

IFRS 9: Addressing Validation and Benchmarking challenges

November 2017



Roshni Patel

Associate Director – Stress Testing, Portfolio &
Capital Management Specialist
Moody's Analytics - London



Alexis Hamar

Director – Portfolio and Finance Analytics
Product Management
Moody's Analytics - France

Agenda

1. Current Challenges and growing demands
2. IFRS 9 2018 themes
3. Model Validation and Benchmarking
4. Assessing the Impact of IFRS 9 on Earnings Risk and Portfolio Strategies
5. Summary

1

Current challenges and growing demands

IFRS 9 & Beyond

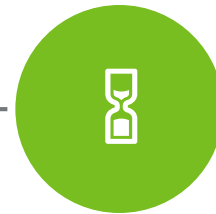
Overall Objective : Finalize IFRS 9 project and move into BAU mode



2017 H2

IFRS 9 methodologies

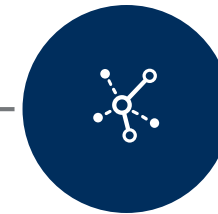
- Fine-tune lifetime PD and LGD methodologies
- Finalize stage allocation criteria
- Set-up approval and review committees
- Coverage of smaller/specialized portfolios (treasury/investment, structure finance)
- Parallel run
- Latecomers for IFRS9 tactical implementation



2018

IFRS 9 Compliance

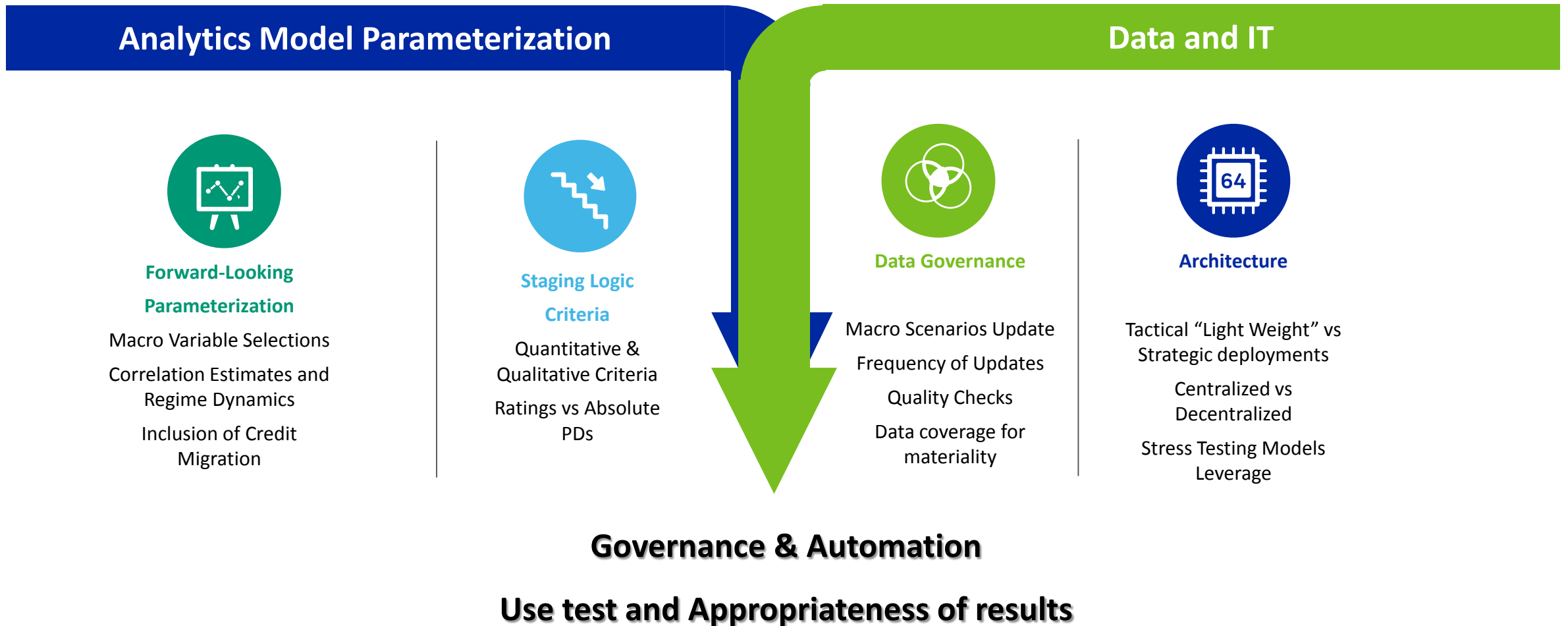
- Parallel run
- **Validation/Benchmarking**
- Discussion with external auditor
- User training for IFRS 9 in the BAU
- **Familiarity of senior management with impairment methodologies, dynamics and volatility**
- Preparation of 2018 ST and ICAAP exercises



IFRS 9 & Beyond

- **Ongoing validation/monitoring**
- Tactical into strategic IFRS 9 implementation
- Managing the volatility that IFRS 9 brings
- Integration of IFRS 9 with stress testing
- Capital and business planning under IFRS 9
- Submit results for local regulators ST and ICAAP exercises (linkage to TRIM)

Current Challenges



Industry Growing Demand with Model Risk



Regulatory Pressure

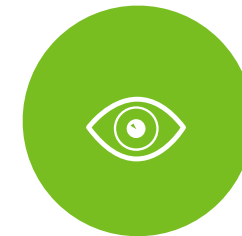
One of the most persistent and important drivers for model risk management across financial services is regulatory pressure (e.g. TRIM)



Stakeholder Pressure

Stakeholders are paying closer attention to the process of managing risk, especially the use of risk models

