

# Risk management

The sections marked by a grey line in the left margin form part of the Group's audited financial statements. Please refer to Pillar 3 and Other Regulatory Disclosures for other risk disclosures.

## 1 Risk overview

### Business and strategic risk

Overarching risk arising from adverse business and economic changes materially affect DBS' long-term objectives. This risk is managed separately under other governance processes.

Read more about this on page 67.

### Credit risk

Risk arising from borrowers or counterparties failing to meet their debt or contractual obligations.

Read more about this on page 75.

### Market risk

Risk arising from adverse changes in interest rates, foreign exchange rates, equity prices, credit spreads and commodity prices, as well as related factors.

Read more about this on page 82.

### Liquidity risk

Risk that arises if DBS is unable to meet financial obligations when they are due.

Read more about this on page 84.

### Operational risk

Risk arising from inadequate internal processes, people or systems, as well as

external events. This includes legal risk, but excludes strategic and reputational risk.

Read more about this on page 88.

### Reputational risk

Risk that arises if our shareholder value (including earnings and capital) is adversely affected by any negative stakeholder perception of DBS' image. This influences our ability to establish new relationships or services, service existing relationships and have continued access to sources of funding. Reputational risk usually occurs when the other risks are poorly managed.

Read more about this on page 90.

## 2 Risk-taking and our business segments

As we focus on Asia's markets, we are exposed to concentration risks within the region. We manage this by diversifying our risk across industries and individual exposures. In addition, DBS relies on the specialist knowledge of our regional markets and industry segments to effectively assess our risks. The chart below provides an overview of the risks arising from our business segments. The asset size of each business segment reflects its contribution to the balance sheet, and the risk-weighted assets (RWA) offer a risk-adjusted perspective.

Refer to Note 46 to the financial statements on page 175 for more information about DBS' business segments.

SGD million	Consumer Banking/ Wealth Management	Institutional Banking	Treasury Markets	Others <sup>(a)</sup>	Group
Assets <sup>(b)</sup>	115,470	263,125	108,646	58,335	545,576
Risk-weighted assets	43,285	186,281	39,730	20,340	289,636
% of RWA	Consumer Banking/ Wealth Management	Institutional Banking	Treasury Markets	Others	Group
Credit risk	83%	94%	39%	74%	84%
Market risk	0%	0%	57%	18%	9%
Operational risk	17%	6%	4%	8%	7%

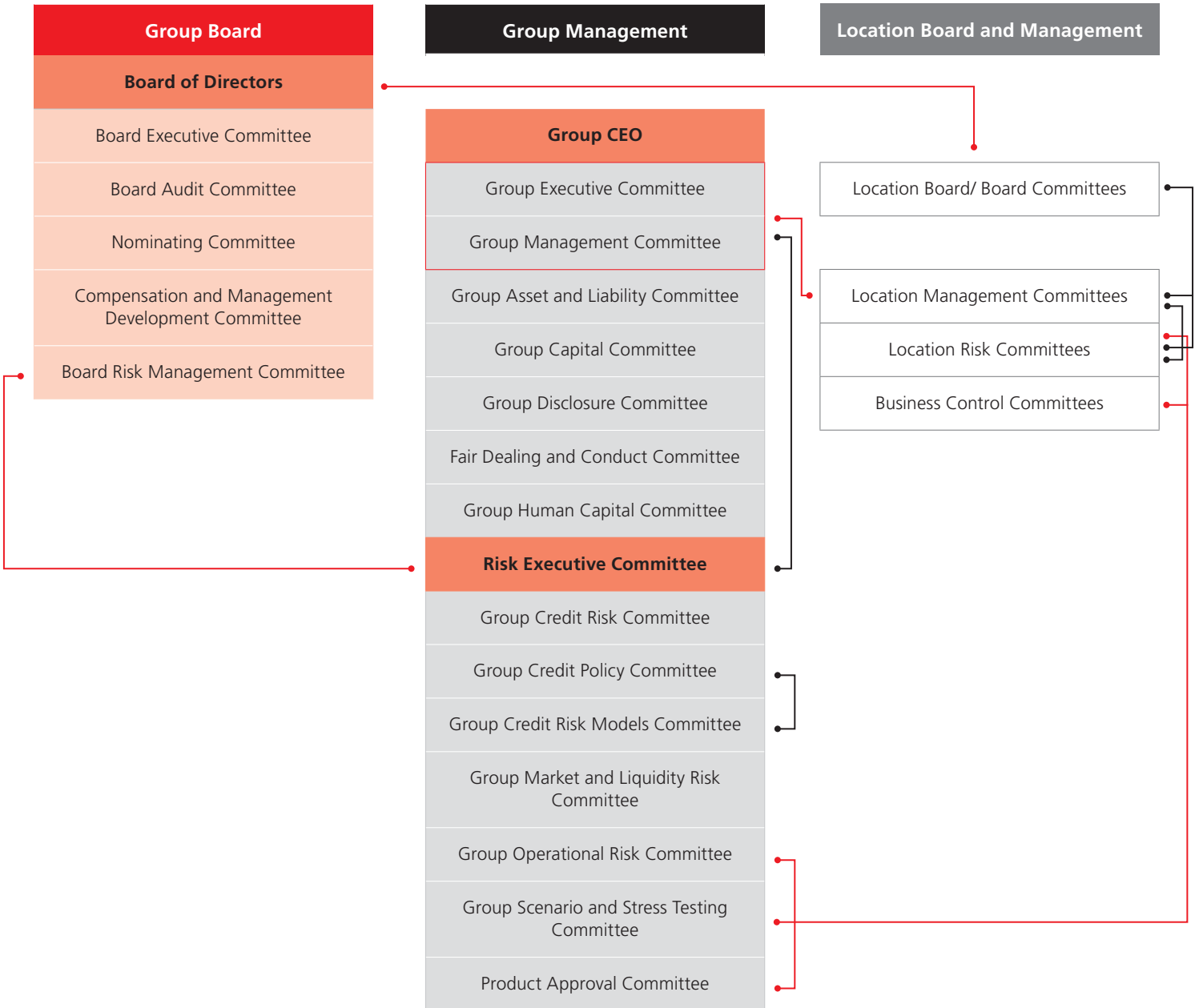
(a) Encompasses assets/ RWA from capital and balance sheet management, funding and liquidity activities, DBS Vickers Group and The Islamic Bank of Asia Limited

(b) Before goodwill and intangibles

### 3 Risk governance

The Board oversees DBS' affairs and provides sound leadership for the CEO and management. Authorised by the Board, various Board committees oversee specific responsibilities based on clearly defined terms of reference.

Under our risk management approaches, the Board, through the Board Risk Management Committee (BRMC), sets our Risk Appetite, oversees the establishment of enterprise-wide risk management policies and processes, and sets risk appetite limits to guide DBS' risk-taking.



Note: The lines reflect possible escalation protocols and are not reporting lines per se

The BRMC also oversees the identification, monitoring, management and reporting of credit, market, liquidity, operational and reputational risks. To facilitate the BRMC's risk oversight, the following risk management committees have been established.

Risk management committees	
Risk Executive Committee (Risk EXCO)	As the overall executive body regarding risk matters, the Risk EXCO oversees DBS' risk management as a whole.
Group Credit Risk Committee (GCRC) Group Credit Policy Committee (GCPC) Group Credit Risk Models Committee (GCRMC) Group Market and Liquidity Risk Committee (GMLRC) Group Operational Risk Committee (GORC) Group Scenario and Stress Testing Committee (GSSTC)	Each of the committees reports to the Risk EXCO, and the committees as a whole serve as an executive forum to discuss and implement DBS' risk management.  Key responsibilities: <ul style="list-style-type: none"> <li>• Assess and approve risk-taking activities</li> <li>• Oversee DBS' risk management infrastructure, which includes frameworks, decision criteria, authorities, people, policies, standards, processes, information and systems</li> <li>• Approve risk policies such as model governance standards, stress testing scenarios, and the evaluation and endorsement of risk models</li> <li>• Assess and monitor specific credit concentration</li> <li>• Recommend stress-testing scenarios (including macroeconomic variable projections) and review the results</li> </ul> The members in these committees comprise representatives from the Risk Management Group (RMG) as well as key business and support units.
Product Approval Committee (PAC)	The PAC oversees new product approvals, which are vital for mitigating risk within DBS. The committee assesses the reputational risk and suitability of products. In addition, the committee assesses whether we have the appropriate systems to monitor and manage the resulting risks.

Most of the above committees are supported by local risk committees in all major locations, where appropriate. These local risk committees oversee the local risk positions for all businesses and support units, ensuring that they keep within limits set by the Group risk committees. They also approve location-specific risk policies.

The Chief Risk Officer (CRO), who is a member of the Group Executive Committee and reports to the Chairman of the BRMC and the CEO, oversees the risk management function. The CRO is independent of business lines and is actively involved in key decision-making processes. He often engages with regulators to discuss risk matters, enabling a more holistic risk management perspective.

Working closely with the risk and business committees, the CRO is responsible for the following:

- Management of DBS' risks, including systems and processes to identify, approve, measure, monitor, control and report risks
- Engagement with senior management about material matters regarding all risk types
- Development of risk controls and mitigation processes
- Ensuring DBS' risk management is effective, and the Risk Appetite established by the Board is adhered to

## 4 Risk Appetite

DBS' Risk Appetite is set by the Board and governed by the Risk Appetite Policy. This also serves to reinforce our risk culture through 'tone from the top' articulation of risks that we are willing to accept. A strong organisational risk culture, including an appropriate incentive framework (refer to "Remuneration Report" section on page 57), helps to further embed our Risk Appetite.

