%	2018	2017
Base run		96,912	95,348
Discount rate	+1	(1,855)	(2,583)
Discount rate	–1	10,106	11,472
Mortality/Morbidity	+10	168	306
Mortality/Morbidity	–10	(138)	(260)

The analysis above has been prepared for a change in variable with all other assumptions remaining constant and ignores changes in values of the related assets.

For the sensitivity in discount rate, an absolute +/–1% of the discount rate is used. For the Mortality/Morbidity sensitivity, a relative +/–10% (i.e. multiply the assumption by 110% or 90%) is used.

(e) Operational risk

(audited)

Operational risk is the risk to achieving our strategy or objectives as a result of inadequate or failed internal processes, people and systems or from external events.

Responsibility for minimising operational risk lies with the staff of the Group. All staff are required to manage the operational risks of the business and operational activities for which they are responsible.

Operational risk management framework

The Group's Operational Risk Management Framework ("ORMF") is our overarching approach for managing operational risk, the purpose of which is to:

- Identify and manage our operational risks in an effective manner
- Remain within the operational risk appetite, which helps the organisation understand the level of risk it is willing to accept
- Drive forward-looking risk awareness and assist management focus during 2018

Business and functional managers throughout the organisation are responsible for maintaining an acceptable level of internal control commensurate with the scale and nature of operations, and for identifying and assessing risks, designing controls and monitoring the effectiveness of these controls. The ORMF helps managers to fulfil these responsibilities by defining a standard risk assessment methodology and providing a tool for the systematic reporting of operational loss data.

A centralised database is used to record the results of the operational risk management process. Operational risk and control self-assessments are input and maintained by business units. Business and functional management and business risk and control managers monitor the progress of documented action plans to address shortcomings. To ensure that operational risk losses are consistently reported and monitored at Group level, all Group companies are required to report individual losses when the net loss is expected to exceed USD10,000, and to aggregate all other operational risk losses under USD10,000. Losses are entered into the Group Operational Risk database and are reported to the Risk Management Meeting on a monthly basis.

Activities to strengthen our risk culture and better embed the use of the ORMF was further implemented in 2018. In particular, the use of the activity-based "three lines of defence" model, which sets out roles and responsibilities for managing operational risks on a daily basis.

Exposures

(unaudited)

The Group continues to strengthen those controls that manage our most material risks:

- Further embedding Global Standards to ensure that we know and protect our customers, ask the right questions and escalate concerns.
- Increased monitoring and enhanced detective controls to manage those fraud risks which arise from new technologies and new ways of banking.
- Strengthening security controls to prevent cyber-attacks.

  The cyber threat remains a major concern in the financial industry and it continues to rapidly evolve. Their attacks are becoming increasingly well organised, planned and sophisticated. Cyber criminals seek financial gains through compromising bank and customer information and launch disruption to banking services. Unauthorised access to bank systems by hackers may result in financial and reputational losses, increased regulatory scrutiny which could adversely affect confidence of customers and investors in Hang Seng Bank.

(e) Operational risk continued

Exposures continued
(unaudited)

We have established a governance forum to oversee cyber security to ensure cyber security risks are managed effectively, and to oversee issues and activities related to information security risks. We continue to strengthen and significantly invest in our ability to prevent, detect and respond to the ever-increasing and sophisticated threat of cyber attacks. Specifically, we continue to enhance our capabilities to protect against increasingly sophisticated malware, denial of service attacks and data leakage, as well as enhance security event detection and incident response processes. We participate in intelligence sharing with both law enforcement and industry schemes to help improve our understanding of, and ability to respond to, the evolving threats faced by us and our peers within our industry.

– Improve controls and security to protect customers when using digital channels.

– Enhancing controls associated with IT privileged access.

(f) Regulatory Compliance Risk

(unaudited)

Overview
The Regulatory Compliance ("RC") function provides independent, objective oversight and challenge and promotes a compliance oriented culture, supporting the business in delivering fair outcomes for customers, maintaining the integrity of financial markets and achieving the Group's strategic objectives.

Key risk management processes
We regularly review our policies and procedures. Global policies and procedures require the prompt identification and escalation of any actual or potential regulatory breach to RC. Reportable events are escalated to the RMM and the Risk Committee, as appropriate.

Conduct of business
In 2018, we continued to take steps to raise our standards relating to conduct, which included:

– delivering further mandatory conduct training to all employees in 2018;

– incorporating the assessment of expected values and behaviours as key determinants in recruitment, performance appraisal and remuneration processes;

– improving our market surveillance capability;

– enhancing the quality and depth of conduct management information and how it is used across the Group;

– implementing an assessment process to check the effectiveness of our conduct initiatives across the Group; and

– assessing conduct standards and practices within our key third party suppliers and distributors.

(g) Financial Crime Risk

(unaudited)

Overview

The Group continued its progress towards implementing an effective financial crime risk management capability across the Group. The Group completed the roll-out of major compliance systems and shifted our focus towards embedding a sustainable approach to financial crime risk management everywhere we operate. This was underpinned by the implementation of a target operating model for the Financial Crime Risk function and by the completion of a country-by-country assessment against our financial crime risk framework.

Key risk management processes

During 2018, the Group introduced a strengthened financial crime risk management governance framework, mandating Financial Crime Risk Management Committees with a standardised agenda at country, region and business line levels.

We strengthened our approach to affiliate risk management, implementing an effective Group-level process to assess and remediate affiliate risk, and established a strong investigations and analytical capability to enable us to proactively identify emergent risk issues.

(h) Reputational Risk

(unaudited)

Reputational risk is the failure to meet stakeholder expectations as a result of any event, behaviour, action or inaction, either by the Group itself, our employees or those with whom we are associated, that might cause stakeholders to form a negative view of the Group.

Reputational risk relates to perceptions, whether based on fact or otherwise. Stakeholders' expectations are constantly changing and thus reputational risk is dynamic and varies between geographies, groups and individuals. As the leading domestic bank, we show unwavering commitment to operating to the high standards we have set for ourselves in every jurisdiction. Any lapse in standards of integrity, compliance, customer service or operating efficiency represents a potential reputational risk.

A number of measures to enhance our anti-money laundering, sanctions and other regulatory compliance frameworks have been taken and/or are ongoing. These measures, which should also serve over time to enhance our reputational risk management, include the following:

- simplifying our business through the progressive implementation of our Group strategy, including the adoption of a global financial crime risk filter, which should help to standardise our approach to doing business in higher risk countries;
- an increase in reputational risk resources in each region in which we operate, and the introduction of a central case management and tracking process for reputational risk and client relationship matters;
- the creation of combined reputational risk and client selection committees within the business lines, with a clear process to escalate and address matters at the appropriate level;
- the continued roll-out of training and communication about the HSBC Values programme that defines the way everyone in the Group should act, and seeks to ensure that the Values are embedded into our operations; and
- the continuous development and implementation of Global Standards around financial crime compliance, which underpin our businesses. This includes ensuring globally consistent application of policies that govern AML and sanctions compliance provisions.

The Group has zero tolerance for knowingly engaging in any business, activity or association where foreseeable reputational damage has not been considered and mitigated. There must be no barriers to open discussion and escalation of issues that could affect the Group negatively. While there is a level of risk in every aspect of business activity, appropriate consideration of potential harm to the Group's good name must be a part of all business decisions. Detecting and preventing illicit actors' access to the global financial system calls for constant vigilance and we will continue to cooperate closely with all governments to achieve success. This is integral to the execution of our strategy, to our values and to preserving and enhancing our reputation.