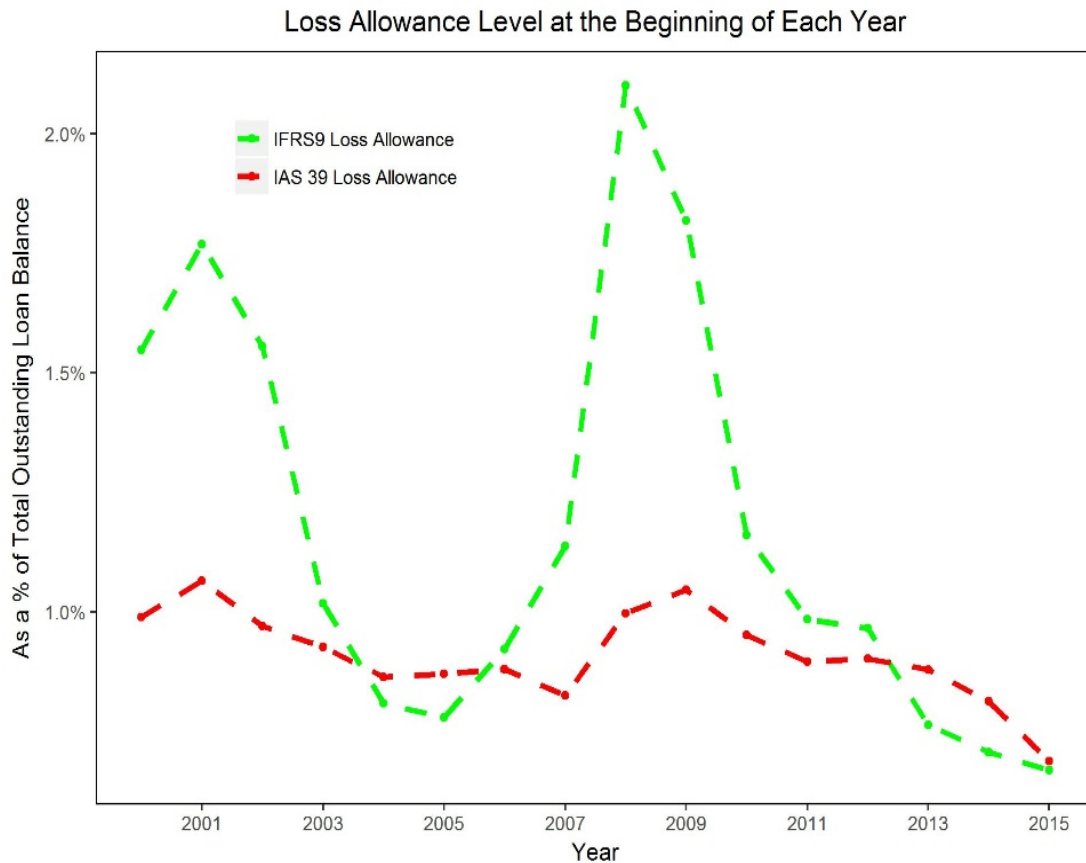
Management of business volatility



Managing Reputation

Firms realize that model failures could cause significant reputational damage and want to be able to include reputation as part of model risk assessment

The Challenge of Volatility under IFRS 9



“75% of the banks anticipate that IFRS 9 impairment requirements will **increase volatility in profit or loss.**”

Report on Results from EBA Impact Assessment of IFRS 9, EBA, 2016

“**Volatility of loan-loss provisioning from new accounting standard demands additional own-funds protection, say banks.**”

Banks mull dedicated IFRS 9 capital buffers
Risk.Net, May 15, 2017

2

IFRS 9 2018 Themes

Bank Challenges in the post-IFRS 9 World

Regulatory requirements and challenges

IFRS 9

- Fine-tune ECL methodologies for all portfolios
- Fine-tune stage allocation criteria
- Governance
- Parallel run
- Validation/benchmarking
- Managing volatility
- Integration with Stress Testing and Planning

Stress Testing

- P&L impact will need to be quantified in terms of IFRS 9 numbers from 2018
- Forecasting stocks and flows of stage 1, 2 and 3 assets under stress
- Scenario design
- Heavy reporting requirements

Integration

- Integrate scenario-based analysis across the institution to include a unified framework for Stress Testing, IFRS 9, and Business/Capital Planning
- Centralize scenario generation process across all areas and link to business planning
- Unify and ensure consistent data for modelling, reporting and business decision making
- Risk-based culture and integration compliance-related risk initiatives in decision-making
- Optimization of balance sheet

Market comments

Views on IFRS9 validation/benchmarking

Benchmarking analysis should leverage “representative, comparable, up to date data”

One validation framework does not fit all
Differences in portfolio

Senior Management clarity on provision levels and their alignment to market benchmarks

Linkages of model validation / benchmark in context of IFRS9, ST and TRIM

Belief an annual external service for data and models

Understanding the gaps in historical data and scenario estimates for forward looking component

Providing linkages of results to Capital Planning, ICAAP and Business strategies

Top-down view of new portfolio strategies on impairments from an external view

Validation on data and models is useful, however comparison of data/models to external sources resonates better with auditors and senior management

Linkage to Stress Testing

Stress Testing emergence

- » IFRS 9 reinforces the necessity for projecting assets values and their corresponding loss allowances in conjunction to future CET 1 requirements

01

Key components

- » Enable banks to have a forward looking understanding of the risk and earnings profile based on business and regulatory stress scenarios
- » Project Capital and Regulatory ratios

02

Impacts

- » Volatility measurement and impacts under IFRS9
- » Understanding the behaviour or earnings and risk under distressed conditions allows for connecting the capital « reserves » and surplus to the earnings and losses

03

Stress Testing in context of Model Validation for IFRS 9



May 2017- Guidelines on credit institutions' credit risk management practices and accounting for expected credit losses

Page 31: 4.2.5 Paragraph 64 – ECL model validation: “ECL assessment and measurement may involve models and assumption-based estimates for risk identification and measurement. Models may be used in various aspects of the ECL assessment and measurement process at both the individual transaction and overall portfolio levels, including credit grading, credit risk identification, measurement of ECL allowances for accounting purposes, **stress testing** and capital allocation. ECL assessment and measurement models (“models”) should consider the **impact of changes to borrower and credit risk-related variables such as changes in PDs, LGDs, exposure amounts, collateral values, migration of default probabilities and internal borrower credit risk grades based** on historical, current and reasonable and supportable forward-looking information, including macroeconomic factors.

June 2017 - 2018 EU-Wide Stress Test

Page 13 Paragraph 25 :“This means that for banks commencing to report under IFRS 9 in 2018, the 2018 EU-wide stress test takes the impact of the introduction of IFRS 9 into account in starting point data as well as in the projections of banks”

Page 21 Paragraph 39 : “Banks are requested to **forecast credit impairments** influenced by the materialisation of a set 39.of single scenarios (baseline and adverse) on the basis of IFRS 9 as prescribed in the methodology laid down in this section.”

Linkages with broader regulations

Targeted Review of Internal Models

Key TRIM activities:

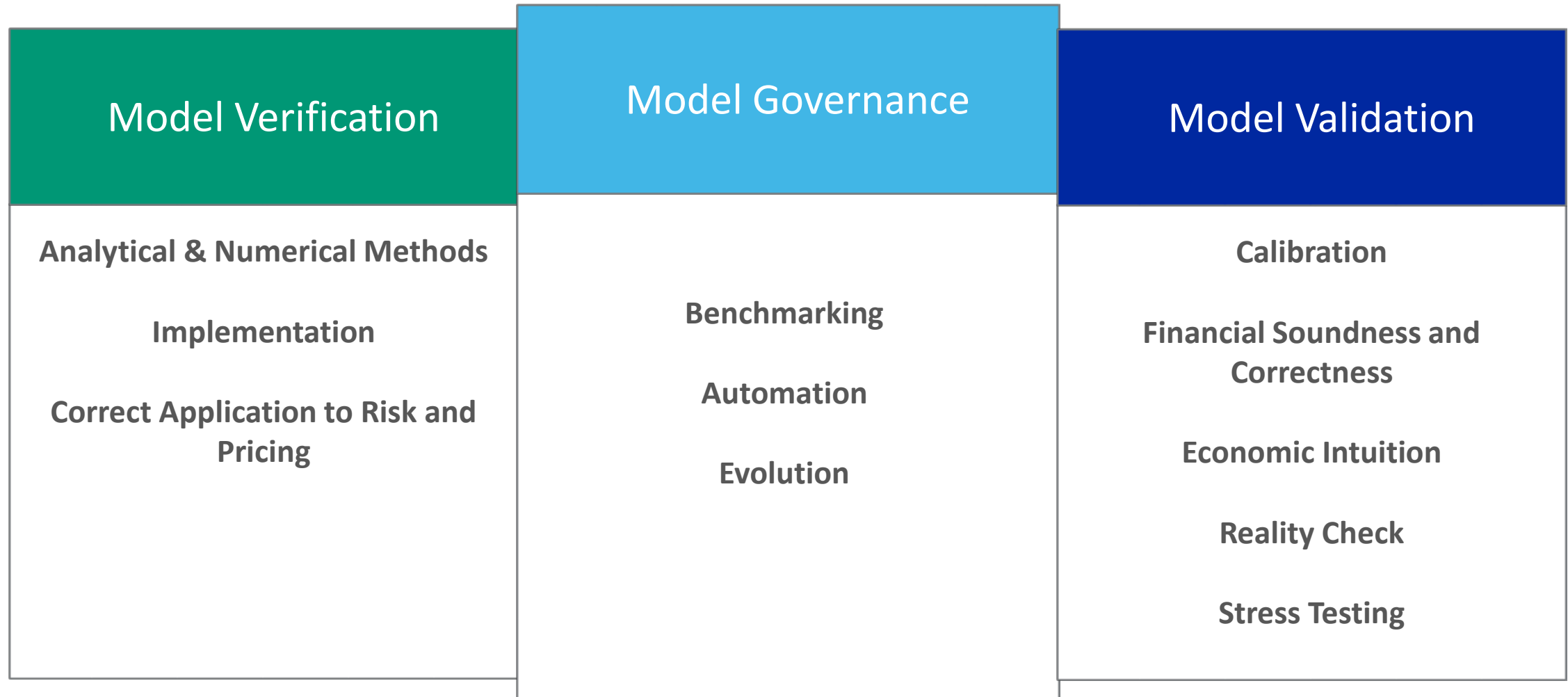
- » Provide overview of regulatory compliance with the model framework, including compliance to estimation of PD and LGD (based on EBA guidelines)
- » Produce evidence of adequate model validation processes
- » Show policies and procedures for model governance and data systems, including audit trails