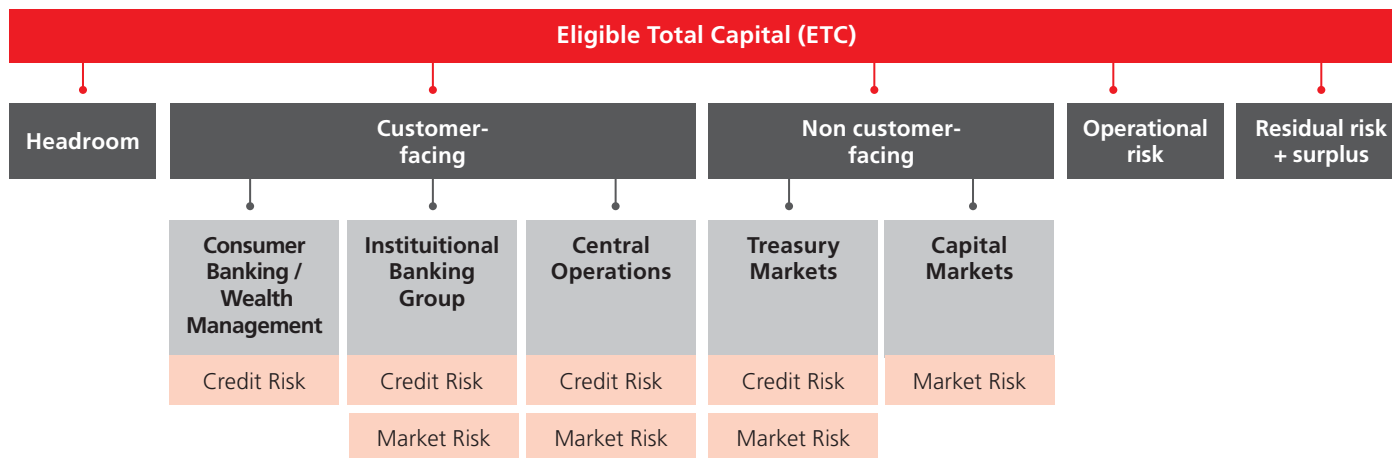
### 4.1 Risk thresholds and economic capital usage

Our Risk Appetite takes into account a spectrum of risk types and it is implemented using thresholds, policies, processes and controls.

Threshold structures are essential in making DBS' Risk Appetite an intrinsic part of our businesses because they help to keep all our risks within acceptable levels. Portfolio risk limits for the quantifiable risk types reach all parts of DBS from the top down, and these are implemented using formal frameworks. As for the non-quantifiable risk types, these are controlled using qualitative principles.

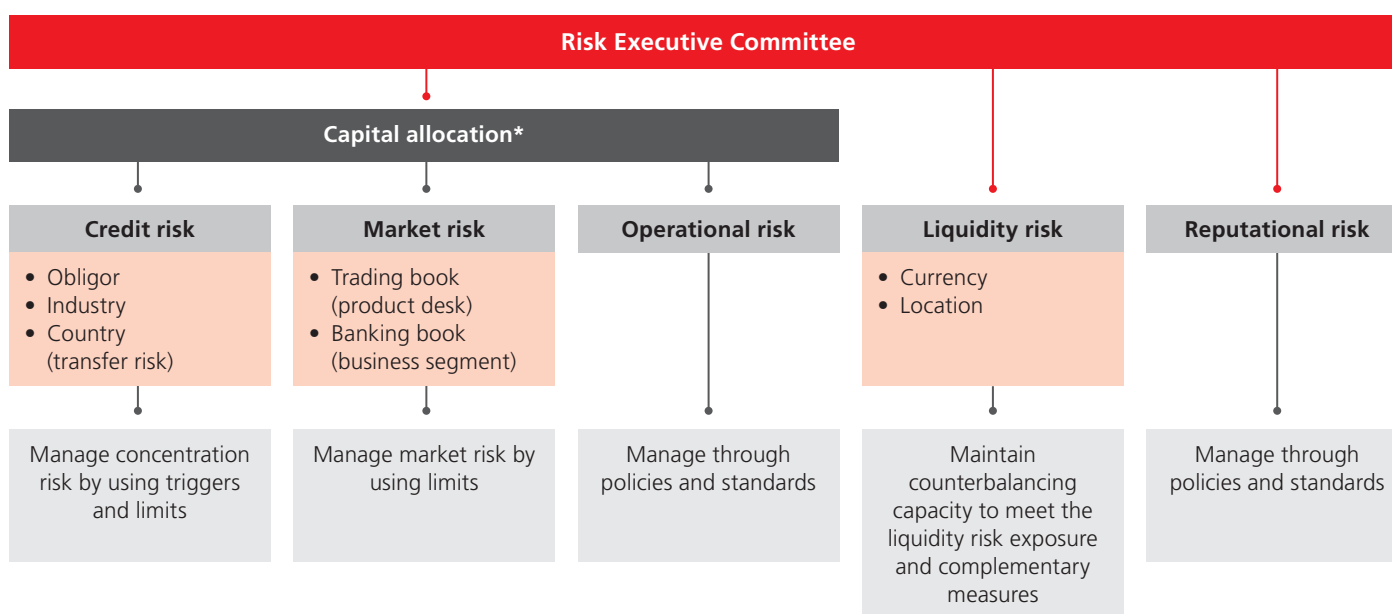
To ensure that the thresholds pertaining to our Risk Appetite are completely risk sensitive, we have adopted economic capital (EC) as our primary risk metric. EC is also a core component in our Internal Capital Adequacy Assessment Process (ICAAP).

Risk Appetite is managed through a capital allocation structure to monitor internal capital demand. The diagram below shows how risk is managed along the dimensions of customer-facing and non customer-facing units.



As a commercial bank, DBS allocates more EC to our customer-facing units, as compared to non customer-facing units. A buffer is also maintained for other risks as well, including country, operational, reputational and model risks.

The following chart provides a broad overview of how our Risk Appetite permeates throughout DBS. Refer to Sections 5 through 9 for more information about each risk type.



\* Refer to Capital allocation diagram above

## 4.2 Stress testing

Stress testing is an integral part of our risk management process. It includes both sensitivity analysis and scenario analysis and is conducted regularly. In particular, the ICAAP (a group-wide exercise spanning risk types) is performed annually. On top of this, additional stress tests are carried out in response to microeconomic and macroeconomic conditions or portfolio developments. Every stress test is documented and the results are discussed at the BRMC.

Stress testing alerts senior management to our potential vulnerability to exceptional but plausible adverse events. As such, stress testing enables us to assess capital adequacy and identify potentially risky portfolio segments as well as inherent systematic risks. This then allows us to develop the right contingency plans, exit strategies and mitigating actions beforehand.

The ICAAP ensures our business plans are consistent with our Risk Appetite. This is done by comparing the projected demand for capital to the projected supply of capital under various scenarios, including severe macroeconomic stress.

## 5 Credit risk

The most significant measurable risk DBS faces – credit risk – arises from our daily activities in our various businesses. These activities include lending to retail, corporate and institutional customers. It includes the risk of lending, pre-settlement and settlement risk of foreign exchange, derivatives and debt securities.

Refer to Note 43.1 to the financial statements on page 164 for details on DBS' maximum exposure to credit risk.

## 5.1 Credit risk management at DBS

DBS' approach to credit risk management comprises the following building blocks:

Policies

Risk methodologies

Processes, systems and reports

### Policies

The dimensions of credit risk and the scope of its application are defined in the Group Credit Risk Management Policy. Senior management sets the overall direction and policy for managing credit risk at the enterprise level.

The Group Core Credit Risk Policies (CCRPs) established for Consumer Banking/ Wealth Management and Institutional Banking set forth the principles by which DBS conducts its credit risk management and control activities. These policies, supplemented by a number of operational standards and guidelines, ensure consistency in identifying, assessing, underwriting, measuring, reporting and controlling credit risk across DBS, and provide guidance in the formulation of business-specific and/ or location-specific credit risk policies and standards.

The operational standards and guidelines are established to provide greater details on the implementation of the credit principles within the Group CCRPs and are adapted to reflect different credit environments and portfolio risk profiles. The CCRPs are considered and approved by the GCPC.

### Risk methodologies

Credit risk is managed by thoroughly understanding our corporate customers – the businesses they are in, as well as the economies in which they operate. It is also managed through statistical models and data analytics for retail customers.

The assignment of credit risk ratings and setting of lending limits are integral parts of DBS' credit risk management process, and we use an array of rating models for our corporate and retail portfolios. Most of these models are built internally using DBS' loss data, and the limits are driven by DBS' Risk Appetite Statement and the Target Market and Risk Acceptance Criteria (TMRAC).

Wholesale borrowers are assessed individually using both judgmental credit risk models and statistical credit risk models. They are further reviewed and evaluated by experienced credit risk managers who consider relevant credit risk factors in the final determination of

the borrower's risk. For some portfolios within the SME segment, DBS also uses a programme-based approach to achieve a balanced management of risks and rewards. Retail exposures are assessed using credit score models, credit bureau records as well as internally and externally available customer behaviour records supplemented by our Risk Acceptance Criteria (RAC). Credit applications are proposed by the business unit, and applications outside the RAC are independently assessed by the credit risk managers.

*Refer to Section 5.3 on page 78 to read more about our internal credit risk models.*

Pre-settlement credit risk for traded products arising from a counterparty potentially defaulting on its obligations is quantified by evaluation of the market price plus potential future exposure. This is used to calculate DBS' regulatory capital under the Current Exposure Method (CEM), and is included within DBS' overall credit limits to counterparties for internal risk management.

We actively monitor and manage our exposure to counterparties for over-the-counter (OTC) derivative trades to protect our balance sheet in the event of a counterparty default. Counterparty risk exposures that may be adversely affected by market risk events are identified, reviewed and acted upon by management, and highlighted to the appropriate risk committees. Specific wrong-way risk arises when the credit exposure of a counterparty (from the traded product transaction) directly correlates with the probability of default of the counterparty. DBS has a policy to guide the handling of specific wrong-way risk transactions, and its risk measurement metric takes into account the higher risks associated with such transactions.

Issuer default risk that may also arise from derivatives, notes and securities are generally measured based on jump-to-default computations.

### Concentration risk management

Our risk management processes, which are aligned with our Risk Appetite, ensure that an acceptable level of risk diversification is maintained across DBS.

For credit risk, we use EC as our measurement tool, since it combines the individual risk factors of the probability of default (PD), loss given default (LGD) and exposure at default (EAD), as well as portfolio concentration factors. Granular EC thresholds are set to ensure that the allocated EC stays within our Risk Appetite.

Thresholds are set on major industry groups and single counterparty exposures and notional limits are established for country

exposures. Governance processes are in place to ensure that our exposures are regularly monitored with these thresholds in mind, and appropriate actions are taken when the thresholds are breached.

DBS continually examines how we can enhance the scope of our thresholds to improve the management of concentration risk.

### Country risk

Country risk refers to the risk of loss due to events in a specific country (or a group of countries). This includes political, exchange rate, economic, sovereign and transfer risks.

DBS manages country risk through the requirements of the Group CCRPs and the said risk is part of our concentration risk management. The way we manage transfer risk at DBS is set out in our Country Risk Management Standard. This includes an internal transfer risk and sovereign risk rating system, where assessments are made independently of business decisions. Our transfer risk limits are set in accordance with the Group Risk Appetite Policy.

Transfer risk limits for priority countries are set based on country-specific strategic business considerations as well as the acceptable potential loss according to our Risk Appetite. Management actively evaluates and determines the appropriate level of transfer risk exposures for these countries taking into account the risks and rewards and whether they are in line with our strategic intent. Limits for all other non-priority countries are set using a model-based approach.

