

# RISK MANAGEMENT

(This section forms an integral part of OCBC's audited financial statements)

## Developments In 2015

2015 was a challenging year for banks. Financial markets were volatile due to several factors, including slow global economic growth, the collapse in oil prices, and the transitional impact of China's economic reforms. These developments led to reduced regional manufacturing and trade activities and dampened market sentiments. Banks also faced increased expectations from regulators on capital, liquidity and compliance requirements. Despite these challenges, the Group's asset quality and capital position remained healthy and our non-performing loans stay within our expectations due to proactive risk management.

Despite the tough economic environment, we continued to invest for the long term to support our regional ambition. The Group's risk infrastructure and systems were further strengthened during the year. Our global risk reporting and risk management capabilities were enhanced through automation which allow for more timely response to volatile conditions. We added more overseas branches into our automated daily reporting of Group-wide liquidity positions.

The growing presence of cyber threats tested our readiness against non-traditional forms of cyber security risks. Our IT security systems withstood these threats and they remained resilient and secure. Nonetheless, we will remain vigilant and are keeping abreast of cyber security developments through close monitoring and collaboration with government agencies and other industry associations.

As Chairman of the Association of Banks in Singapore ("ABS") taskforce for outsourcing risk, we helped to establish the industry Guidelines on Control Objectives and Procedures for Outsourced Services Providers. We also helped to formulate the ABS Guidelines on Responsible Financing. Over the next 12 to 18 months, we will be reinforcing our existing frameworks, formalising our Environment, Social

and Governance ("ESG") risk practices into policies, including developing new ones where relevant. To advance responsible financing as an organisation, we will also be training our staff to engage customers in deeper ESG risk discussions to promote long-term sustainable development.

During 2015, we continued to deepen our franchise and grow our regional presence in support of our strategic priorities. We officially opened our Myanmar branch and signed Memoranda of Understanding ("MOU") with 10 local banks to help strengthen the development and growth of the financial sector in Myanmar. The integration of OCBC Wing Hang into the OCBC Group is on track and we are already seeing early cross-sell successes in serving our enlarged customer base.

Looking ahead in 2016, we expect the operating environment to continue to be challenging. Further rise in US interest rates may encourage more capital outflows from Asia which will add further stress to higher leveraged economies and businesses. Weak demand from China will slow intra-regional trade. At the same time, cyber attacks and geopolitical threats are also growing. These challenges will have a negative impact on our operations. However, our proactive management actions, disciplined and prudent risk management practices should ensure that we are able to maintain acceptable asset quality levels and minimise operational surprises. With a strong balance sheet, ample capital and adequate liquidity, the Group is well-positioned to ride through the challenges ahead.

## Risk Management in OCBC Group

We believe that sound risk management is paramount to the success of our risk-taking activities. Our philosophy is to ensure that risks and returns remain consistent with our risk appetite. To achieve this, we identify emerging portfolio threats and credit concentrations at an early stage in order to develop timely risk-response strategies.

The key elements of OCBC Group's enterprise-wide risk management strategy are:

- **Risk appetite** – The Board of Directors approves the Group's risk appetite, and all risks are managed in alignment with the risk appetite. Risk-taking decisions must be consistent with strategic business goals and returns commensurate with the risks taken.
- **Risk frameworks** – The Group's risk management frameworks for all risk types are effective, comprehensive, and consistent.
- **Holistic risk management** – Risks are managed holistically, with a view to understanding the potential interactions among risk types.
- **Qualitative and quantitative evaluations** – Risks are evaluated both qualitatively and with appropriate quantitative analyses and robust stress testing. Risk models in use are regularly reviewed and independently validated to ensure that they are fit-for-use.

Cultivating a strong risk culture and a robust internal control environment throughout the Group is paramount to sound risk management. Accountability for managing risks is jointly owned among customer facing and product business units, dedicated and independent functional risk management units, as well as other support units such as Operations and Technology. Group Audit also provides independent assurance that our risk management system and control and governance process comply with regulatory requirements, internal rules and standards and are effective. Rigorous stress testing and scenario analyses are used to identify possible events or market conditions that could adversely affect our portfolios. The results are taken into account in formulating our business strategy, capital adequacy assessment and risk limit setting.

This risk management chapter discusses the risk management practices, policies, and frameworks of OCBC Group. Our banking subsidiaries are generally required to

implement risk management policies that conform to Group standards or adopt stricter local regulations where applicable. Approving authority and limit structures of our subsidiaries are consistent with the Group to ensure proper ownership and accountability. OCBC Wing Hang is progressively adopting the Group's risk management practices.

Great Eastern Holdings ("GEH") and PT Bank OCBC NISP Tbk ("Bank OCBC NISP") are listed companies that publish their own annual reports, which contain information on their risk management frameworks, and practices (refer to Note 39 in the Group's Financial Statements for information on GEH's risk management). GEH and Bank OCBC NISP collaborate with OCBC in aligning their risk management policies and practices to Group risk standards.