Organisation	Decision making influence on processes and models
	Top-down strategy linkages
	Volatility management
Governance & Processes	Documentation reviews and details on management overrides
	Process for early warning indicators
	IT system robustness
Models	Modelling techniques/approaches
	Best practice consideration /benchmark
	Validation and model governance
Data & IT	Appropriateness
	Representativeness
	Quality
	BCBS 239

3

IFRS 9 Model Validation and Benchmarking

Model Validation and Governance



Validation and refinement of IFRS 9 models

A multi-faceted requirement

Quantitative

- ✓ Validate macro models used to generate scenarios and Scenario probabilities
- ✓ Credit risk models used to generate lifetime PD, LGD, EAD
- ✓ Lifetime EL
- ✓ Staging criteria

Independence

- ✓ Clear roles and responsibilities
- ✓ Adequate independence from development process
- ✓ Prompt and timely reporting
- ✓ Institution to ensure the work done by the external party meets the elements of a sound model validation framework



Qualitative

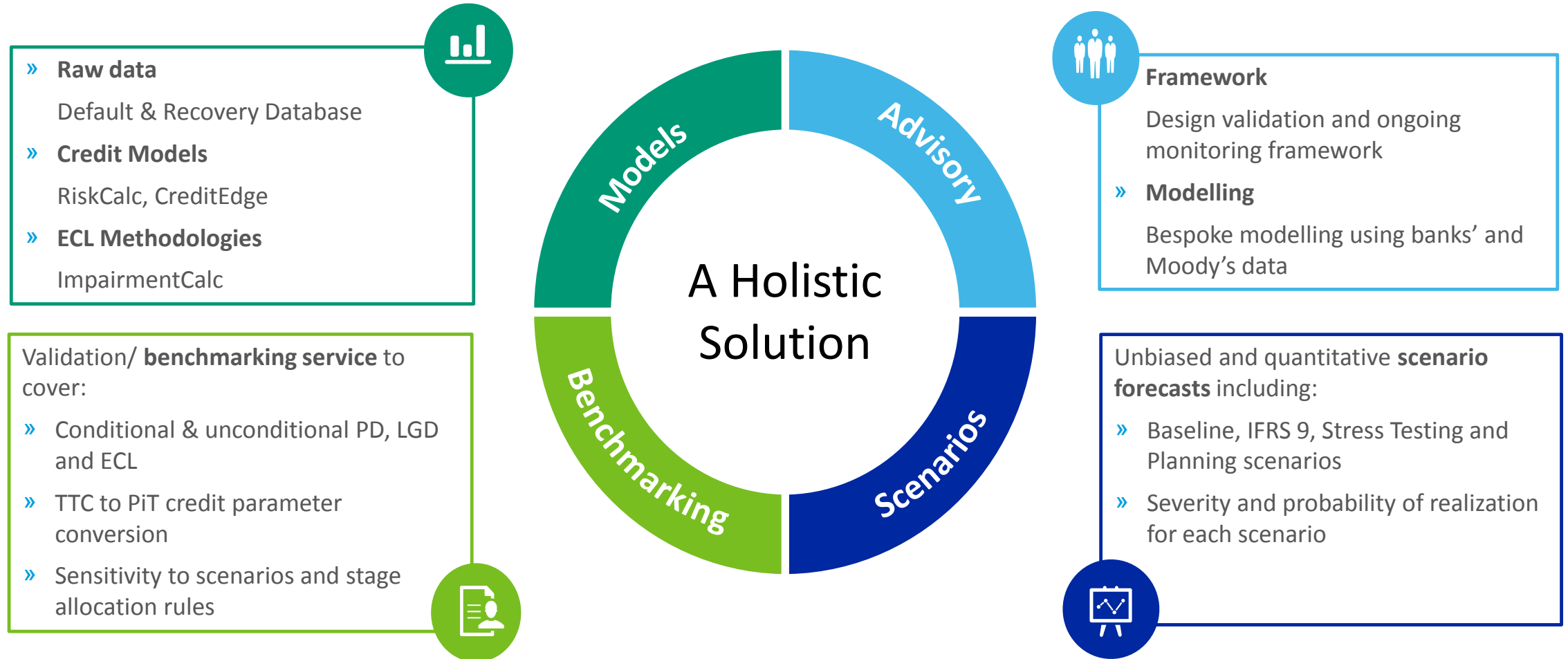
- ✓ Model specification, assumptions and design
 - ✓ Econometric modelling technique
 - ✓ Model Inputs / Data quality
- ✓ Review of the model validation process
 - ✓ Documentation quality
 - ✓ Regulatory compliance

Documentation

- ✓ Document the procedures
- ✓ Changes in validation methodology and tools,
 - ✓ Range of data used
- ✓ Results and any remedial actions
- ✓ Regularly reviewed and updated

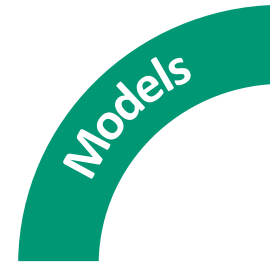
Validation and refinement of IFRS 9 models

A holistic solution for validation and benchmarking



Validation and refinement of IFRS 9 models

A holistic solution for validation and benchmarking

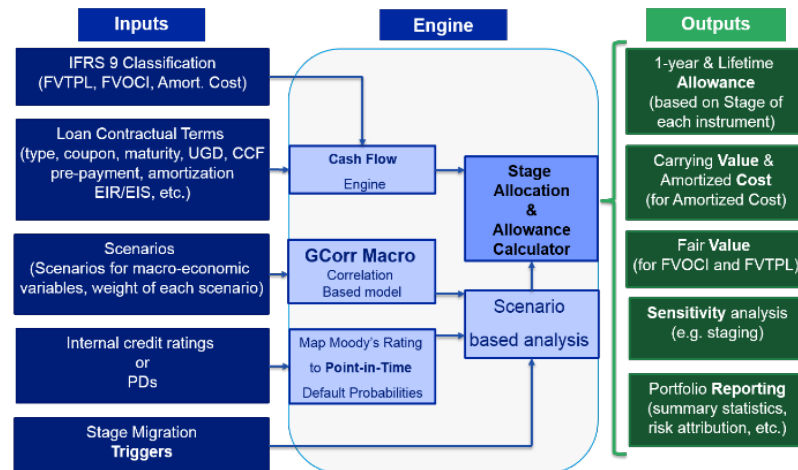


- » **Raw data**
Default & Recovery Database
- » **Credit Models**
RiskCalc, CreditEdge
- » **ECL Methodologies**
ImpairmentCalc