All transfer risk limits are approved by the BRMC.

### Credit stress testing

DBS engages in various types of credit stress testing, and these are driven either by regulators or internal requirements and management.

Our credit stress tests are performed at the total portfolio or sub-portfolio level, and are generally performed to assess the impact of changing economic conditions on asset quality, earnings performance, capital adequacy and liquidity. DBS' stress testing programme is comprehensive and covers all major functions and areas of business.

DBS typically performs the following types of credit stress testing at a minimum and others as necessary:

<b>Pillar 1 credit stress testing</b>	DBS conducts Pillar 1 credit stress testing regularly as required by regulators. Under Pillar 1 credit stress testing, DBS assesses the impact of a mild stress scenario (at least two consecutive quarters of zero GDP growth) on Internal Ratings-Based (IRB) estimates (i.e. PD, LGD and EAD) and the impact on regulatory capital. The purpose of the Pillar 1 credit stress test is to assess the robustness of internal credit risk models and the cushion above minimum regulatory capital.
<b>Pillar 2 credit stress testing</b>	DBS conducts Pillar 2 credit stress testing once a year as part of the ICAAP. Under Pillar 2 credit stress testing, DBS assesses the impact of stress scenarios, with different levels of severity, on asset quality, earnings performance as well as internal and regulatory capital. The results of the credit stress tests form inputs to the capital planning process under ICAAP. The purpose of the Pillar 2 credit stress testing is to examine, in a rigorous and forward-looking manner, the possible events or changes in market conditions that could adversely impact DBS and to develop the appropriate action plan.
<b>Industry-wide stress testing</b>	DBS participates in the annual industry-wide stress test (IWST) conducted by the Monetary Authority of Singapore (MAS) to facilitate the ongoing assessment of Singapore's financial stability. Under the IWST, DBS is required to assess the impact of adverse scenarios, as defined by the regulator, on asset quality, earnings performance and capital adequacy.
<b>Sensitivity and scenario analyses</b>	DBS also conducts multiple independent sensitivity analyses and credit portfolio reviews based on various scenarios. The intent of these analyses and reviews is to identify vulnerabilities for the purpose of developing and executing mitigating actions.

### Processes, systems and reports

DBS constantly invests in systems to support risk monitoring and reporting for our Institutional Banking and Consumer Banking/ Wealth Management businesses.

The end-to-end credit process is continually being reviewed and improved through various front-to-back initiatives involving the business units, the operations unit, the risk management units and other key stakeholders. Day-to-day monitoring of credit exposures, portfolio performance and external environmental factors potentially affecting credit risk profiles is key to our philosophy of effective credit risk management.

In addition, credit trends, which may include industry analysis, early warning

alerts and significant weak credits, are submitted to the various risk committees, allowing key strategies and action plans to be formulated and evaluated. Credit control functions also ensure that any credit risk taken complies with the credit risk policies and standards. These functions ensure that approved limits are activated, credit excesses and policy exceptions are appropriately endorsed, compliance with credit standards is carried out, and covenants established are monitored.

Independent risk management functions that report to the CRO are jointly responsible for developing and maintaining a robust credit stress testing programme. These units oversee the implementation of credit stress tests as well as the analysis of the results, of which

management, various risk committees and regulators are informed.

### Non-performing assets

DBS' credit facilities are classified as "Performing assets" or "Non-performing assets" (NPA), in accordance with the MAS Notice to Banks No. 612 "Credit Files, Grading and Provisioning" (MAS Notice 612).

Credit exposures are categorised into one of the following five categories, according to our assessment of a borrower's ability to repay a credit facility from its normal sources of income and/ or the repayment behaviour of the borrower.

Classification grade	Description
<b>Performing assets</b>	
<b>Pass</b>	Indicates that the timely repayment of the outstanding credit facilities is not in doubt.
<b>Special mention</b>	Indicates that the borrower exhibits potential weaknesses that, if not corrected in a timely manner, may adversely affect future repayments and warrant close attention by DBS.
<b>Classified or NPA</b>	
<b>Substandard</b>	Indicates that the borrower exhibits definable weaknesses in its business, cash flow or financial position that may jeopardise repayment on existing terms.
<b>Doubtful</b>	Indicates that the borrower exhibits severe weaknesses such that the prospect of full recovery of the outstanding credit facilities is questionable and the prospect of a loss is high, but the exact amount remains undeterminable as yet.
<b>Loss</b>	Indicates that the outstanding credit facility is not collectable, and little or nothing can be done to recover the outstanding amount from any collateral or from the assets of the borrower generally.



A default is considered to have occurred with regard to a particular borrower when either or both of the following events have taken place:

- Subjective default: Borrower is considered to be unlikely to pay its credit obligations in full, without DBS taking action such as realising security (if held)
- Technical default: Borrower is more than 90 days past due on any credit obligation to DBS

For retail borrowers, the categorisation into the respective MAS loan grades is at the facility level and consistent with MAS Notice 612.

Credit facilities are classified as restructured assets when we grant non-commercial concessions to a borrower because its financial position has deteriorated or is unable to meet the original repayment schedule. A restructured credit facility is classified into the appropriate non-performing grade based on the assessment of the borrower's financial condition and its ability to repay according to the restructured terms.

Such credit facilities are not returned to the performing status until there are reasonable grounds to conclude that the borrower will be able to service all future principal and interest payments on the credit facility in accordance with the restructured terms and MAS Notice 612. Apart from what has been described, we do not grant concessions to borrowers in the normal course of business.

In addition, it is not within DBS' business model to acquire debts that have been restructured at inception (e.g. distressed debts).

*Refer to Note 2.11 to the financial statements on page 112 for our accounting policies regarding specific and general allowances for credit losses.*

In general, specific allowances are recognised for defaulting credit exposures rated substandard and below.

*The breakdown of our NPA by loan grading and industry and the related amounts of specific allowances can be found in Note 43.2 to the financial statements on page 166. A breakdown of past due loans can also be found in the same note.*

When required, we will take possession of all collateral and dispose of them as soon as practicable. Realised proceeds are used to reduce outstanding indebtedness.

*A breakdown of collateral held for NPA is shown in Note 43.2 to the financial statements on page 168.*

Repossessed collateral is classified in the balance sheet as other assets. The amounts of such other assets for 2018 and 2017 were not material.

## 5.2 Credit risk mitigants

### Collateral received

Where possible, DBS takes collateral as a secondary source of repayment. This includes, but is not limited to, cash, marketable securities, real estate, trade receivables, inventory, equipment, and other physical and/ or financial collateral. We may also take fixed and floating charges on the assets of borrowers.

Policies are in place to determine the eligibility of collateral for credit risk mitigation. These include requiring specific collateral to meet minimum requirements in order to be considered as effective risk mitigants. DBS' collateral is generally diversified and periodic valuations of collateral are required. Real estate constitutes the bulk of our collateral, while marketable securities and cash are immaterial.

For derivatives, repurchase agreements (repo) and other repo-style transactions with financial market counterparties, collateral arrangements are typically covered under market-standard documentation, such as International Swaps & Derivatives Association (ISDA) Agreements and Master Repurchase Agreements. The collateral received is mark-to-market on a frequency DBS and the counterparties mutually agreed upon. This is governed by internal guidelines with respect to collateral eligibility. In the event of a default, the credit risk exposure is reduced by master-netting arrangements where DBS is allowed to offset what we owe a counterparty against what is due from that counterparty in a netting-eligible jurisdiction.

*Refer to Note 15 to the financial statements on page 127 for further information on financial assets and liabilities subject to netting agreement but not offset on the balance sheet.*

Collateral held against derivatives generally consists of cash in major currencies and highly rated government or quasi-government bonds. Exceptions may arise in certain countries, where due to domestic capital markets and business conditions, the bank may be required to accept less highly rated or liquid government bonds and currencies. Reverse repo-transactions are generally limited to large institutions with reasonably good credit standing. DBS takes haircuts against the underlying collateral of these transactions that commensurate with collateral quality to ensure credit risks are adequately mitigated.

In times of difficulty, we will review the customers' specific situation and circumstances to assist them in restructuring their financial obligations. However, should the need arise, disposal and recovery processes are in place to dispose of collateral held. DBS maintains a panel of agents and solicitors to assist in the disposal of non-liquid assets and specialised equipment quickly.

### Collateral posted

DBS is required to post additional collateral in the event of a rating downgrade. As at 31 December 2018, for a three-notch downgrade of its Standard & Poor's Ratings Services and Moody's Investors Services ratings, DBS will have to post additional collateral amounting to SGD 189 million (2017: SGD 19 million).

### Other credit risk mitigants

DBS accepts guarantees as credit risk mitigants. Internal thresholds for considering the eligibility of guarantors for credit risk mitigation are in place.

## 5.3 Internal credit risk models

DBS adopts rating systems for the different asset classes under the Internal Ratings-Based Approach (IRBA).

There is a robust governance process for the development, independent validation and approval of any credit risk model. The models go through a rigorous review process before they are endorsed by the GCRMC and Risk EXCO. They must also be approved by the BRMC before being used. The key risk measures generated by the internal credit risk rating models to quantify regulatory capital include PD, LGD and EAD. For portfolios under the Foundation IRBA, internal estimates of PD are used while the supervisory LGD and EAD estimates are applied. For retail portfolios under the Advanced IRBA, internal estimates of PD, LGD and EAD are used. In addition, the ratings from the credit models act as the basis for underwriting credit risk, monitoring portfolio performance and determining business strategies. The performance of the rating systems is monitored regularly and reported to the GCRMC, Risk EXCO and BRMC to ensure their ongoing effectiveness.

An independent risk unit conducts formal validations for the respective rating systems annually. The validation processes are also independently reviewed by Group Audit. These serve to highlight material deterioration in the rating systems for management attention.

### 5.3.1 Retail exposure models

Retail portfolios are categorised into the following asset classes under the Advanced IRBA: residential mortgages, qualifying revolving retail exposures and other retail exposures.

Within each asset class, exposures are managed on a portfolio basis. Each account is assigned to a risk pool, considering factors such as borrower characteristics and collateral type. PD, EAD and LGD estimates are based on internal historical default, utilisation and realised losses within a defined period. Default is identified at the facility level.

Product-specific credit risk elements such as underwriting criteria, scoring models, approving authorities and asset quality and business strategy reviews, as well as systems, processes and techniques to monitor portfolio performance, are in place. Credit risk models for secured and unsecured portfolios are also used to update the risk level of each loan on a monthly basis, reflecting the broad usage of risk models in portfolio quality reviews.