### **Risk Governance and Organisation**

The Board of Directors establishes the Group's risk appetite and risk principles. The Board Risk Management Committee ("BRMC") is the principal Board committee that oversees the Group's risk management. It sets the Group's overall risk management philosophy and approves risk management frameworks, major risk policies, and risk models. The BRMC also oversees the establishment and operation of the risk management systems, and receives regular reviews on their effectiveness. The Group's various risk exposures, risk profiles, risk concentrations, and trends are regularly reported to senior management, BRMC and the Board of Directors for review and action.

The BRMC is supported by Group Risk Management Division ("GRM"), headed by the Group Chief Risk Officer. GRM is an independent risk control function that manages credit, market, operational, liquidity, and other key risks. Dedicated GRM officers establish Group-wide policies and procedures, risk measurement and methodology. They also monitor the

Group's risk profiles and portfolio concentrations. Our risk management and reporting systems are designed to ensure that risks are comprehensively identified and evaluated to support risk decisions. The compensation of risk officers is determined independently of other business areas and is reviewed to ensure it remains market-competitive.

Senior management actively manages risks through various risk management committees, such as the Credit Risk Management Committee, the Market Risk Management Committee, the Asset and Liability Committee, and the Operational Risk and Information Security Committee. Both risk-taking and risk control units are represented in these committees, emphasising shared risk management responsibilities.

Credit officers' approval authority limits are set based on their relevant experience and qualifications. GRM officers also provide expertise during the design and approval of new products to ensure existing systems and processes are able to adequately manage any new product risks.

### **Basel Requirements**

We have implemented the Monetary Authority of Singapore ("MAS") Notice 637 on Risk Based Capital Adequacy Requirements for banks incorporated in Singapore, including the enhanced quality of regulatory capital base and expanded risk coverage under Basel III. As part of enhanced public disclosures on risk profile and capital adequacy, we also publish mid-year disclosures on our investor relations website (Please refer to the Pillar 3 Disclosures section for information as at 31 December 2015).

For credit risk, we have adopted the Foundation Internal Ratings-Based ("F-IRB") approach and supervisory slotting criteria to calculate credit risk-weighted assets for major non-retail portfolios, and the Advanced Internal Ratings-Based ("A-IRB") approach for major retail and small business lending portfolios. Other credit portfolios,

including those belonging to OCBC Wing Hang, Bank OCBC NISP and Bank of Singapore are on the Standardised approach. They will be progressively migrated to the internal ratings-based approaches. The regulatory capital to be set aside for credit risk-weighted assets depends on various factors, including internal risk grades, product type, counterparty type and maturity.

For market risk, we have adopted the Standardised approach. Risk weights for market risk assets are specified according to the instrument category, maturity period, credit quality grade and other factors and applied to the corresponding notional as prescribed under MAS Notice 637. For operational risk, we have adopted the Standardised approach except for Bank OCBC NISP and OCBC Wing Hang which have adopted the Basic Indicator approach. Operational risk-weighted assets are derived by applying specified factors or percentages to the annual gross income for the prescribed business lines in accordance with regulatory guidelines.

At least annually, we go through an Internal Capital Adequacy Assessment Process to evaluate if we are able to maintain sound capital levels after considering business plans and material risks under both base case and severe stress scenarios. Remedial actions are proposed where necessary to ensure that the Group remains prudently managed.

Implementing the Basel framework is an integral part of our efforts to refine and strengthen our management of risks. We closely follow on-going industry and regulatory developments, including higher liquidity and capital requirements.

### **Credit Risk Management**

Credit risk arises from the risk of loss of principal or income on the failure of an obligor or counterparty to meet its contractual obligations. As our primary business is commercial banking, we are exposed to credit risks from lending to consumer, corporate, and institutional customers. Trading and investment banking activities,

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such as the trading of derivatives, debt securities, foreign exchange, commodities, securities underwriting, and the settlement of transactions, also expose the Group to counterparty and issuer credit risks. For derivative contracts, the total credit exposure of the contract is the sum of the mark-to-market value and its peak exposure at a specified confidence interval over the remaining term of the contract.

## CREDIT RISK MANAGEMENT OVERSIGHT AND ORGANISATION

The Credit Risk Management Committee ("CRMC") is the senior management group that supports the CEO and the BRMC in proactively managing credit risk, including reshaping the credit portfolios. It oversees the execution of the Group's credit risk management, framework and policies, and reviews the credit profile of material portfolios to ensure that credit risk taking is aligned with business strategy and risk appetite. In addition, the CRMC recommends credit approval authority limits and highlights any concentration concerns to higher management.

Credit Risk Management ("CRM") department manage credit risk within pre-determined risk appetite, customer targets, limits and established risk standards. Dedicated risk functions are responsible for risk portfolio monitoring, risk measurement methodology, risk reporting, and remedial loan management.

Regular risk reports are provided to the Board of Directors, BRMC and the CRMC in a timely, objective, and transparent manner. These reports include detailed profiles on portfolio quality, credit migration, expected losses, and concentration of risk exposures by business portfolio and geography. Such reporting alerts the Board of Directors, BRMC and senior management to adverse credit trends early, so that timely corrective actions can be taken.

## CREDIT RISK MANAGEMENT APPROACH

Our credit risk management framework covers the entire credit risk cycle,

underpinned by comprehensive credit risk processes, as well as using models to efficiently quantify and manage risks in a consistent manner.