Credit Research Database (CRD™)

- » World's largest historical time series of private firm loan data for C&I borrowers
- » 18 million borrowers globally with over 2.2m private company defaults
- » **CRD** contains borrower financial statements, facility and loan information
 - Facility information: origination date/amount, contractual maturity, unpaid balance
 - Borrower information: internal rating/PD, industry, geographical info, size, etc.
 - Forward looking, PIT PD term structures from Moody's Analytics RiskCalc™

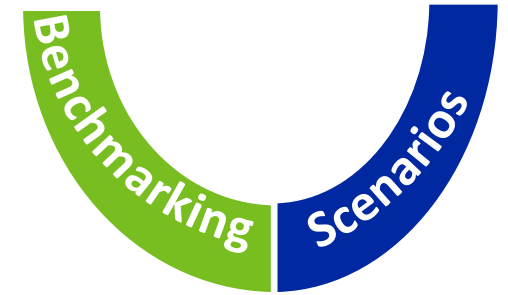


The **Default & Recovery Database** is an expansive data set that allows you to slice data in a way that is relevant to your needs while still having enough observations to create meaningful results. The DRD consist of the following:

- » Over 550,000 individual debt securities
- » 60,000 distinct issuers
- » Corporate and sovereign coverage
- » Historical defaults back to 1920

Validation and refinement of IFRS 9 models

A holistic solution for validation and benchmarking



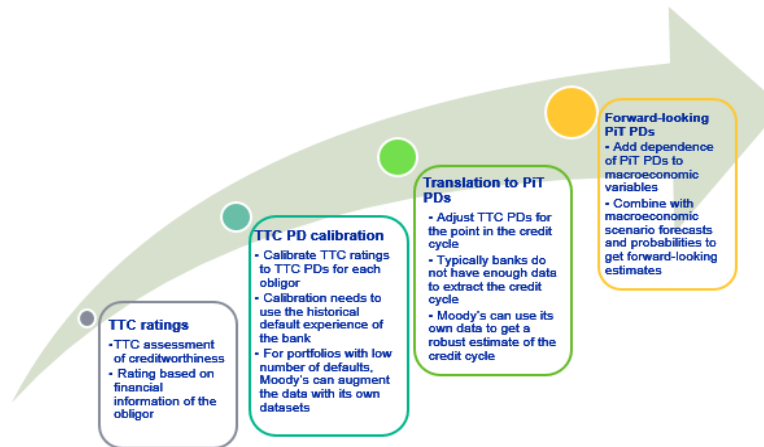
Validation/ benchmarking service to cover:

- » Conditional & unconditional PD, LGD and ECL
- » TTC to PiT credit parameter conversion
- » Sensitivity to scenarios and stage allocation rules



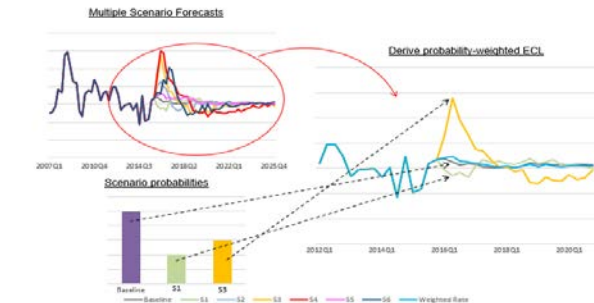
Expected Credit Loss Calculation

Calculations steps



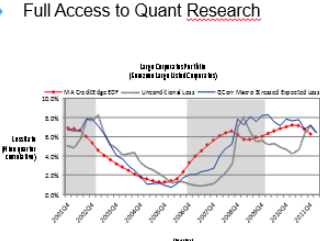
Macroeconomic Scenarios

Probability-weighted expected loss



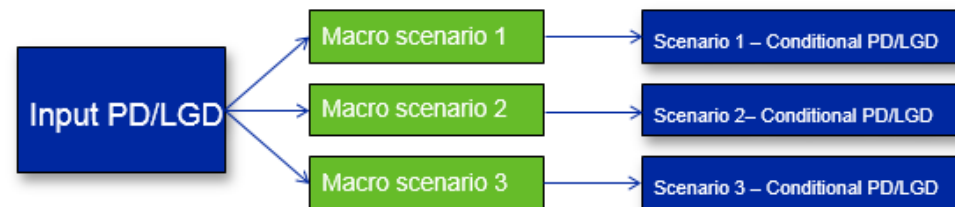
A transparent model

- » Our Analytics have been used by 100+ organizations and regulators since few decades
- » Analytics are updated, validated and backtested on yearly Basis
- » Our IFRS 9 Impairment Model is fully documented and maintained (calibration, parameterization)
- » Full Access to Quant Research



Forward-looking adjustments

- » The methodology utilizes a scenario based model to convert input PD/LGD to conditional PD and LGD term structure for a single or multiple set of macroeconomic scenarios. These conditional PD/LGD values are utilized for IFRS 9 stage allocation and impairment calculations.



IFRS9 Validation / Benchmarking case studies

Current examples of IFRS9 validation and benchmarking services across EMEA and Asia.

- » Provision communications
- » Understanding IFRS9 Volatility case studies
- » Impact on business strategies
- » Linkage of capital management from board level
- » Workshops
- » Top down analytical level business impacts

- » Implementation Testing (portfolio segmentation, inputs, sources, adjustments)
- » Data quality, history and use in context of portfolio materiality
- » Robustness and adaptability checks
- » Outcome analysis
- » IT infrastructure review (BCBS 239 principles)

Wholesale (dedicated Advisory team)

- » SME (big ticket size)
- » Middle Market Enterprise
- » Large Corporates
- » Commercial Real Estate
- » Project finance
- » Banks / Sovereigns (+ Local Governments)
- » Private Banking Loans

Retail (dedicated team with economists)

- » SME Loans (low ticket size)
- » Credit cards
- » Personal / Mortgage Loans
- » Auto Loans
- » Secured and unsecured lending portfolio

Credit Policy

- » Group policy alignment
- » Regulatory alignment
- » Regulatory understanding



- » Management Override process
- » Watch lists governance
- » Model documentations
- » Compliance with external requirements (e.g. accounting and regulatory requirements)
- » Early Warning Indicators
- » Forward looking implications

- » PD, LGD, EAD Models including for Low Default Portfolios
- » Benchmarking Ratings/PDs of Public and Private Firms
- » Stress Testing / IFRS 9 linkages
- » Model and Basel Pool Validation
- » Compliance in accordance with TRIM

France
 Netherlands
 Portugal
 UK
 South Africa
 Middle East (UAE, Qatar)
 Asia (Japan, Malaysia)

Stress Testing Focus as a validation tool

» Stress Testing as a model validation tool where the process includes:

- Model Assumptions
- Stressability of Projections

1. Model Assumptions characterize the scope of stress

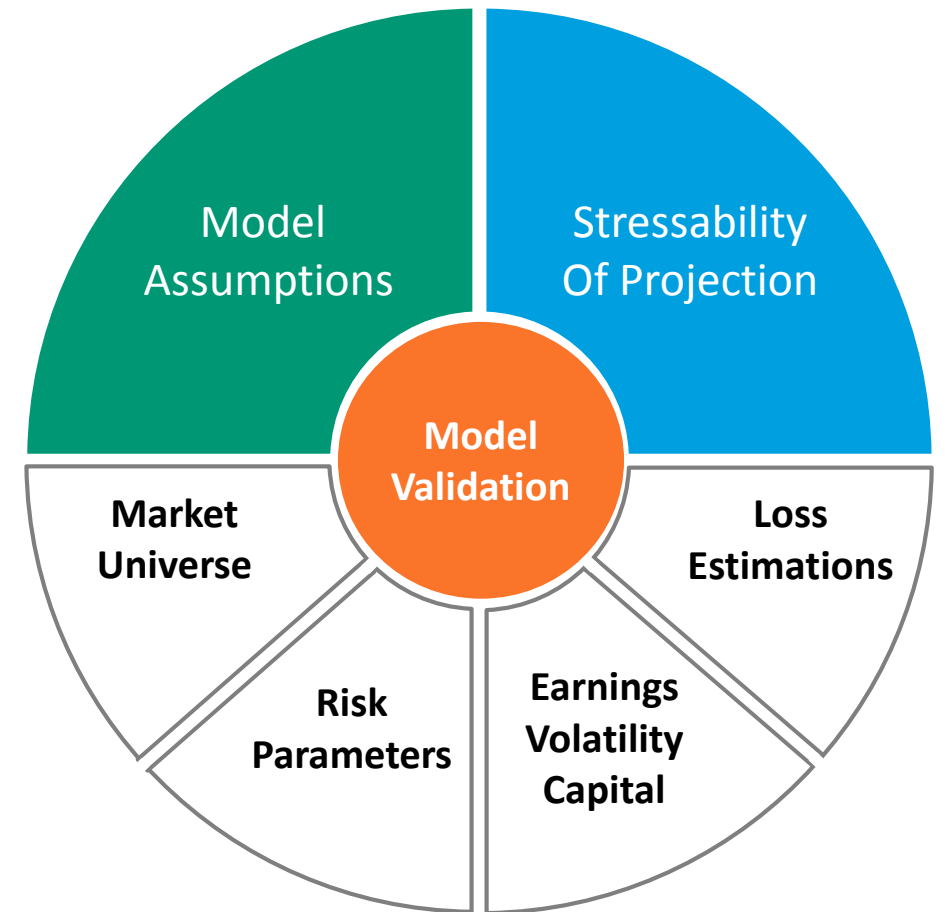
- › Market Conditions: macro and financial variables selection and applied shocks
- › Risk Parameters /Identification: PD, LGD, Correlations, Migrations;

2. “Stressability” of Projections :

- › Loss Estimation
- › Credit Earnings and Volatility of ECLs to identify
- › Regulatory Capital and Tier 1

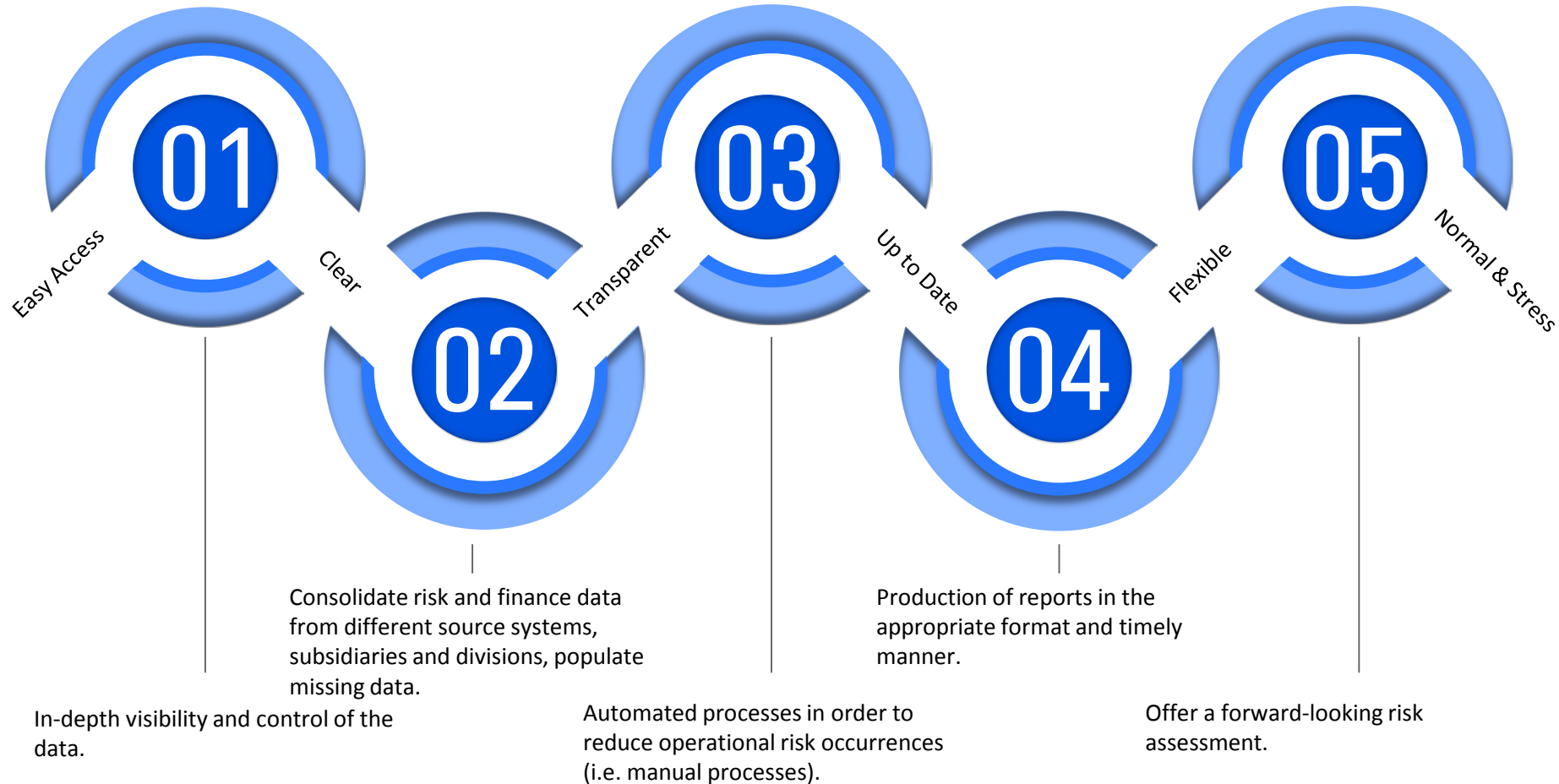
» **Main Objectives are :**

- Capture/Manage Volatility Magnitude over time
- Identify and Understand Portfolio Vulnerabilities
- Take actions for managing volatility



An Integrated and Holistic Approach to Data Governance

The solution should ensure the appropriate data is in the right place at the right time, provide control of the reporting by making it easy to collect, consolidate and submit reports correctly.