### 5.3.2 Wholesale exposure models

Wholesale exposures are under the Foundation IRBA for capital computation. They include sovereign, bank and corporate. Specialised lending exposures are under IRBA using supervisory slotting criteria.

The risk ratings for the wholesale exposures (other than securitisation exposures) are mapped to corresponding external rating equivalents.

Sovereign exposures are risk-rated using internal risk-rating models. Factors related to country-specific macroeconomic risk, political risk, social risk and liquidity risk are included in the sovereign rating models to assess the sovereign credit risk in an objective and systematic manner.

Bank exposures are assessed using the bank-rating model. The model considers both quantitative and qualitative factors such as capital levels and liquidity, asset quality, earnings, management and market sensitivity.

Large corporate exposures are assessed using internal rating models. Factors considered in the risk assessment process include the counterparty's financial standing and qualitative factors such

as industry risk, access to funding, market standing and management strength.

SME credit rating models consider risk factors on the counterparty's financial position and strength, as well as its account performance.

Credit risk ratings under the IRBA portfolios are, at a minimum, reviewed by designated approvers on an annual basis unless credit conditions require more frequent assessment.

### 5.3.3 Specialised lending exposures

Specialised lending IRBA portfolios include income-producing real estate, project finance, object finance, hotel finance and commodities finance. These adopt the supervisory slotting criteria specified under Annex 7v of MAS Notice 637, which are used to determine the risk weights to calculate credit risk-weighted exposures.

### 5.3.4 Securitisation exposures

We arrange securitisation transactions for our clients for fees. These transactions do not involve special-purpose entities we control. For transactions that are not underwritten, no securitisation exposures are assumed as a direct consequence of arranging the transactions. Any decision to invest in any of such arranged transactions is subject to independent risk assessment.

Where DBS provides an underwriting commitment, any securitisation exposure that arises will be held in the trading book to be traded or sold down in accordance with our internal policy and risk limits. In addition, DBS does not provide implicit support for any transactions we structure or have invested in.

We invest in our clients' securitisation transactions from time to time. These may include securitisation transactions arranged by us or other parties. We may also act as a liquidity facility provider, working capital facility provider or swap counterparty. Such exposures require the approval of the independent risk function and are subject to regular risk reviews after they take place. We also have processes in place to monitor the credit risk of our securitisation exposures.

### 5.3.5 Credit exposures falling outside internal credit risk models

DBS applies the Standardised Approach (SA) for portfolios that are expected to transit to IRBA or for portfolios that are immaterial in terms of size and risk profile. These portfolios include:

- IRBA-transitioning retail and wholesale exposures
- IRBA-exempt retail exposures
- IRBA-exempt wholesale exposures

Any identified transitioning retail and/or wholesale exposures are expected to adopt Advanced or Foundation IRBA, subject to certification by MAS. Prior to regulatory approval, these portfolios are under SA.

The portfolios under the SA are subject to our overall governance framework and credit risk management practices. DBS continues to monitor the size and risk profile of these portfolios and will enhance the relevant risk measurement processes if these risk exposures become material.

DBS uses external ratings for credit exposures under the SA where relevant, and we only accept ratings from Standard & Poor's, Moody's and Fitch in such cases. DBS follows the process prescribed in MAS Notice 637 to map the ratings to the relevant risk weights.

## 5.4 Credit risk in 2018

### Concentration risk

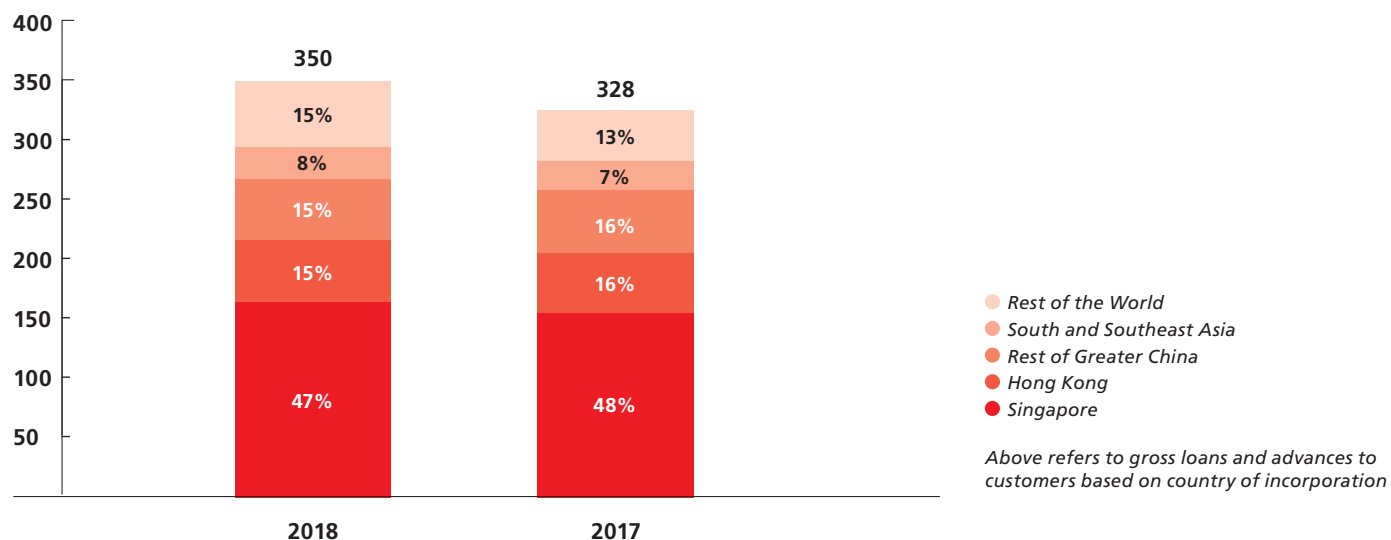
DBS' geographic distribution of customer loans has remained stable for the past year.

Our gross loans and advances to customers continue to be predominantly in our home market of Singapore, accounting for 47% of our total portfolio. The portfolios for Hong Kong and Rest of Greater China grew slightly, while the portfolios in South and Southeast Asia grew by over 16%, largely in India and Indonesia.

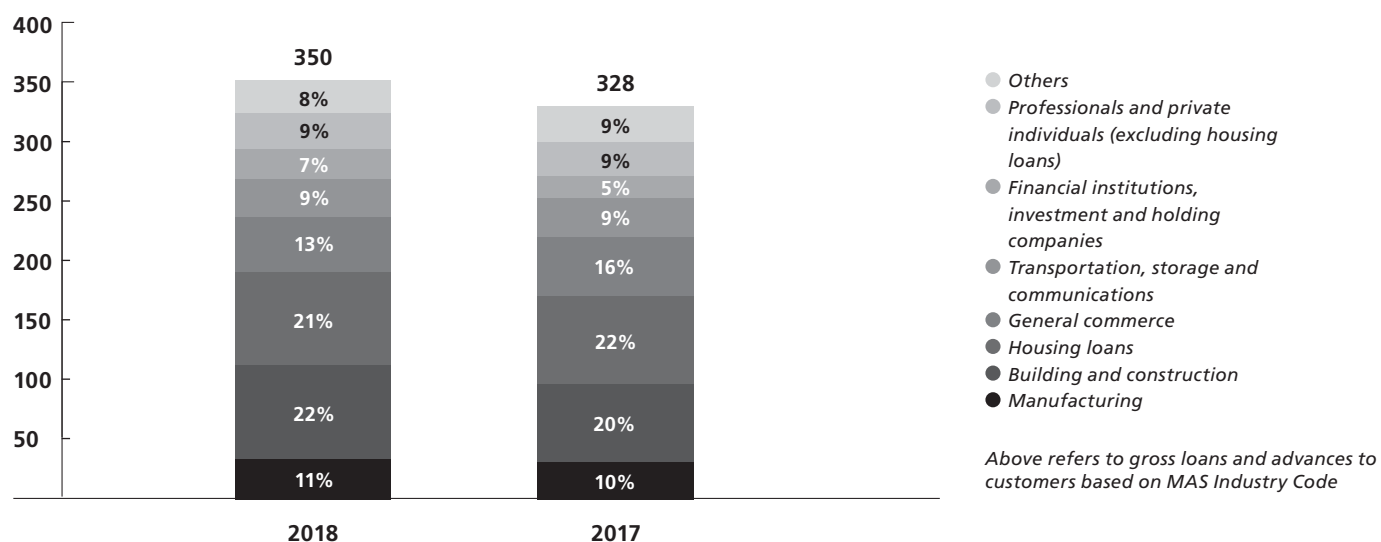
Our portfolio remains well diversified across industry and business segments and is fairly stable, with building and construction, general commerce and manufacturing being the largest contributors in the wholesale portfolio, accounting for 46% of the total portfolio.



## Geographical Concentration (SGD billion)



## Industry Concentration (SGD billion)



Refer to Note 43.4 to the financial statements on page 170 for DBS' breakdown of credit risk concentration.

### Non-performing assets

New non-performing asset (NPA) formation remained low and was more than offset by recoveries and write-offs. In absolute terms, our total NPA decreased by 6% from the previous year to SGD 5,684 million and non-performing loans (NPL) ratio declined from 1.7% to 1.5% in 2018.

Refer to "CFO Statement" on page 20.

### Collateral received

The tables below provide breakdowns by loan-to-value (LTV) bands for the borrowings secured by real estate and other collateral from the various market segments.

### Residential mortgage loans

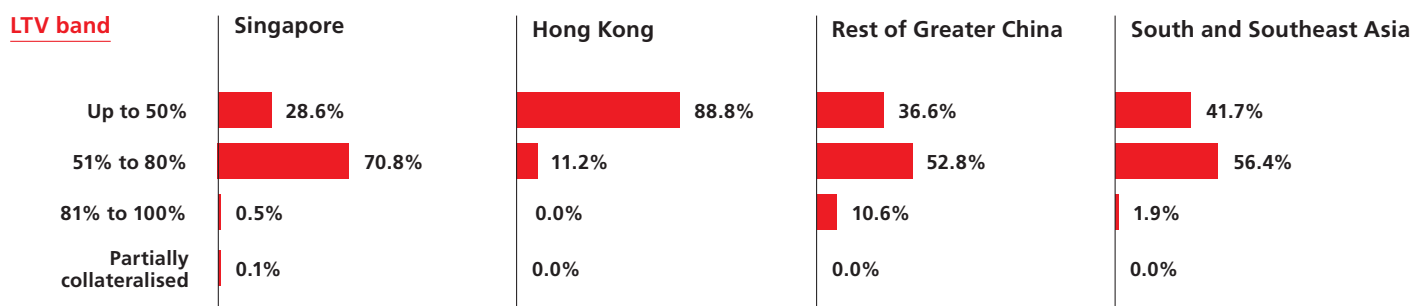
The LTV ratio is calculated using mortgage loans including undrawn commitments divided by the collateral value. Property valuations are determined by using a combination of professional appraisals and housing price indices.