We seek to undertake only credit risks that meet our underwriting standards, and risks that commensurate with returns to enhance shareholder value. As Fair Dealing is an integral part of our core corporate values, credit extensions are offered only after a comprehensive assessment of the borrower's creditworthiness, suitability and the appropriateness of the product offered, as well as an understanding of the borrower's approach in managing ESG risks associated with its business or industry. In addition, the key to our risk management success lies in the sound judgement of our experienced credit officers whose appointments are regularly reviewed.

### Lending to Consumers and Small Businesses

Credit risks for the consumer and small business sectors are managed on a portfolio basis with credit programmes for mortgages, credit cards, unsecured loans, auto loans, commercial property loans and business term loans. Loans underwritten under these programmes conform to clearly defined target markets, terms of lending and maximum loan advances. Systems and processes are in place to detect fraud. The portfolios are closely monitored each month using MIS analytics. Scoring models are also used in the credit decision process for most products to enable objective, consistent decisions and efficient processing. Behavioural scores are used to identify potentially problematic loans early.

### Lending to Corporate and Institutional Customers

Loans to corporate and institutional customers are individually assessed and approved by experienced risk officers. They identify and assess the credit risks of corporate or institutional customers, including any customer group's interdependencies, and take into consideration management quality, financial and business competitive

profiles against industry and economic threats. Collaterals or other credit support are also used to mitigate potential losses. Credit extensions are guided by pre-defined target market and risk acceptance criteria. To ensure objectivity in credit extension, co-grantor approvals and shared risk ownership are required from both the business units as well as credit risk functions. At OCBC Wing Hang, loans are approved by a Credit Committee it will adopt the co-grantor approach in due course.

### Lending to Private Banking Customers

Credit extensions to our wealth management clients in the Bank of Singapore are subject to comprehensive credit assessment, the availability of acceptable collateral and compliance with loan ratios and margin requirements. Joint approvals from the business and risk units also ensure objectivity. Loan advance rates are dependent on the liquidity, volatility and diversification of the collateral portfolio under stressed conditions. Credit exposures that are secured by marketable securities are subject to daily valuation and independent price verification controls.

### Credit Risk from Investment and Trading Activities

Counterparty credit risks arising from our trading, derivative, and debt securities activities are actively managed to protect against potential losses in replacing a contract if a counterparty defaults. Counterparty credit limits are established for each counterparty based on our assessment of the counterparty's creditworthiness, as well as the suitability and appropriateness of the product offered. Credit exposures are also controlled through independent monitoring and prompt reporting of excesses and breaches against approved limits and risk mitigation thresholds.

We have limited exposure to asset-backed securities and collateralised debt obligations and are not active in securitisation activities.

**INTERNAL CREDIT RATING MODELS**

Internal credit rating models are an integral part of our credit risk management, loan decision-making process and capital assessment. These internal rating models and the parameters – probability of default (“PD”), loss given default (“LGD”), and exposure at default (“EAD”) – are factors used in limit setting and limit utilisation monitoring, credit approval, reporting, remedial management, stress testing, and internal assessment of the capital adequacy and provisions.

Model risk is managed under an internal model risk management framework, including an internal ratings framework, to govern the development and validation of rating models and the application of these models. Approval for material models and annual validation results rests with the BRMC. All models are subject to independent validation before implementation to ensure that all aspects of the model development process have met internal standards. The models are developed with the active participation of credit experts from risk taking and risk control units. In addition, the models are subject to annual review (or more frequently, where necessary) and independent validation to ensure they perform as expected, and that the assumptions used in model development remain appropriate. All rating models are assessed for compliance with internal and regulatory requirements, which are also subject to independent review by Group Audit and approval by regulators.

Our internal risk grades are not explicitly mapped to external credit agency ratings. Nevertheless, our internal risk grades may correlate with external ratings in terms of the probability of default ranges as factors used to rate obligors would be similar; an obligor rated poorly by an external rating agency is likely to have a weaker internal risk rating.

**A-IRB for Major Retail Portfolios**

We have adopted the A-IRB approach for major retail portfolios, including residential mortgages, credit cards, auto loans, as well as small business lending.

Internal rating models, developed from internal data, are used to estimate PD, LGD, and EAD parameters for each of these portfolios. Application and Behaviour scorecards are used as key inputs for several retail PD models. Product, collateral, and geographical characteristics are major factors used in the LGD and EAD models.

**F-IRB for Major Non-Retail Portfolios**

Our major non-retail portfolios, including income-producing real estate (“IPRE”) specialised lending are on the F-IRB approach. Under this approach, internal models are used to estimate the PD for each obligor, while LGD and EAD parameters are prescribed by MAS. These PD models are statistical based or expert judgement models that use both quantitative and qualitative factors to assess an obligor’s repayment capacity and are calibrated to the expected long-term average one-year default rate over an economic cycle. Expert judgement models are typically used for portfolios with low defaults following inputs from internal credit experts. The models also comply with the regulatory criteria for parameterisation. For other specialised lending portfolios, namely Project Finance, Object Finance and Commodities Finance, risk grades derived from internal models are mapped to the five supervisory slotting categories as prescribed in MAS Notice 637. The risk weights prescribed for these slotting categories are used to determine the regulatory capital requirements for such exposures.