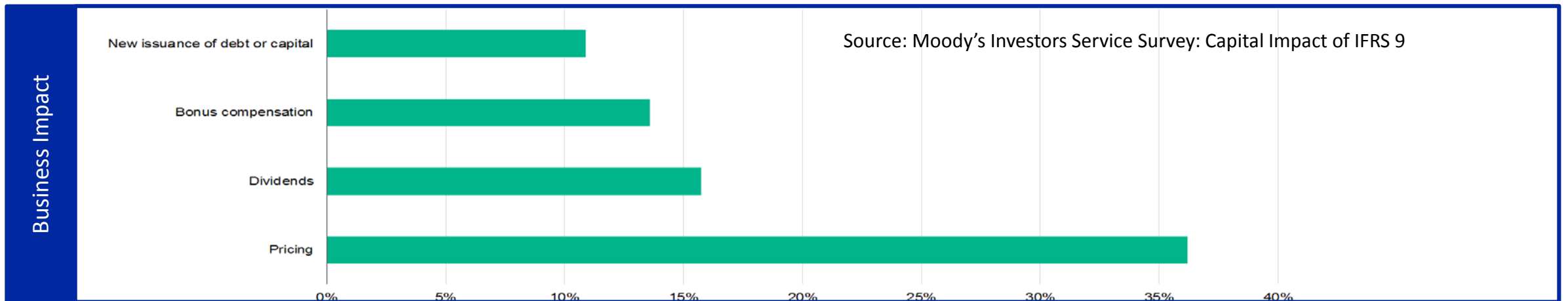
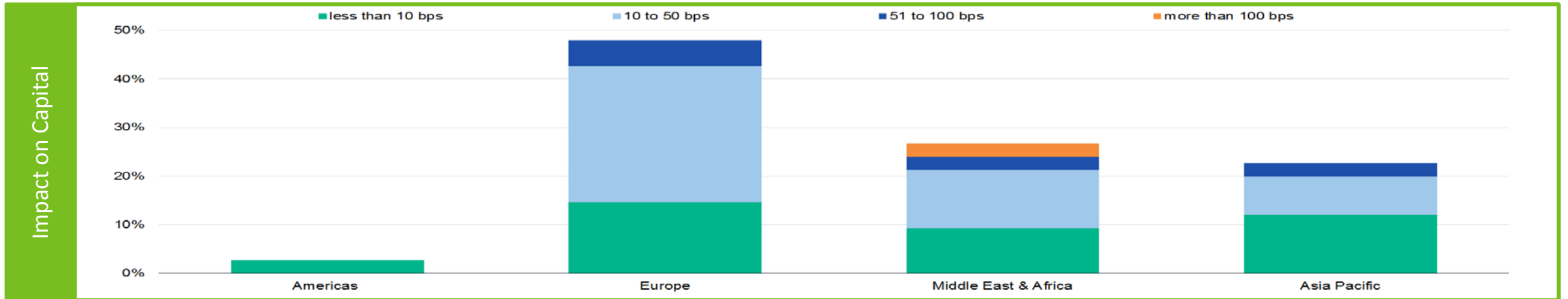


4

Assessing the Impact of IFRS 9 on Earnings Risk and Portfolio Strategies

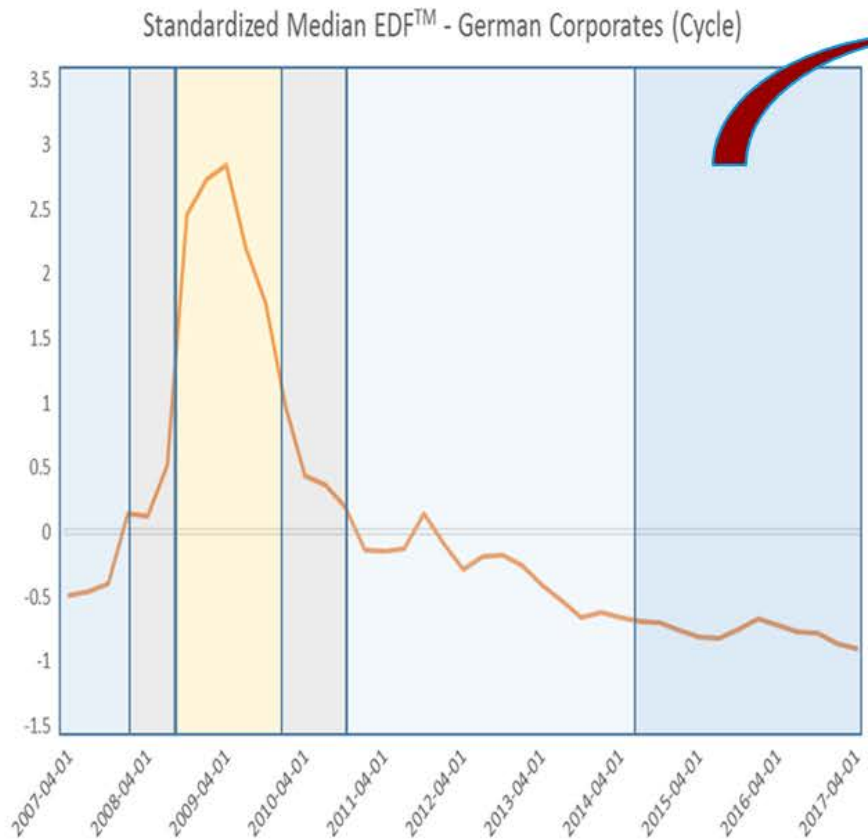
Business Impact of IFRS 9

What do the banks say?



Impact on Earnings and Capital Volatility

Stage allocation and the state of the credit cycle can lead to capital shortfalls



Simplified Example

- 1% coupon rate
- 40% LGD
- Profits held as surplus capital
- \$1million initial capital surplus

Sources: Moody's Analytics, CreditEdgeTM, ImpairmentCalcTM

Existing Capital Buffers Need to Be Reassessed

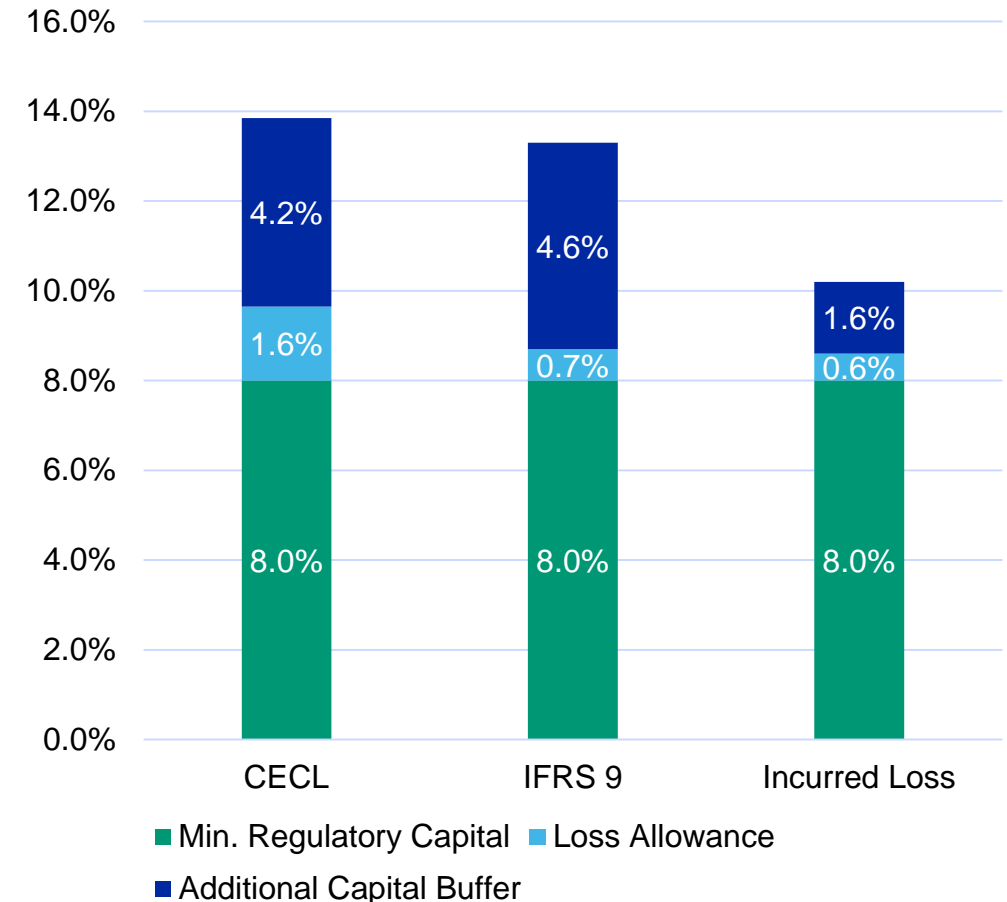
» Level

- The higher level of loss allowance at origination reduces available capital under CECL and IFRS 9 compared to incurred loss.