For Singapore mortgages, new loans are capped at LTV limits of up to 75% for private residential mortgages, since July 2018. In tandem with the increase in private property prices by 7.9% comparing end 2018 against end 2017, there was an approximate 7.8% shift in the proportion of mortgage exposure with LTV > 80% to the LTV < 80% band.

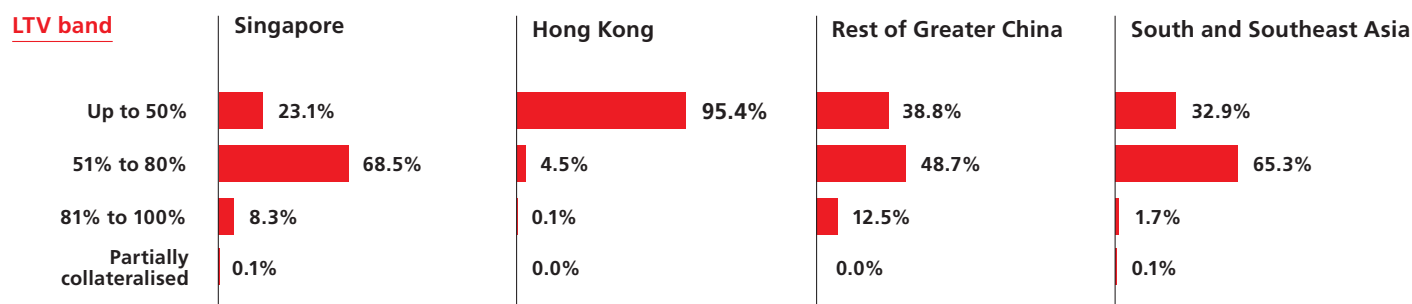
For Hong Kong mortgages, there was an approximate 6.7% increase in the proportion of mortgage exposure in the 51-80% LTV band attributed to strong new loans booked in 2018. Nevertheless, exposure remained flat.

## Percentage of residential mortgage loans (breakdown by LTV band and geography)

As at 31 December 2018



As at 31 December 2017



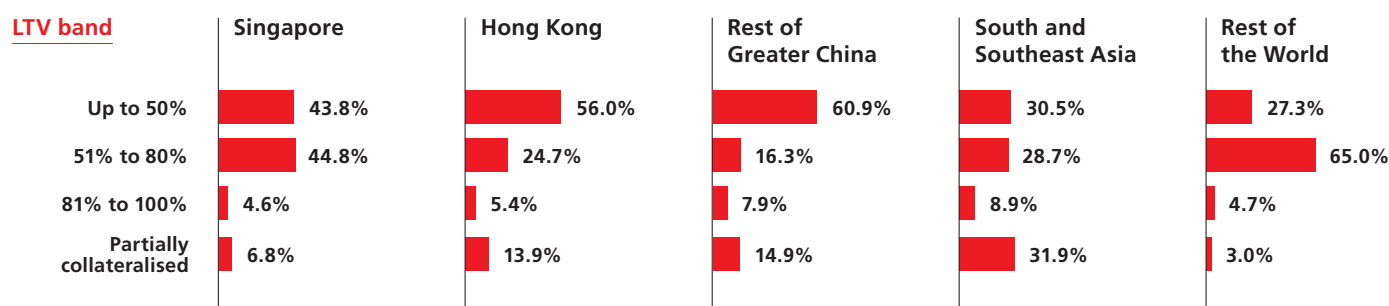
## Loans and advances to corporates secured by real estate

These secured loans are extended for the purpose of acquisition and/ or development of real estate, as well as for general working capital. 90% of such loans were fully collateralised. Majority of these loans have LTV < 80% and they are concentrated in Singapore and Hong Kong, which together accounted for 82%.

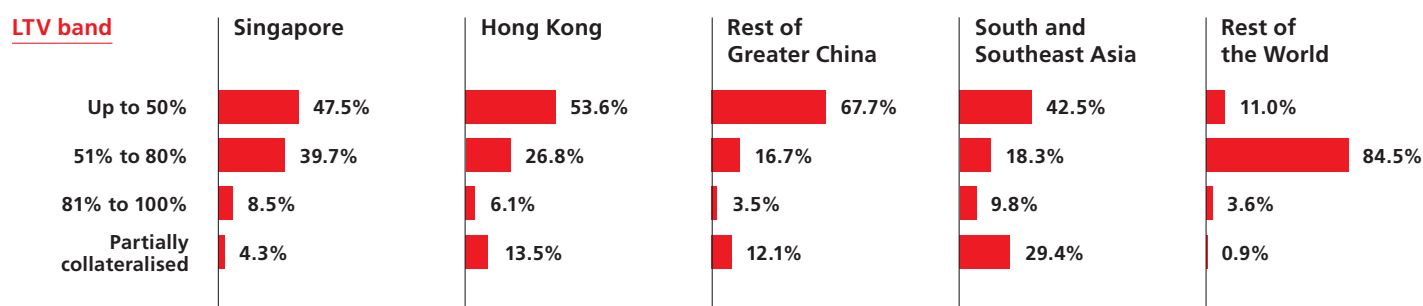
The LTV ratio is calculated as loans and advances divided by the value of collaterals that secure the same facility. Real estate forms a substantial portion of the collaterals; other collateral values such as cash, marketable securities, and bank guarantees are also included.

## Percentage of loans and advances to corporates secured by real estate (breakdown by LTV band and geography)

As at 31 December 2018



As at 31 December 2017



## Loans and advances to banks

In line with market convention, loans and advances to banks are typically unsecured. DBS manages the risk of such exposures by keeping tight control of the exposure tenor and monitoring of their credit quality.

## Derivatives counterparty credit risk by markets and settlement methods

We continue to manage our derivatives counterparty risk exposures with netting and collateral arrangements, thereby protecting our balance sheet in the event of a counterparty default.

A breakdown of our derivatives counterparty credit risk by markets (OTC versus exchange-traded) and settlement methods (cleared through a central counterparty versus settled bilaterally) can be found below.

## Notional OTC and exchange-traded products

In notional terms, SGD million	As at 31 Dec 2018
OTC derivatives cleared through a central counterparty	901,075
OTC derivatives settled bilaterally	1,136,286
<b>Total OTC derivatives</b>	<b>2,037,361</b>
Exchange-traded derivatives	26,017
<b>Total derivatives</b>	<b>2,063,378</b>

Please refer to Note 38 to the financial statements on page 151 for a breakdown of the derivatives positions held by DBS.

## 6 Market risk

Our exposure to market risk is categorised into:

**Trading portfolios:** Arising from positions taken for (i) market-making, (ii) client-facilitation and (iii) benefiting from market opportunities.

**Non-trading portfolios:** Arising from (i) positions taken to manage the interest rate risk of our Institutional Banking and Consumer Banking assets and liabilities, (ii) debt securities and equities comprising investments held for yield and/ or long-term capital gains, (iii) strategic stakes in entities and (iv) structural foreign exchange risk arising mainly from our strategic

investments, which are denominated in currencies other than the Singapore Dollar.

We use a variety of financial derivatives such as swaps, forwards and futures, and options for trading and hedging against movements in interest rates, foreign exchange rates, equity prices and other market risks of our (i) investments, (ii) maturity mismatches between loans and deposits, (iii) structured product issuances, and (iv) other assets and liabilities.

### 6.1 Market risk management at DBS

DBS' approach to market risk management comprises the following building blocks:

#### Policies

#### Risk methodologies

#### Processes, systems and reports

#### Policies

The Group Market Risk Management Policy sets our overall approach towards market risk management, while the Market Risk Management Standard establishes the basic requirements for the said management within DBS. The Market Risk Management Guide complements the Market Risk Management Standard by providing more details regarding specific subject matters. Both the Market Risk Management Standard and Market Risk Management Guide facilitate the identification, measurement, control, monitoring and reporting of market risk in a consistent manner. They also set out the overall approach, standards and controls governing market risk stress testing across DBS.

The criteria for determining the positions to be included in the trading book are stipulated in the Trading Book Policy Statement.

#### Risk methodologies

Value-at-Risk (VaR) is a method that computes the potential losses of risk positions as a result of market movement over a specified time horizon and according to a given level of confidence.

Our VaR model is based on historical simulation with a one-day holding period. We use Expected Shortfall (ES), which is the average of potential loss beyond a given level of confidence, to monitor and limit market risk exposures, as well as monitor net open positions net of hedges. The market risk economic capital that is allocated by the BRMC is linked to ES by a multiplier. ES is supplemented by risk control metrics such as sensitivities

to risk factors and loss triggers for management action.

DBS conducts backtesting to verify the predictiveness of the VaR model. Backtesting compares VaR calculated for positions at the close of each business day with the profit and loss (P&L) that arises from those positions on the following business day. The backtesting P&L excludes fees and commissions, revenues from intra-day trading, non-daily valuation adjustments and time effects.

For backtesting, VaR at the 99% level of confidence and over a one-day holding period is used. We adopt the standardised approach to compute market risk regulatory capital under MAS Notice 637 for the trading book positions. As such, VaR backtesting does not impact our regulatory capital for market risk.

VaR models allow us to estimate the aggregate portfolio market risk potential loss due to a range of market risk factors and instruments. However, there are limitations to VaR models; for example, past changes in market risk factors may not provide accurate predictions of future market movements, and the risk arising from adverse market events may be understated.

To monitor DBS' vulnerability to unexpected but plausible extreme market risk-related events, we conduct multiple market risk stress tests regularly. These cover trading and non-trading portfolios and follow a combination of historical and hypothetical scenarios depicting risk-factor movement.

ES and Net Interest Income (NII) variability are the key risk metrics used to manage our assets and liabilities. As an exception, credit risk arising from loans and receivables is managed under the credit risk management framework. We also manage banking book interest rate risk arising from mismatches in the interest rate profiles of assets, liabilities and capital instruments (and associated hedges), which includes basis risk arising from different interest rate benchmarks, interest rate re-pricing risk, yield curve risk and embedded optionality. Behavioural assumptions are applied when managing the interest rate risk of banking book deposits with indeterminate maturities. DBS measures interest rate risk in the banking book on a weekly basis.

#### Processes, systems and reports

Robust internal control processes and systems have been designed and implemented to support our market risk management approach. DBS reviews these control processes and systems regularly, and these reviews allow senior management to assess their effectiveness.