**IRB Approach for Securitisation Exposures**

The credit risk-weighted assets for securitisation exposures are computed using the ratings-based method for such exposures as prescribed by MAS Notice 637.

**Standardised Approach for Other Portfolios**

Credit portfolios in OCBC Wing Hang, Bank OCBC NISP and Bank of Singapore, and exposures to sovereigns, are under the Standardised approach. These portfolios will be progressively migrated

to the internal ratings-based approaches, of which implementation initiatives are in progress for OCBC Wing Hang and Bank of Singapore. Regulatory prescribed risk weights based on asset class and external ratings from approved credit rating agencies, where available, are used to determine regulatory capital. Approved external rating agencies include Standard and Poor’s, Moody’s and Fitch Ratings.

**CREDIT RISK CONTROL****Credit Risk Mitigation**

Transactions are entered into primarily on the strength of a borrower’s creditworthiness and ability to repay. To manage credit risk, the Group accepts collaterals and credit protection as credit risk mitigants, subject to Group policies on their eligibility. Collateral includes physical and financial assets, and forms a major portion of credit risk mitigants at OCBC Group. The value of collaterals is prudently assessed on a regular basis, and valuations are performed by independent qualified appraisers. Appropriate discounts are applied to the market value of collaterals, reflecting their underlying quality, liquidity and volatility. The loan-to-value ratio is a main factor in secured lending decision. We also accept guarantees from individuals, corporates and institutions as a form of support.

To manage counterparty credit risk, financial collaterals with appropriate discounts applied may be taken to partially or fully cover mark-to-market exposures on outstanding positions. The collateral agreement typically includes a minimum threshold amount where additional collateral is to be posted by either party if the mark-to-market exposures exceed the agreed threshold. Master agreements, such as those from the International Swaps and Derivatives Agreement (“ISDA”), also allow for close-out netting if either counterparty defaults. Some of our netting and collateral agreements may contain rating triggers. Given our investment grade rating, there is minimal increase in collaterals required to be provided to our counterparties

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under a one-notch downgrade occurrence. We also use Central Clearing Counterparty ("CCP") to reduce counterparty risk for Over-the-Counter ("OTC") derivatives.

## Managing Credit Risk Concentrations

Credit risk concentrations may arise from lending to single customer groups, borrowers who are in similar activities or diverse groups of borrowers being affected by similar economic or market conditions. To manage such concentrations, limits are established for single borrowing groups, products, portfolio and country. These limits are aligned with our business strategy, capacity and expertise. Impact on earnings and capital are also considered during the setting of limits.

We continue to diversify our country exposure with our expanded presence and activities in Greater China and Indonesia. As a key player at home, we have significant exposure to the real estate market in Singapore. Dedicated specialist real estate teams manage this risk by focusing on client selection, collateral quality, project viability and real estate cycle trends. Regular stress tests are also conducted to identify potential vulnerabilities on the real estate portfolio.

The Bank is in compliance with Section 35 of the Banking Act, which limits its exposure to real estate in Singapore to not more than 35% of its total eligible loan assets.

## REMEDIAL MANAGEMENT

We constantly assess our portfolio to detect potential problem credits early. As we value long-term customer relationships, we understand that some customers may be facing temporary financial distress and prefer to work closely with them at the onset of their difficulties. We recognise the opportunity to promote customer loyalty and retention in such instances, even as we enforce strict discipline and place a priority on remedial management to minimise credit loss.

Loans are categorised as "Pass" or "Special Mention", while non-performing loans ("NPLs") are categorised as "Substandard", "Doubtful" or "Loss" in accordance with MAS Notice 612.

Restructured assets are classified when the Bank has granted concessions or restructured repayment terms to borrowers who are facing difficulties in meeting the original repayment schedules. Such restructured assets are classified in the appropriate non-performing grades and will not be restored to performing loan status until the borrowers have demonstrated sustained ability to meet all future obligations under the restructured terms.

We have dedicated specialist workout teams to manage problem exposures. Time, risk-based event specific triggers are used to develop collection and asset recovery strategies. We use information and analytical data such as delinquency buckets and adverse status tags for delinquent consumer loans to constantly fine-tune and prioritise our collection efforts.

## Impairment Allowances for Loans

We maintain loan allowances that are sufficient to absorb credit losses inherent in our loan portfolio. Total loan loss reserves comprise specific allowances against each NPL and a portfolio allowance for all loans to cover any losses that are not yet evident.

Specific allowances for credit losses are evaluated either individually or collectively for a portfolio. The amount of specific allowance for an individual credit exposure is determined by ascertaining the difference between the present value of future recoverable cash flows of the impaired loan and the carrying value of the loan. For homogenous unsecured retail loans such as credit card receivables, specific allowances are determined collectively as a portfolio, taking into account historical loss experience of such loans.

Portfolio allowances are set aside based on our credit experiences and judgement for estimated inherent losses that may exist but have not been identified for any specific financial asset. Credit experiences are based on historical loss rates that take into account geographic and industry factors. A minimum 1% portfolio allowance is set aside under the transitional arrangement in MAS Notice 612.