» Volatility

- Increased earnings volatility IFRS 9 due to loss allowance raises the additional capital buffer needed.

Effective Capital Breakdown



5

Summary

Assess, Communicate, Act

IFRS 9 would imply impacts in respect of:

- » More volatile provisions
- » More volatile P&L
- » Higher probabilities of recapitalization needs
- » Higher cost in pricing and generally more competition on pricing

IFRS 9 would imply a strong Governance around:

- » Method, Model and Risk Parameters consistent with Stress Test analytics/processes
- » Validation / Benchmarking against market best practices / peers
- » Process Automation
- » New Paradigm designed behind a strong reinforcement on **stress testing**

Contacts

Roshni Patel
roshni.patel@moodys.com

Alexis Hamar
Alexis.hamar@moodys.com

ENTERPRISE RISK SOLUTIONS

**MOODY'S
ANALYTICS**

**WHITEPAPER
MAY 2017**

Author
Pierre Gaudin
Senior Director, Enterprise Risk Solutions
Email: pierre.gaudin@moodys.com

Acknowledgements
Nihil Patel, Antony Wilson, Amnon Levy
and Pierre Xu.

Contact Us
Americas
+1 212 553 1658
clientservices@moodys.com
Europe
+44 20 7772 5454
clientservices.emea@moodys.com
Asia (Excl. Japan)
+85 2 2916 1121
clientservices.asia@moodys.com
Japan
+81 3 5408 4100
clientservices.japan@moodys.com

As preliminary IFRS9 results are being released, many institutions are sharing common concerns about variations of point-in-time credit assessments and forward-looking credit forecasts. Indeed, these measurements are responsive to the current economic environment and display high dependencies on the constant evolutions of the macroeconomic outlook. Moreover, this variance in provision charges is amplified by asset transitions from stage 1 to stage 2 or 3, that may simultaneously affect correlated segments of the portfolio.

As provision charges are therefore bound to fluctuate significantly under IFRS9, many institutions are now bracing for an increased levels of volatility in earnings as well as in deductions from core equity tier 1 under the Basel capital eligibility rule.

This document discusses risk measurements that can assist in the communication of the provision levels to senior stakeholders. It also describes techniques available to anticipate earnings volatility, and manage it through the diversification of risks in the credit portfolio. Finally, we explore how IFRS9 scenarios and related portfolio management strategy can be leveraged by front office as part of the credit decision process.

1 SEPTEMBER 2017

MAY 2017

**MOODY'S
ANALYTICS**

**MODELING
METHODOLOGY**

**A Composite Capital Allocation Measure
Integrating Regulatory and Economic
Capital, and the Impact of IFRS 9 and CECL**

Authors
Amnon Levy
Pierre Xu

Acknowledgements
We would like to thank
Christophher Grossen, Qiang Meng,
and Libor Fopisik for their
comments and suggestions.

Contact Us
Americas
+1 212 553 1658
clientservices@moodys.com
Europe
+44 20 7772 5454
clientservices.emea@moodys.com
Asia (Excluding Japan)
+85 2 2916 1121
clientservices.asia@moodys.com
Japan
+81 3 5408 4100
clientservices.japan@moodys.com

Abstract
In this paper, we propose a composite capital allocation measure integrating regulatory and economic capital. The approach builds upon the economic framework underpinning traditional RORAC-style business decision rules, allowing for an optimized risk-return tradeoff while adhering to regulatory capital constraints. The measure has a number of depictions, and it can be viewed as a weighted sum of economic and regulatory capital, as economic capital adjusted for a regulatory capital charge, or as regulatory capital adjusted for concentration risk and diversification benefits. Intuitively, when represented as economic capital adjusted for a regulatory capital charge, the adjustment can be represented as the additional top-of-the-house regulatory capital, above economic capital, allocated by each instrument's required regulatory capital. We show that the measure has ideal properties for an integrated capital measure. When regulatory capital is binding, composite capital aggregates to the institution's top-of-the-house target capitalization rate. We find the measure is higher than economic capital, but lower than regulatory capital for instruments with high credit quality, reflecting the high regulatory capital charge for this instrument class. Finally, we address how IFRS 9/CECL impacts the CCM and discuss the broader implications of the new accounting standards.

**MOODY'S
ANALYTICS**

METHODOLOGY

IFRS 9 Probability-Weighted Scenarios

Prepared by
Martin Janicko, PhD
Martin.janicko@moodys.com
Assistant Director
Kamil Kovar
Kamil.kovar@moodys.com

The IFRS 9 accounting standard for impairment of financial assets requires calculation of expected loss defined as a probability-weighted product of probability of default, loss given default, and exposure at default across scenarios. This document describes the process of constructing three globally consistent IFRS 9 scenarios: a baseline scenario that captures the most likely economic future, one scenario that presents adverse economic conditions, and one scenario that presents favorable economic conditions. The three scenarios are constructed in accordance with target severity for each of the scenarios. While the baseline

© 2017 Moody's Corporation, Moody's Investors Service, Inc., Moody's Analytics, Inc. and/or their licensors and affiliates (collectively, "MOODY'S"). All rights reserved.

CREDIT RATINGS ISSUED BY MOODY'S INVESTORS SERVICE, INC. AND ITS RATINGS AFFILIATES ("MIS") ARE MOODY'S CURRENT OPINIONS OF THE RELATIVE FUTURE CREDIT RISK OF ENTITIES, CREDIT COMMITMENTS, OR DEBT OR DEBT-LIKE SECURITIES, AND MOODY'S PUBLICATIONS MAY INCLUDE MOODY'S CURRENT OPINIONS OF THE RELATIVE FUTURE CREDIT RISK OF ENTITIES, CREDIT COMMITMENTS, OR DEBT OR DEBT-LIKE SECURITIES. MOODY'S DEFINES CREDIT RISK AS THE RISK THAT AN ENTITY MAY NOT MEET ITS CONTRACTUAL, FINANCIAL OBLIGATIONS AS THEY COME DUE AND ANY ESTIMATED FINANCIAL LOSS IN THE EVENT OF DEFAULT. CREDIT RATINGS DO NOT ADDRESS ANY OTHER RISK, INCLUDING BUT NOT LIMITED TO: LIQUIDITY RISK, MARKET VALUE RISK, OR PRICE VOLATILITY. CREDIT RATINGS AND MOODY'S OPINIONS INCLUDED IN MOODY'S PUBLICATIONS ARE NOT STATEMENTS OF CURRENT OR HISTORICAL FACT. MOODY'S PUBLICATIONS MAY ALSO INCLUDE QUANTITATIVE MODEL-BASED ESTIMATES OF CREDIT RISK AND RELATED OPINIONS OR COMMENTARY PUBLISHED BY MOODY'S ANALYTICS, INC. CREDIT RATINGS AND MOODY'S PUBLICATIONS DO NOT CONSTITUTE OR PROVIDE INVESTMENT OR FINANCIAL ADVICE, AND CREDIT RATINGS AND MOODY'S PUBLICATIONS ARE NOT AND DO NOT PROVIDE RECOMMENDATIONS TO PURCHASE, SELL, OR HOLD PARTICULAR SECURITIES. NEITHER CREDIT RATINGS NOR MOODY'S PUBLICATIONS COMMENT ON THE SUITABILITY OF AN INVESTMENT FOR ANY PARTICULAR INVESTOR. MOODY'S ISSUES ITS CREDIT RATINGS AND PUBLISHES MOODY'S PUBLICATIONS WITH THE EXPECTATION AND UNDERSTANDING THAT EACH INVESTOR WILL, WITH DUE CARE, MAKE ITS OWN STUDY AND EVALUATION OF EACH SECURITY THAT IS UNDER CONSIDERATION FOR PURCHASE, HOLDING, OR SALE.