The RMG Market and Liquidity Risk unit – an independent market risk management function reporting to the CRO – monitors, controls and analyses DBS' market risk daily. The unit comprises risk control, risk analytics, production and reporting teams.

## 6.2 Market risk in 2018

The main risk factors driving DBS' trading portfolios in 2018 were interest rates, foreign exchange, equities and credit spreads. The following table shows the period-end, average, high and low diversified ES (based on a 97.5% level of confidence) and ES by risk class for our trading portfolios.

1 Jan 2018 to 31 Dec 2018				
SGD million	As at 31 Dec 2018	Average	High	Low
Diversified	14	11	19	8
Interest rates	11	10	21	8
Foreign exchange	4	3	6	2
Equity	6	2	6	#
Credit spread	6	5	6	4
Commodity	#	#	1	#

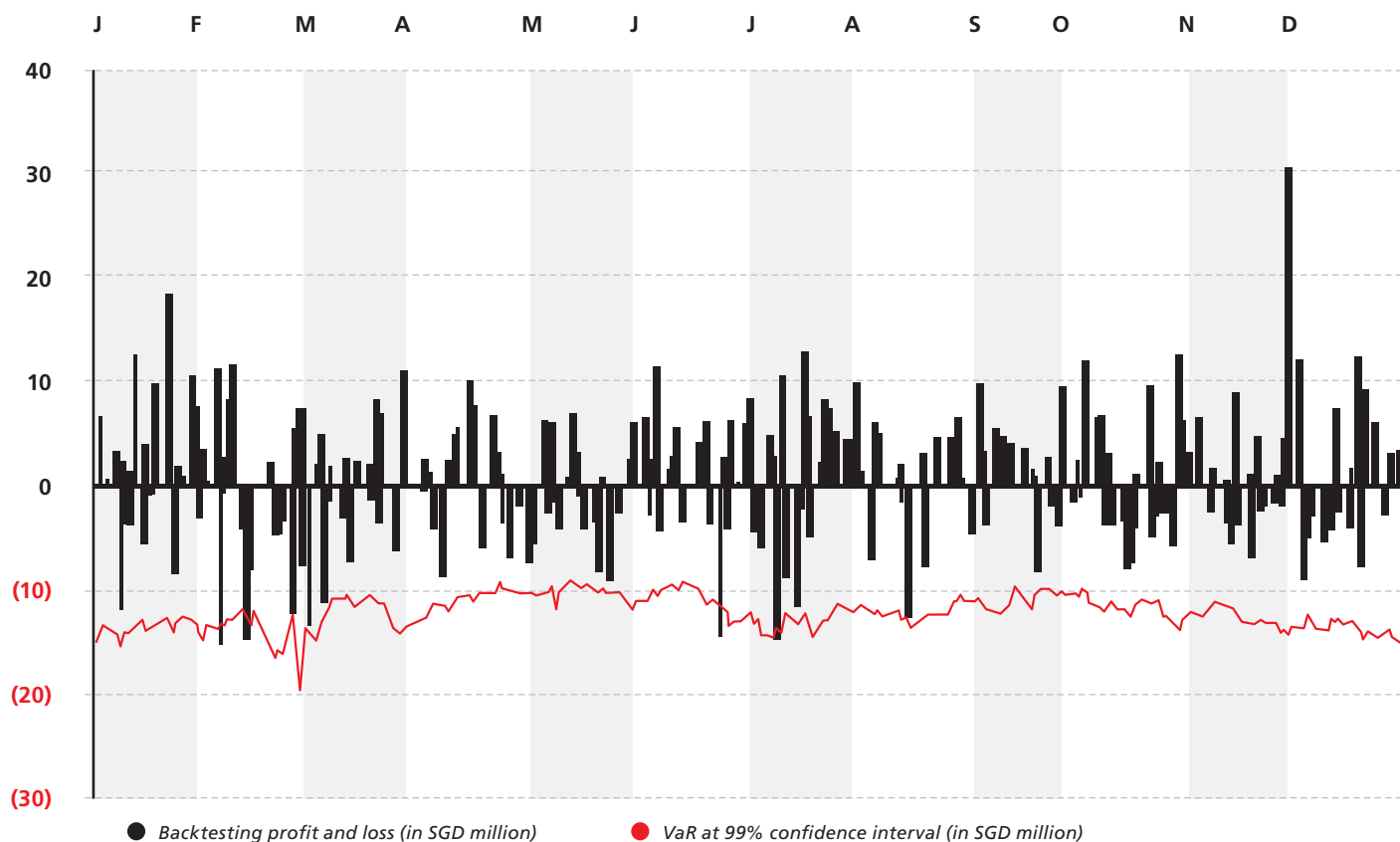
# Amount under SGD 500,000

1 Jan 2017 to 31 Dec 2017				
SGD million	As at 31 Dec 2017	Average	High	Low
Diversified	16	21	29	13
Interest rates	15	16	20	14
Foreign exchange	5	5	16	3
Equity	1	1	1	#
Credit spread	4	14	24	4
Commodity	#	#	1	#

# Amount under SGD 500,000

DBS' trading portfolios experienced four backtesting exceptions in 2018, which occurred in February, June and July. The backtesting exceptions were largely due to swings in equity and USD interest rate volatilities, and movements in bond credit spreads.

SGD million



In 2018, the key market risk drivers of our non-trading portfolios were interest rates (Singapore Dollar and US Dollar) and foreign exchange.

The economic value impact of changes in interest rates was assessed with plausible rates movements and characteristics of the non-trading portfolio assets and liabilities. The economic value changes based on the worse of an upward or downward parallel shift in the yield curve of 100 basis points and 200 basis points were negative SGD 1,219 million and negative SGD 2,305 million (2017: negative SGD 1,221 million and SGD 2,311 million) respectively.

Foreign exchange risk in our non-trading portfolios was primarily from structural foreign exchange positions, arising mainly from our strategic investments and retained earnings in overseas branches and subsidiaries.

Refer to Note 39.3 to the financial statements on page 155 for details on DBS' structural foreign exchange positions.

## 7 Liquidity risk

DBS' liquidity risk arises from our obligations to honour withdrawals of deposits, repayments of borrowed funds at maturity and our commitments to extend loans to our customers. We seek to manage our liquidity to ensure that our liquidity obligations will continue to be honoured under normal as well as adverse circumstances.

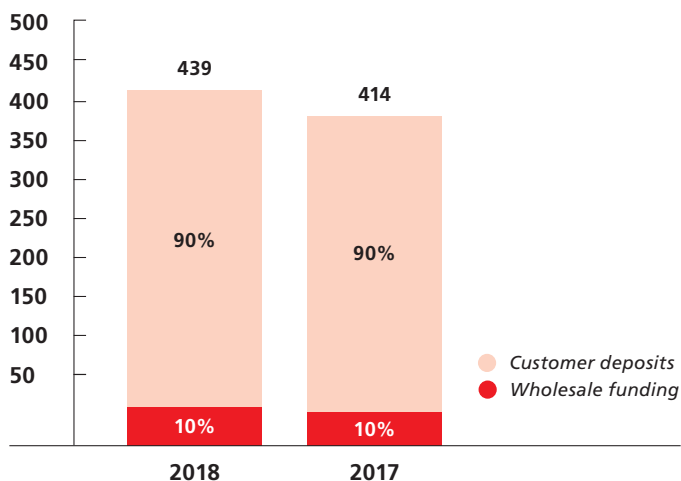
### 7.1 Liquidity risk management at DBS

#### Liquidity management and funding strategy

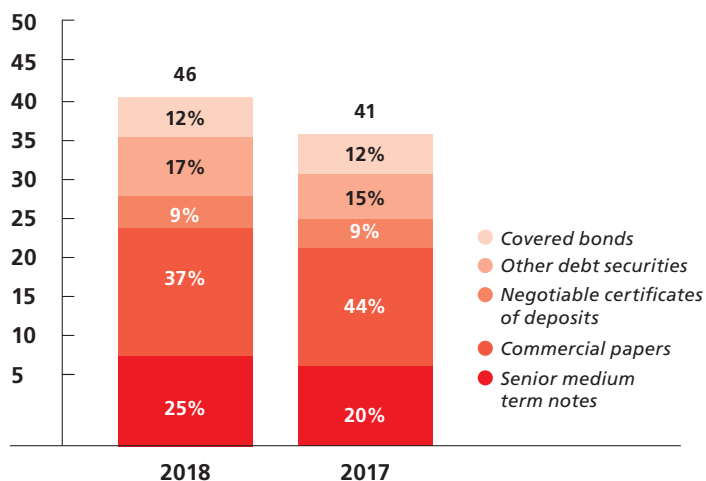
DBS strives to develop a diversified funding base with access to funding sources across retail and wholesale channels. Our funding strategy is anchored on strengthening our core deposit franchise as the foundation of our long-term funding advantage.

Customer deposits grew by SGD 20 billion in 2018.

### Funding Sources (SGD billion)



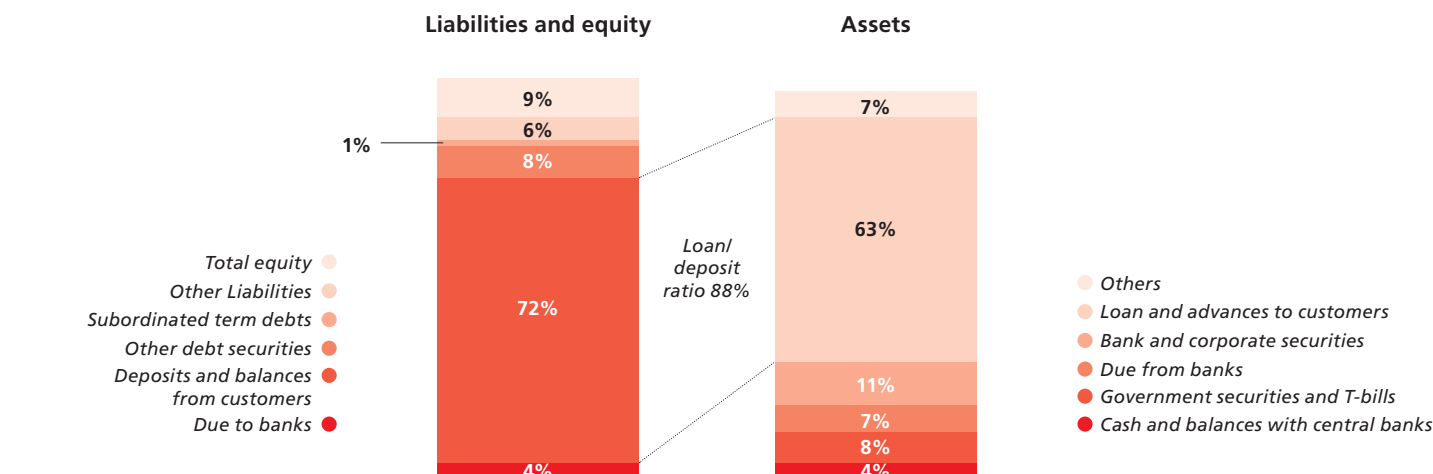
### Wholesale Funding Breakdown (SGD billion)



DBS aims to ensure continuous access to the investor base for capital and senior wholesale funding to support our commercial banking activities. We look for cost efficiencies over the long term and market extensively, focusing on the Singapore Dollar, US Dollar, Euro, Australian Dollar and Hong Kong Dollar as our key issuance currencies. Capital instruments are primarily issued from DBS Group Holdings Ltd (DBSH) while covered bonds originate from DBS Bank Ltd. Senior notes are issued from both DBSH and the Bank as required, although DBSH is currently the only active issuer of USD senior benchmarks.