Our policy for loan allowances is guided by Financial Reporting Standard 39 ("FRS 39"), as modified by MAS Notice 612. We are making progress to implement Financial Reporting Standards 109 ("FRS 109") which replaces FRS 39 with effect from 1 January 2018.

## Write-offs

Loans are written off against impairment allowances when the loss can be reasonably determined, i.e. after recovery action has been exhausted or when recovery prospects are deemed remote.

## Ceasing of Interest Accrual on Loans

When a loan is classified "Substandard", "Doubtful" or "Loss", interest income ceases to be recognised in the income statement on an accrual basis. However, this non-accrual of interest does not preclude our entitlement to the interest income as it merely reflects the uncertainty in the collection of such interest income.

## Collateral Held Against NPLs

Real estate in Singapore forms the main type of collateral for our NPLs. The realisable value of the real estate collateral is used to determine the adequacy of the collateral coverage. Cross collateralisation will only apply when exposures are supported by proper legal documentation.

## Market Risk Management

Market risk is the risk of loss of income or market value due to fluctuations in factors such as interest rates, foreign exchange rates, equity and commodity prices, or changes in volatility or

correlations of such factors. OCBC Group is exposed to market risks from its trading, client servicing and balance sheet management activities.

Our market risk management strategy and market risk limits are established within the Group's risk appetite and business strategies, taking into account macroeconomic and market conditions. Market risk limits are subject to regular review.

#### MARKET RISK MANAGEMENT OVERSIGHT AND ORGANISATION

The Market Risk Management Committee ("MRMC") is the senior management group that supports the CEO and the BRMC in managing market risk. The MRMC establishes the market risk management objectives, framework and policies governing prudent market risk taking, which are backed by risk methodologies, measurement systems and internal controls.

The MRMC is supported by Market Risk Management ("MRM") department within GRM. MRM is the independent risk control unit responsible for operationalising the market risk management framework to support business growth while ensuring adequate risk control and oversight.

#### MARKET RISK MANAGEMENT APPROACH

Market risk management is a shared responsibility. Business units are

responsible for proactively managing risk within their approved trading strategies and investment mandates, while MRM acts as the independent monitoring unit to ensure sound governance. The key risk management activities of identification, measurement, monitoring, control and reporting are regularly reviewed to ensure effective risk management.

#### MARKET RISK IDENTIFICATION

Risk identification is addressed via our internal new product approval process at product inception. Market risks are also identified by our risk managers from their on-going interactions with the business units.

#### MARKET RISK MEASUREMENTS

##### Value-At-Risk

Value-at-risk ("VaR"), as a key market risk measure for the Group's trading activities, is a component of aggregate market risk appetite. VaR is measured and monitored by its individual market risk components, namely interest rate risk, foreign exchange risk, equity risk and credit spread risk, as well as at the consolidated level. VaR is based on a historical simulation approach and is applied against a one-day holding period at a 99% confidence level. As VaR is a statistical measure based on historical market fluctuations, it might not accurately predict forward-looking market conditions all the time. As such, losses on a single trading day may exceed VaR, on average, once every 100 days.

#### Risk Measures

As the Group's main market risk is interest rate fluctuations, Present Value of a Basis Point ("PV01"), which measures the change in value of interest rate sensitive exposures resulting from a one basis point increase across the entire yield curve, is an additional measure monitored on a daily basis. Other than VaR and PV01, we also utilise notional amounts, One Basis Point Move in Credit Spreads ("CS01") and derivative greeks for specific exposure types, where appropriate, to supplement its risk measurements.

#### Stress Testing and Scenario Analyses

We also perform stress testing and scenario analyses to better quantify and assess potential losses arising from low-probability but plausible extreme market conditions. The stress scenarios are regularly reviewed and fine-tuned to ensure that they remain relevant to the Group's trading activities, risk profile and prevailing and forecast economic conditions. These analyses determine if potential losses from such extreme market conditions are within the Group's risk tolerance.

The table below provides a summary of the Group's trading VaR profile by risk types as at 31 December 2015 and 31 December 2014.

#### VaR BY RISK TYPE – Trading Portfolio

S\$ millions	2015				2014			
	End of the period	Average	Minimum	Maximum	End of the period	Average	Minimum	Maximum
Interest Rate VaR	2.94	3.12	1.52	6.04	2.96	7.83	2.36	21.43
Foreign Exchange VaR	3.45	6.25	2.77	12.21	8.02	6.96	2.59	11.46
Equity VaR	0.64	1.16	0.30	2.65	0.52	0.96	0.34	1.51
Credit Spread VaR	2.26	3.00	2.19	7.10	5.11	3.00	1.55	5.49
Diversification Effect <sup>(1)</sup>	-4.67	-6.33	NM <sup>(2)</sup>	NM <sup>(2)</sup>	-6.33	-6.16	NM <sup>(2)</sup>	NM <sup>(2)</sup>
Aggregate VaR	4.62	7.20	3.41	14.26	10.28	12.60	6.05	27.62

<sup>(1)</sup> Diversification effect is computed as the difference between Aggregate VaR and sum of asset class VaRs.