MOODY'S CREDIT RATINGS AND MOODY'S PUBLICATIONS ARE NOT INTENDED FOR USE BY RETAIL INVESTORS AND IT WOULD BE RECKLESS AND INAPPROPRIATE FOR RETAIL INVESTORS TO USE MOODY'S CREDIT RATINGS OR MOODY'S PUBLICATIONS WHEN MAKING AN INVESTMENT DECISION. IF IN DOUBT YOU SHOULD CONTACT YOUR FINANCIAL OR OTHER PROFESSIONAL ADVISER.

ALL INFORMATION CONTAINED HEREIN IS PROTECTED BY LAW, INCLUDING BUT NOT LIMITED TO, COPYRIGHT LAW, AND NONE OF SUCH INFORMATION MAY BE COPIED OR OTHERWISE REPRODUCED, REPACKAGED, FURTHER TRANSMITTED, TRANSFERRED, DISSEMINATED, REDISTRIBUTED OR RESOLD, OR STORED FOR SUBSEQUENT USE FOR ANY SUCH PURPOSE, IN WHOLE OR IN PART, IN ANY FORM OR MANNER OR BY ANY MEANS WHATSOEVER, BY ANY PERSON WITHOUT MOODY'S PRIOR WRITTEN CONSENT.

All information contained herein is obtained by MOODY'S from sources believed by it to be accurate and reliable. Because of the possibility of human or mechanical error as well as other factors, however, all information contained herein is provided "AS IS" without warranty of any kind. MOODY'S adopts all necessary measures so that the information it uses in assigning a credit rating is of sufficient quality and from sources MOODY'S considers to be reliable including, when appropriate, independent third-party sources. However, MOODY'S is not an auditor and cannot in every instance independently verify or validate information received in the rating process or in preparing the Moody's publications.

To the extent permitted by law, MOODY'S and its directors, officers, employees, agents, representatives, licensors and suppliers disclaim liability to any person or entity for any indirect, special, consequential, or incidental losses or damages whatsoever arising from or in connection with the information contained herein or the use of or inability to use any such information, even if MOODY'S or any of its directors, officers, employees, agents, representatives, licensors or suppliers is advised in advance of the possibility of such losses or damages, including but not limited to: (a) any loss of present or prospective profits or (b) any loss or damage arising where the relevant financial instrument is not the subject of a particular credit rating assigned by MOODY'S.

To the extent permitted by law, MOODY'S and its directors, officers, employees, agents, representatives, licensors and suppliers disclaim liability for any direct or compensatory losses or damages caused to any person or entity, including but not limited to by any negligence (but excluding fraud, willful misconduct or any other type of liability that, for the avoidance of doubt, by law cannot be excluded) on the part of, or any contingency within or beyond the control of, MOODY'S or any of its directors, officers, employees, agents, representatives, licensors or suppliers, arising from or in connection with the information contained herein or the use of or inability to use any such information.

NO WARRANTY, EXPRESS OR IMPLIED, AS TO THE ACCURACY, TIMELINESS, COMPLETENESS, MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE OF ANY SUCH RATING OR OTHER OPINION OR INFORMATION IS GIVEN OR MADE BY MOODY'S IN ANY FORM OR MANNER WHATSOEVER.

Moody's Investors Service, Inc., a wholly-owned credit rating agency subsidiary of Moody's Corporation ("MCO"), hereby discloses that most issuers of debt securities (including corporate and municipal bonds, debentures, notes and commercial paper) and preferred stock rated by Moody's Investors Service, Inc. have, prior to assignment of any rating, agreed to pay to Moody's Investors Service, Inc. for appraisal and rating services rendered by it fees ranging from \$1,500 to approximately \$2,500,000. MCO and MIS also maintain policies and procedures to address the independence of MIS's ratings and rating processes. Information regarding certain affiliations that may exist between directors of MCO and rated entities, and between entities who hold ratings from MIS and have also publicly reported to the SEC an ownership interest in MCO of more than 5%, is posted annually at www.moody's.com under the heading "Investor Relations — Corporate Governance — Director and Shareholder Affiliation Policy."

Additional terms for Australia only: Any publication into Australia of this document is pursuant to the Australian Financial Services License of MOODY'S affiliate, Moody's Investors Service Pty Limited ABN 61 003 399 657AFSL 336969 and/or Moody's Analytics Australia Pty Ltd ABN 94 105 136 972 AFSL 383569 (as applicable). This document is intended to be provided only to "wholesale clients" within the meaning of section 761G of the Corporations Act 2001. By continuing to access this document from within Australia, you represent to MOODY'S that you are, or are accessing the document as a representative of, a "wholesale client" and that neither you nor the entity you represent will directly or indirectly disseminate this document or its contents to "retail clients" within the meaning of section 761G of the Corporations Act 2001. MOODY'S credit rating is an opinion as to the creditworthiness of a debt obligation of the issuer, not on the equity securities of the issuer or any form of security that is available to retail investors. It would be reckless and inappropriate for retail investors to use MOODY'S credit ratings or publications when making an investment decision. If in doubt you should contact your financial or other professional adviser.

Additional terms for Japan only: Moody's Japan K.K. ("MJKK") is a wholly-owned credit rating agency subsidiary of Moody's Group Japan G.K., which is wholly-owned by Moody's Overseas Holdings Inc., a wholly-owned subsidiary of MCO. Moody's SF Japan K.K. ("MSFJ") is a wholly-owned credit rating agency subsidiary of MJKK. MSFJ is not a Nationally Recognized Statistical Rating Organization ("NRSRO"). Therefore, credit ratings assigned by MSFJ are Non-NRSRO Credit Ratings. Non-NRSRO Credit Ratings are assigned by an entity that is not a NRSRO and, consequently, the rated obligation will not qualify for certain types of treatment under U.S. laws. MJKK and MSFJ are credit rating agencies registered with the Japan Financial Services Agency and their registration numbers are FSA Commissioner (Ratings) No. 2 and 3 respectively.

MJKK or MSFJ (as applicable) hereby disclose that most issuers of debt securities (including corporate and municipal bonds, debentures, notes and commercial paper) and preferred stock rated by MJKK or MSFJ (as applicable) have, prior to assignment of any rating, agreed to pay to MJKK or MSFJ (as applicable) for appraisal and rating services rendered by it fees ranging from JPY200,000 to approximately JPY350,000,000.

MJKK and MSFJ also maintain policies and procedures to address Japanese regulatory requirements.