We raised additional capital at competitive levels across the Singapore Dollar, US Dollar, Euro, Australian Dollar, Japanese Yen and Chinese Yuan in 2018. Through active investor engagement, we have further broadened our investor base.

The diagrams below show our asset funding structure as at 31 December 2018.



Refer to Note 31 to the financial statements on page 140 for more details of our wholesale funding sources and Note 44.1 on page 172 for the contractual maturity profile of our assets and liabilities.

With increasing diversification of funding sources, optimising the mismatch in fund deployment against sources with respect to pricing, size, currency and tenor remains challenging. To this end, where practicable and transferable without loss in value, we make appropriate use of the swap markets for different currencies, commensurate with the liquidity of each, in the conversion and deployment of surplus funds across locations.

As these swaps typically mature earlier than loans, we are exposed to potential cash flow mismatches arising from the risk that counterparties may not roll over maturing

swaps with us to support the continual funding of loans. We mitigate this risk by setting triggers on the number of swaps transacted with the market and making conservative assumptions on the cash flow behaviour of swaps under our cash flow maturity gap analysis (refer to Section 7.2 on page 86).

In general, overseas locations centralise the majority of their borrowing and deployment of funds with our head office, taking into account the relevant regulatory restrictions while maintaining a commensurate level of presence and participation in the local funding markets.

During our annual budget and planning process, each overseas location conducts an in-depth review of its projected loan and deposit growth as well as its net funding and liquidity profile for the next year. Each overseas location is required to provide justification if head office funding support is required.

The Group Assets and Liabilities Committee and respective Location Assets and Liabilities Committee regularly review our balance sheet composition, the growth in loans and deposits, our utilisation of wholesale funding, the momentum of our



business activities, market competition, the economic outlook, market conditions and other factors that may affect liquidity in the continual refinement of DBS' funding strategy.

### Approach to liquidity risk management

DBS' approach to liquidity risk management comprises the following building blocks:

<b>Policies</b>
<b>Risk methodologies</b>
<b>Processes, systems and reports</b>

#### Policies

The Group Liquidity Risk Management Policy sets our overall approach towards liquidity risk management and describes the range of strategies we employ to manage our liquidity.

These strategies include maintaining an adequate counterbalancing capacity to address potential cash flow shortfalls and having diversified sources of liquidity.

DBS' counterbalancing capacity includes liquid assets, the capacity to borrow from the money markets (including the issuance of commercial papers and covered bonds), and forms of managerial interventions that improve liquidity. In the event of a potential or actual crisis, we have in place a set of liquidity contingency and recovery plans to ensure that we maintain adequate liquidity.

The Group Liquidity Risk Management Policy is supported by Standards that establish the detailed requirements for liquidity risk identification, measurement, reporting and control within DBS. The set of Policies, Standards and supporting Guides communicate these baseline requirements to ensure consistent application throughout DBS.

#### Risk methodologies

The primary measure used to manage liquidity within the tolerance defined by the Board is cash flow maturity mismatch analysis.

This form of analysis is performed on a regular basis under normal and adverse scenarios. It assesses the adequacy of our counterbalancing capacity to fund or mitigate any cash flow shortfalls that may occur as forecasted in the cash flow movements across successive time bands. To ensure that liquidity is managed in line with our Risk Appetite, core parameters such as the types of scenarios, the survival period and the minimum level of liquid assets, are pre-specified for monitoring and control on a group-wide basis. Any occurrences of forecasted shortfalls that cannot be covered by our counterbalancing capacity will be escalated to the relevant committees for evaluation and action.

Liquidity risk stress testing is performed regularly using cash flow maturity mismatch analysis, and covers adverse scenarios including general market and idiosyncratic stress scenarios. Stress tests assess our vulnerability when liability run-offs increase, asset rollovers increase and/ or liquid asset buffers decrease. In addition, ad hoc stress tests are performed as part of our recovery planning and ICAAP exercises.

Liquidity risk control measures such as liquidity-related ratios and balance sheet analysis are complementary tools for cash flow maturity mismatch analysis, and they are performed regularly to obtain deeper insights and finer control over our liquidity profile across different locations. The liquidity risk control measures also include concentration measures regarding top depositors, wholesale borrowing and swapped funds ratios.

#### Processes, systems and reports

Robust internal control processes and systems support our overall approach in identifying, measuring, aggregating, controlling and monitoring liquidity risk across DBS.

Continuous improvement in data and reporting platforms has allowed most elements of internal liquidity risk reporting to be centralised.

The RMG Market and Liquidity Risk unit manages the day-to-day liquidity risk monitoring, control reporting and analysis.

### 7.2 Liquidity risk in 2018

DBS actively monitors and manages our liquidity profile through cash flow maturity mismatch analysis.

In forecasting cash flow under the analysis, behavioural profiling is necessary in cases where a product has indeterminate maturity or the contractual maturity does not realistically reflect the expected cash flow.

Two examples are maturity-indeterminate savings and current account deposits, which are generally viewed as sources of stable funding for commercial banks. In fact, they consistently exhibit stability even under historic periods of stress. A conservative view is adopted in the behavioural profiling of assets, liabilities and off-balance sheet commitments that have exhibited cash flow patterns that differ significantly from the contractual maturity profile shown under Note 44.1 of our financial statements on page 172.

The table below shows our behavioural net and cumulative maturity mismatch between assets and liabilities over a one-year period, in a normal scenario without incorporating growth projections. DBS' liquidity was observed to remain adequate in the maturity mismatch analysis. In 2018, improvement in the short term cumulative mismatch resulted from increase in liquid assets while deposit outflows moved from the near term to the medium term. Growth in long term loans reduced the net liquidity surplus at the longer tenors.

SGD million <sup>(a)</sup>	Less than 7 days	1 week to 1 month	1 to 3 months	3 to 6 months	6 months to 1 year
<b>As at 31 Dec 2018 Net liquidity mismatch</b>	24,498	(4,567)	(11,168)	10,508	5,224
<b>Cumulative mismatch</b>	24,498	19,931	8,763	19,271	24,495
<b>As at 31 Dec 2017<sup>(b)</sup> Net liquidity mismatch</b>	10,218	7,789	(5,203)	15,252	10,963
<b>Cumulative mismatch</b>	10,218	18,007	12,804	28,056	39,019

(a) Positive indicates a position of liquidity surplus. Negative indicates a liquidity shortfall that has to be funded

(b) As the behavioural assumptions used to determine the maturity mismatch between assets and liabilities are updated from time to time, the liquidity mismatches may not be directly comparable across past balance sheet dates

### 7.3 Liquid assets

Liquid assets are assets that are readily available and can be easily monetised to meet obligations and expenses under times of stress.

Such assets are internally defined under the governance of the relevant oversight committees, taking into account the asset class, issuer type and credit rating, among other criteria, before they are reflected as available funds through cash flow maturity mismatch analysis. DBS' Treasury function expects to be able to operationally monetise our pool of liquid assets to meet liquidity shortfalls when the need arises. These liquid assets must be unencumbered and free of any legal, regulatory, contractual or other restrictions.

In practice, liquid assets are maintained in key locations and currencies to ensure that operating entities in such locations possess a degree of self-sufficiency to support business needs and guard against contingencies. The main portion of our liquid assets is centrally maintained in Singapore to support liquidity needs in smaller overseas subsidiaries and branches. Internally, DBS sets a requirement to maintain its pool of liquid assets above a minimum level as a source of contingent funds, taking into account regulatory recommended liquid asset levels as well as internally projected stress shortfalls under the cash flow maturity mismatch analysis.

The table below shows DBS' encumbered and unencumbered liquid assets by instrument and counterparty against other assets in the same category under the balance sheet. The figures are based on the carrying amount at the balance sheet date.

SGD million	Liquid assets				Others <sup>(d)</sup>	Total
	Encumbered	Unencumbered	Total[1]	Average <sup>(c)</sup>	[2]	[1] + [2]
<b>As at 31 Dec 2018</b>						
<b>Cash and balances with central banks<sup>(a)</sup></b>	7,964	9,976	17,940	16,670	4,245	22,185
<b>Due from banks<sup>(b)</sup></b>	-	14,170	14,170	13,091	26,008	40,178
<b>Government securities and treasury bills</b>	8,015	39,019	47,034	47,536	244	47,278
<b>Banks and corporate securities</b>	1,271	49,447	50,718	48,047	7,479	58,197
<b>Total</b>	<b>17,250</b>	<b>112,612</b>	<b>129,862</b>	<b>125,344</b>	<b>37,976</b>	<b>167,838</b>

(a) Unencumbered balances with central banks comprise holdings that are unrestricted and available overnight. The encumbered portion represents the mandatory balances held with central banks, which includes a minimum cash balance (MCB) amount that may be available for use under a liquidity stress situation. The "Others" portion includes term placements with central banks

(b) Liquid assets comprise nostro accounts and eligible certificates of deposits

(c) Total liquid assets reflected on an average basis over the four quarters in 2018

(d) "Others" refer to assets that are not recognised as part of the available pool of liquid assets for liquidity management under stress due to (but not limited to) inadequate or non-rated credit quality, operational challenges in monetisation (e.g. holdings in physical scrips), and other considerations

In addition to the above table, collateral received in reverse repo-transactions amounting to SGD 8,481 million were recognised for liquidity management under stress. It can be observed from the table that our funding strategy in the normal course of business does not rely on collateralised wholesale funding. Instead, liquid assets are usually maintained only as a source of contingent funding.