<sup>(2)</sup> Not meaningful as the minimum and maximum VaR may have occurred on different days for different asset classes.

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## RISK MONITORING AND CONTROL

### Limits

Only authorised trading activities for approved products may be undertaken by the various trading units. All trading risk positions are monitored on a daily basis against approved and allocated limits by independent support units. Limits are approved to reflect available and anticipated trading opportunities, with clearly defined exception escalation procedures. Exceptions, including any temporary breaches, are promptly reported and escalated to senior management for resolution. Multiple risk limits (VaR and risk sensitivities), profit or loss, and other measures allow for more holistic analysis and management of market risk exposures.

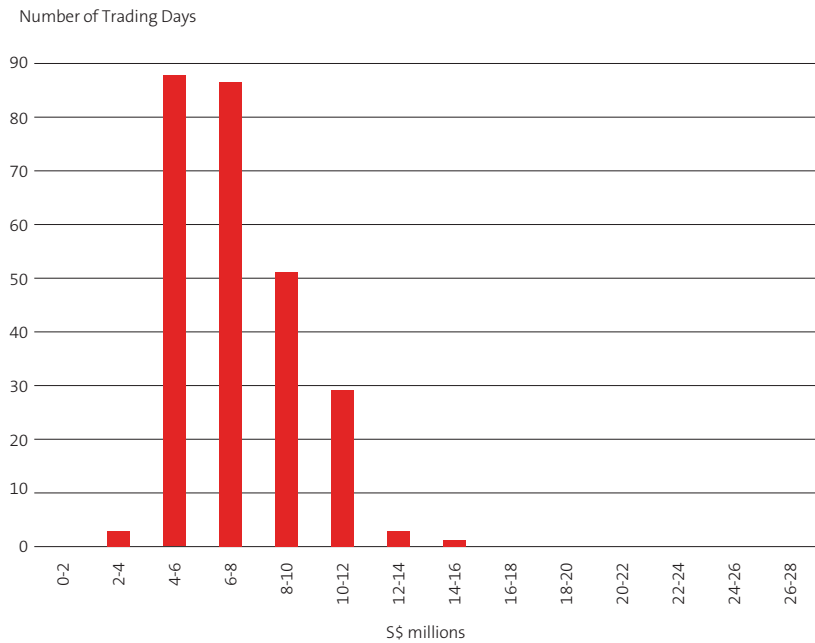
### Model Validation

Model validation is also an integral part of our risk control process. Risk models are used to price financial instruments and to calculate VaR. We ensure that the models used are fit for their intended purpose through internal verification and assessment. Market rates used for risk measurements and valuation are sourced independently, thereby adding further to the integrity of the trading profits and losses ("P&L"), risk and limit control measurements.

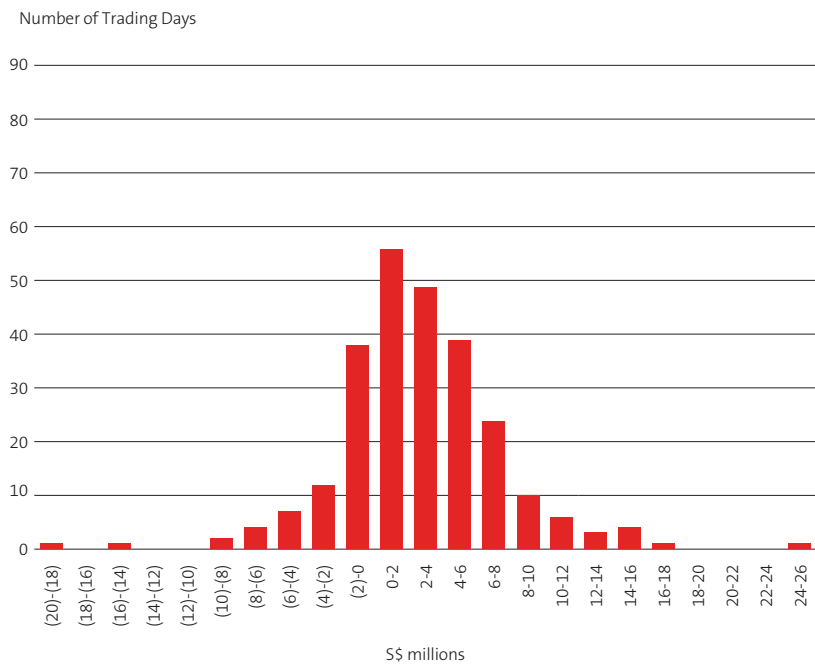
### Back-testing

To ensure the continued integrity of the VaR model, we conduct back-testing to confirm the consistency of actual daily trading P&L and theoretical P&L against the model's statistical assumptions.

## ➤ FREQUENCY DISTRIBUTION OF GROUP TRADING BOOK DAILY TOTAL VAR (One Day Holding Period) for FY 2015



## ➤ FREQUENCY DISTRIBUTION OF GROUP TRADING DAILY P&L for FY 2015



## Asset Liability Management

Asset liability management is the strategic management of the Group's balance sheet structure and liquidity requirements, covering liquidity sourcing and diversification, as well as interest rate and structural foreign exchange management.

### ASSET LIABILITY MANAGEMENT OVERSIGHT AND ORGANISATION

The Asset and Liability Committee ("ALCO") is the senior management group that is responsible for the management of the Group's balance sheet and liquidity risks. The ALCO is chaired by the CEO and includes senior management from the business, risk and support units.

The ALCO is supported by the Corporate Treasury within the Group Finance Division. Asset Liability Management ("ALM") department within GRM monitors the banking book interest rate, structural foreign exchange and liquidity risk profiles for the Group under both baseline and stressed scenarios.

### ASSET LIABILITY MANAGEMENT APPROACH

The asset liability management framework comprises liquidity risk management, interest rate risk mismatch management and structural foreign exchange risk management.

### Liquidity Risk

The objective of liquidity risk management is to ensure that there are sufficient funds to meet contractual and regulatory financial obligations and to undertake new transactions.

Our liquidity management process involves establishing liquidity management policies and limits, regular monitoring against liquidity risk limits, regular stress testing and refining contingency funding plans. These processes are subject to regular reviews to ensure that they remain relevant in the context of prevailing market conditions.

Liquidity monitoring is performed daily within a framework for projecting cash flows on a contractual and behavioural basis. Simulations of liquidity exposures under stressed market scenarios are performed and the results are taken into account in the risk management processes. Indicators such as liquidity and deposit concentration ratios are used to establish the level of optimal funding mix and asset composition. Funding strategies are in place to provide effective diversification and stability in funding sources across tenors, products and geographies. In addition, liquid assets in excess of regulatory requirements are maintained for contingent use in the event of a liquidity crisis. These liquid assets comprise of statutory reserve eligible securities as well as marketable shares and debt securities.

We started daily regulatory reporting of our Group-wide Liquidity Coverage Ratio ("LCR") in January 2015 except for OCBC Wing Hang, OCBC Yangon and Bank OCBC NISP which will be included in due course. This daily reporting capability significantly improves our ability to manage liquidity risk.

### Interest Rate Risk

The primary goal of interest rate risk management is to ensure that interest rate risk exposures are maintained within defined risk tolerances and are consistent with the Risk Appetite parameters.

Interest rate risk is the risk to earnings and capital arising from exposure to adverse movements in interest rates. The material sources of interest rate risk are repricing risk, yield curve risk, basis risk and optionality risk. A range of techniques is employed to measure these risks from an earnings and economic value perspective. One method involves the simulation of the impact of a variety of interest rate scenarios on the net interest income and the economic value of the Group's equity. Other measures

include interest rate sensitivity measures such as PV01 as well as repricing gap profile analysis.

Limits and policies to manage interest rate exposures are established in line with the Group's strategy and risk appetite. Thresholds and policies are appropriately approved, and reviewed regularly to ensure they remain relevant against the external environment. Control systems are in place to monitor the risk profile against the approved risk thresholds.

### Structural Foreign Exchange Risk

Structural foreign exchange exposure arises primarily from net investment in overseas branches, subsidiaries and strategic as well as property assets. The objective is to protect the capital through identifying, measuring and managing the potential adverse impact of structural foreign exchange risk on capital deployed. We actively manage this risk through hedges and match funding for foreign currency investments.

### Other Risks

Non-structural foreign exchange exposures in banking book are largely transferred to trading book for foreign exchange risk management. High quality liquid assets ("HQLA") held in banking book to comply with LCR expose the Group to credit spread risk. While HQLA are of low default risk, their value could be sensitive to changes in credit spread. This risk is monitored against approved CS01 limits on a daily basis and subject to historical and anticipatory stress tests. The other risk residing in banking book is non-strategic equity price risk arising from our investment in equity securities. These non-strategic equity forms an insignificant portion of our overall securities portfolio, excluding GEH.

### System and Infrastructure Upgrade

We have complied with the daily LCR requirements of MAS Notice 649 since 1 January 2015, leveraging on



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the significant liquidity infrastructure upgrades completed in 2014. This upgrade work continued through 2015, creating capacity for the further automation of our liquidity management processes and building Net Stable Funding Ratio ("NSFR") and other risk reporting capabilities.

## Operational Risk Management

Operational risk is the risk of loss resulting from inadequate or failed internal processes, people, systems and management, or from external events. Operational risk management also covers fiduciary, legal and reputational risks.

The Group's operational risk management aims to manage both expected and unexpected losses, including those caused by catastrophic events. The twin goals enable new business opportunities to be pursued in a risk-conscious and controlled manner.

## OPERATIONAL RISK MANAGEMENT OVERSIGHT AND ORGANISATION

The Operational Risk and Information Security Committee ("ORISC") is the senior management group that oversees the execution of our operational risk management, information security and technology risk practices. ORISC ensures that the various risk management programmes in place are appropriate and effective, and support our business strategy.

The Operational Risk Management ("ORM") department within GRM establishes the ORM framework, including supporting policies and techniques. The ORM department also independently oversees operational risk monitoring and controls that reside within business, product and process owners. The ORM programmes are actively implemented through the respective Operational Risk Partners or managers in the business units and subsidiaries. Operational Risk Partners or managers are certified by an industry

recognised accreditation programme to raise competency levels in managing operational risk.