### 7.4 Liquidity Coverage Ratio (LCR)

Under MAS Notice to Banks No. 649 "Minimum Liquid Assets (MLA) and Liquidity Coverage Ratio (LCR)" (MAS Notice 649), DBS, as a domestic bank incorporated and headquartered in Singapore, is required to comply with the LCR standards. In 2018, Group LCR was maintained well above the minimum LCR requirements of 90% and 100% for all-currency and SGD respectively.

DBS' LCR is sensitive to balance sheet movements resulting from commercial loan/ deposit activities, wholesale inter-bank lending/ borrowing, and to the maturity tenor changes of these positions as they fall into or out of the LCR 30-day tenor. In order to meet the LCR requirements, DBS holds a pool of unencumbered High Quality Liquid Assets (HQLA) comprising predominantly cash, balances with central banks and highly rated bonds issued by governments or supranational entities.

### 7.5 Net Stable Funding Ratio (NSFR)

Beginning 1 January 2018, DBS has been subjected to the Net Stable Funding Ratio (NSFR) under MAS Notice to Banks No. 652 "Net Stable Funding Ratio (NSFR)" (MAS Notice 652). Group NSFR has been maintained consistently above the minimum regulatory requirement of 100%.

NSFR aims to improve the resiliency of banks by promoting long term funding stability. We manage our NSFR by maintaining a stable balance sheet supported by a diversified funding base with access to funding sources across retail and wholesale channels.

## 8 Operational risk

Operational risk is inherent in our business activities and may arise from inadequate or failed internal processes, people, systems, or from external events. DBS' objective is to keep operational risk at appropriate levels, taking into account the markets we operate in, the characteristics of the businesses as well as our economic and regulatory environment.

### 8.1 Operational risk management at DBS

DBS' approach to operational risk management comprises the following building blocks:

#### Policies

#### Risk methodologies

#### Processes, systems and reports

#### Policies

The Group Operational Risk Management (ORM) Policy sets our overall approach for managing operational risk in a structured, systematic and consistent manner.

There are policies, standards, tools and programmes in place to govern ORM practices across DBS. These include corporate operational risk policies and standards that are owned by the respective corporate oversight and control functions. The key policies address risk areas relating to technology, compliance, fraud, money laundering, financing of terrorism and sanctions, new product and outsourcing.

#### Risk methodologies

DBS adopts the standardised approach to compute operational risk regulatory capital.

To manage and control operational risk, we use various tools, including risk and control self-assessment, operational risk event management and key risk indicator monitoring.

DBS' three lines of defence adopt one common risk taxonomy, and a consistent risk assessment approach to managing operational risk. Risk and control self-assessment is conducted by each business or support unit to identify key operational risk and assess the effectiveness of internal controls. When control issues are identified, the units develop action plans and track the resolution of the issues.

Operational risk events are classified in accordance with Basel standards. Such events, including any significant incidents that may impact DBS' reputation, must be reported based on certain established

thresholds. Key risk indicators with pre-defined escalation triggers are employed to facilitate risk monitoring in a forward-looking manner.

Additional methodologies are in place to address subject-specific risks, including, but not limited to, the following:

#### Technology risk

Information Technology (IT) risk is managed through an enterprise technology risk approach. This covers risk governance, communication, monitoring, assessment, mitigation and acceptance, and is supported by a set of IT policies and standards, control processes and risk mitigation programmes.

Along with the bank's digital journey and the evolving cyber risk landscape, we have defined cyber security as a key priority which is managed by a dedicated technology team led by our Chief Information Security Officer (CISO). The CISO oversees the cyber security function, a one-stop competency centre for all cyber security related matters.

#### Compliance risk

Compliance risk refers to the risk of DBS not being able to successfully conduct our business because of any failure to comply with laws, regulatory requirements, industry codes or standards of business and professional conduct applicable to the financial sector.

This includes, in particular, laws and regulations applicable to the licensing and conducting of banking or other financial businesses, financial crime such as anti-money laundering and countering the financing of terrorism, fraud and bribery/corruption. We maintain a compliance programme designed to identify, assess, measure, mitigate and report on such risks through a combination of policy and relevant systems and controls.

DBS also provides relevant training and implements assurance processes. We strongly believe in the need to promote a strong compliance culture as well, and this is developed through the leadership of our Board and senior management.

#### Fraud risk

DBS has established minimum standards for our business and support units to prevent, detect, investigate and remediate fraud and related events. This is based on the Fraud Management Programme, through which standards are implemented at the unit and geographical levels. These standards aim to provide end-to-end management for fraud and related issues within DBS.

#### Money laundering, financing of terrorism and sanctions risks

There are minimum standards for our business and support units to mitigate

and manage our actual and/ or potential exposure to money laundering, terrorist financing, sanctions, corruption, or other illicit financial activities. Accountabilities have also been established for the protection of DBS' assets and reputation, as well as the interests of our customers and shareholders.

#### New product and outsourcing risks

Each new product, service or outsourcing initiative is subject to a risk review and sign-off process, where relevant risks are identified and assessed by departments independent of the risk-taking unit proposing the product or service. Variations of existing products or services and outsourcing initiatives are also subject to a similar process.

#### Other mitigation programmes

To manage business disruptions effectively, business continuity management is vital as part of DBS' risk mitigation programme.

A robust business continuity management programme is in place to ensure that essential banking services can continue in the event of unforeseen events or business disruptions. Planning for business resilience includes the identification of key business processes and resources via Business Impact Analysis and documented in the Business Continuity Plan (BCP). DBS' BCP aims to minimise the impact of business interruption stemming from severe loss scenarios and provide a reasonable level of service until normal business operations are resumed. Within the crisis management structure, an incident management process is established which provides guidance on incident severity assessment, roles and responsibilities of process owners and escalation protocols for the effective management of a crisis.

Exercises are conducted annually, simulating different scenarios to test BCPs and crisis management protocol. These scenarios include technology issues affecting essential banking services across DBS, natural disasters with wide geographical impact, safety-at-risk incidents (e.g. terrorism) and other events leading to significant business disruption. The effectiveness of these exercises, as well as DBS' business continuity readiness, our alignment to regulatory guidelines and our disclosure of residual risks, are communicated and attested by senior management to the BRMC on an annual basis.

To mitigate losses from specific unexpected and significant event risks, DBS purchases group-wide insurance policies – under the Group Insurance Programme – from third-party insurers. DBS has acquired insurance policies relating to crime and professional indemnity, directors and officers liability, cyber risk, property damage and business interruption, general liability and terrorism.

## Processes, systems and reports

Robust internal control processes and systems are integral to identifying, assessing, monitoring, managing and reporting operational risk.

All units are responsible for the day-to-day management of operational risk in their products, processes, systems and activities, in accordance with the various frameworks and policies. The RMG Operational Risk unit and other corporate oversight and control functions:

- Oversee and monitor the effectiveness of operational risk management
- Assess key operational risk issues with the units
- Report and/ or escalate key operational risks to risk committees with recommendations on appropriate risk mitigation strategies

DBS implemented an integrated governance, risk and compliance system with aligned risk assessment methodology, common taxonomy, and unified processes for the three lines of defence.

## 8.2 Operational risk in 2018

The total operational risk losses in 2018 decreased to SGD 13 million (0.10% of DBS' total operating income), from SGD 14 million (0.12%) in 2017. The losses may be categorised into the following seven Basel risk event categories:

Basel risk event types	2018		2017	
	SGD million	%	SGD million	%
Execution, delivery and process management (EDPM)	5.44	43%	6.44	45%
External fraud	3.76	29%	6.41	45%
Business disruption and system failures	2.43	19%	0.79	6%
Clients, products and business practices	0.56	4%	0.46	3%
Damage to physical assets	0.23	2%	0.10	1%
Internal fraud	0.43	3%	0	0%
Employment practices and workplace safety	0	0%	0	0%
<b>Total<sup>(1)</sup></b>	<b>12.85</b>	<b>100%</b>	<b>14.20<sup>(2)</sup></b>	<b>100%</b>

### Notes

(1) Reportable operational risk events are those with net loss greater than SGD 10,000 and are reported based on the date of detection

(2) Adjusted to account for updates such as subsequent recoveries and additional costs (e.g. legal expenses) incurred after 2017

EDPM and external fraud accounted for 72% of our total losses in 2018. EDPM, which comprised mainly processing errors, accounted for the highest share.

## 9 Reputational risk

DBS views reputational risk as an outcome of any failure to manage risks in our day-to-day activities/ decisions, and from changes in the operating environment. These risks include:

- Financial risk (credit, market and liquidity risks)
- Inherent risk (operational and business/ strategic risks)

### 9.1 Reputational risk management at DBS

DBS' approach to reputational risk management comprises the following building blocks:

<b>Policies</b>
<b>Risk methodologies</b>
<b>Processes, systems and reports</b>

#### Policies

DBS adopts a four-step approach for reputational risk management, which is to prevent, detect, escalate and respond to reputational risk events.

As reputational risk is a consequence of the failure to manage other risk types, the

definitions and principles for managing such risks are articulated in the respective risk policies. These are reinforced by sound corporate values that reflect ethical behaviours and practices throughout DBS.

At DBS, we have policies in place to protect the consistency of our brand and to safeguard our corporate identity and reputation.

#### Risk methodologies

Under the various risk policies, we have established a number of mechanisms for ongoing risk monitoring.

These mechanisms take the form of risk limits, key risk indicators and other operating metrics, and include the periodic risk and control self-assessment process. Apart from observations from internal sources, alerts from external parties/ stakeholders also serve as an important source to detect potential reputational risk events. In addition, there are policies relating to media communications, social media and corporate social responsibility to protect DBS' reputation. There are also escalation and response mechanisms in place for managing reputational risk.

While the respective risk policies address the individual risk types, the Reputational Risk Policy focuses specifically on our stakeholders' perception of how well DBS manages its reputational risks. Stakeholders include customers, government agencies and

regulators, investors, rating agencies, business alliances, vendors, trade unions, the media, the general public, the Board and senior management, and DBS' employees.

We recognise that creating a sense of shared value through engagement with key stakeholder groups is imperative for our brand and reputation.

*Read more about our stakeholder engagement on page 70.*

#### Processes, systems and reports

Our units are responsible for the day-to-day management of reputational risk, and ensure that processes and procedures are in place to identify, assess and respond to this risk. This includes social media monitoring to pick up adverse comments on DBS. Events affecting DBS' reputational risk are also included in our reporting of risk profiles to senior management and Board-level committees.

### 9.2 Reputational risk in 2018

DBS' priority is to prevent the occurrence of a reputational risk event, instead of taking mitigating action when it occurs. There were no significant reputational risk incidents endangering the DBS franchise in 2018.