## OPERATIONAL RISK MANAGEMENT APPROACH

We adopt a framework that ensures operational risks are properly identified, managed, monitored, mitigated and reported in a structured and consistent manner. The framework is underpinned by an internal control system that reinforces our control culture by establishing clear roles and responsibilities for staff and preserving their rights in executing control functions without fear of intimidation or reprisal.

Each business unit regularly assesses itself on the robustness of its own risk and control environment, including meeting all regulatory and legal requirements. Self-assessment declarations are subject to risk-based independent reviews. Performance metrics are also used to detect early warning signals and to drive appropriate management actions before risks become material losses. To enhance controls over trading activities and data loss prevention, a Control Assurance Function has been established to perform end-to-end surveillance over these areas.

Senior management attests annually to the CEO, Audit Committee and BRMC on the adequacy and effectiveness of the internal control system, as well as report key control deficiencies and accompanying remedial plans. Operational risk losses and incidents data trends are also analysed and regularly reported.

To mitigate operational losses resulting from significant risk events, we have in place an insurance programme that covers crime, civil liability, fraud, property damage and public liability, as well as directors' and officers' liability.

## Outsourcing Risk Management

We recognise the risks associated with outsourcing arrangements. We have in place an outsourcing programme to manage subcontractor risks in a structured, systematic and consistent manner. In 2015, as Chairman of the ABS taskforce on outsourcing risk, we worked closely with ABS and taskforce members to develop the baseline control standards ("Guidelines on Control Objectives and Procedures for Outsourced Services Providers") for banks to manage outsourcing risk.

## Physical and People Security Risk Management

We recognise that as we expand our regional footprint, our personnel and assets may be exposed to more external threats. To address this ever-changing threat landscape, we have in place a physical and people security programme.

## Business Continuity Risk Management

Our business continuity management programme aims to reduce the interruption of essential business activities and services during times of crisis. Our business recovery strategies and plans are reviewed and tested annually. Senior management also provides an annual attestation to the BRMC. The attestation includes a measurement of the programme's maturity, extent of alignment to MAS guidelines and a declaration of acceptable residual risk. We have also enhanced our ability to respond to external calamities and crises such as the Middle East respiratory syndrome coronavirus (MERS-CoV) outbreak and terrorism-related incidents during the year.

## Fraud Risk Management

Our fraud risk management and whistle-blowing programmes help to prevent and to detect fraud or misconduct. Fraud incident reports, including root cause analysis, extent of damage, supporting remedial actions and

recovery steps of major incidents, are regularly reported to ORISC and BRMC. Group Audit independently reviews all fraud and whistle-blowing cases, and reports their findings to the Audit Committee. During the year, we added a new channel for whistle-blowing. The internet-based channel provides staff and external parties with a neutral platform to raise instances of ethical concern or wrongful behaviour.

#### **Reputational Risk Management**

Reputational risk is the current or prospective risk to earnings and capital arising from adverse perception of the Group's image by customers, counterparties, shareholders, investors and regulators. We have a reputational risk management programme which focuses on understanding and managing our responsibilities towards our different stakeholders, and protecting our reputation. A key emphasis of the programme is effective information sharing and engagement with stakeholders.

#### **Fiduciary Risk Management**

We have a fiduciary risk management programme to manage risks associated with fiduciary relationships from managing funds or providing other agency services. The programme provides guidelines on regular identification, assessment, mitigation and monitoring of fiduciary risk exposures, to ensure our compliance with applicable corporate standards.

#### **Regulatory and Legal Risk Management**

Each business unit is responsible for having adequate and effective controls to manage both regulatory and legal risks. Senior management provides the state of regulatory compliance via an annual regulatory compliance certification to the CEO and BRMC.

#### **Technology and Information Security Risk Management**

We protect and ensure the

confidentiality, integrity and availability of our information assets by implementing appropriate security controls and backup systems to guard against the misuse or compromise of information assets. In 2015, we further enhanced our operational risk approach by including technology and information security risk as an integral part of the ORM framework. This holistic approach provides the assurance that technology and information security risks are properly identified, managed, monitored, mitigated and reported in a structured and consistent manner. Senior management attests annually to the CEO and BRMC on the adequacy and effectiveness of technology controls, including any key control deficiencies and remedial plans.

#### **Cyber Security Risk Management**

During 2015, we integrated our Cyber Security Operations Centre ("CSOC") and Technology Command Centre to improve the monitoring of our IT and cyber security systems. With the rise in non-traditional cyber threats, we have remained an active participant in cyber security initiatives within the banking sector. As the Chairman of the ABS Standing Committee ("ABSSC") on cyber security, we take a leading role in collaborating with other industry participants and key government agencies to formulate cyber security management programmes, and share intelligence and counter measures against new forms of cyber attacks. The ABSSC's key objectives are to influence technology risk management strategies and practices, and to recommend solutions to counter cyber threats. We helped to enhance the "ABS Penetration Testing Guidelines" for banks in Singapore that included the establishment of the Council of Registered Ethical Security Testers Singapore ("CREST SG") to raise the competencies of penetration testing providers.