

Connecting ESG Assessments into the Credit Portfolio Chapter 1: Climate Change and the Corporate sector

Damian Watson, James T. Edwards and Rebecca Cui

May 2021

Agenda

- 1. Overview of Moody's ESG Offering
- 2. Quantifying Climate-Induced Corporate Credit Risk
- 3. Patterns of Risk across the Credit Edge Public Universe
 - Overall Risk Magnitudes
 - Drivers of Relative Physical Risk
 - Drivers of Relative Transition Risk
 - Additional Relative Risk Factors

Damian Watson Senior Director Head of Customer Success, EMEA Predictive Analytics

James Edwards

Director Credit Default Modelling Solutions Predictive Analytics

Rebecca Cui Assistant Director Credit Default Modelling Solutions Predictive Analytics

Moody's Overview

Providing trusted insights and integrated analytics leveraging our deep domain and risk expertise

Moody's

Moody's Investors Service

Leading Credit Rating Agency Integrate ESG to satisfy market demand

Moody's Analytics

Leader in Risk Solutions Integrate ESG to satisfy market demand

Moody's ESG Solutions

Integrated risk assessment solutions that deliver value to customers from across Moody's





Moody's ESG Solutions Group

Bringing quality, rigor and consistency to the most comprehensive spectrum of capabilities serving core segments as the economy greens

- Brings together over 30 years of ESG expertise to meet rapidly evolving needs
- Delivers data, analytics and insight to further enhance best-in-class risk assessment capabilities from MIS and MA



Serving risk management, equity and credit markets

'Devastating' impact of Covid-19 Pandemic highlight the risks of failure to act



Accelerated impetus to evaluate Risks of Climate Change



The framework required to measure the financial impact of Climate Change is particularly challenging



Both Climate Change and the Covid-19 Pandemic are being described as a 'Green Swan' event

- Sudden and far-reaching impacts on real and financial sectors
- Complex and multiple interconnective drivers
- The implications on financial stability requires a collaborative response from Policy-makers and other stakeholders

The framework required to measure the financial impact of Climate Change is particularly challenging.

- Specific nature of the risks
- Significant uncertainty & complex tipping points
- Non-linear outcomes & cascading effects
- No historical experience to rely on

MOODY'S



Climate-Adjusted Credit Metrics: Overview

From Climate Risks to Financial Metrics

» Our credit metrics will be part of a full-suite of scenario-conditioned data analytics:

Physical Risks Transition Risks (Extreme weather events, gradual climate change) (Policy, technology, consumer preferences) Recon-Lower value Increase in **Productivity Business** Asset Economy struction / of stranded energy disruption destruction loss replacement prices assets Cash flows and Capital / Collateral/Risk Premium **Financial** business risk impacted by change in asset valuation Impacts impacted by physical and transition risk **Portfolio Impacts Credit Risk** Risk Concentration and correlation risk, VAR PD/LGD, Internal Rating, Expected Loss, **Metrics** and Tail Risk Spreads, etc

Scenario Analysis

Public EDF Model Employs Market Data to Build a Structural Measure of Credit Risk



Climate Risk Affects the Drivers of the EDF Model



Physical Risk: Quantifying Frequency and Magnitude of Climate-Related Asset Shocks





Sea level rise

Water Stress

*Forthcoming

Weather





Transition Risk: Quantifying Scenario-Conditional Cash Flows



Which Climate Scenarios to Analyze?

» One important set of climate scenarios are the NGFS scenarios, which have also been proposed for the 2021 BES exercise:



Investor Expectation Paths within Scenario Matter

Expectation Assumption: Uncertainty Until Policy is Announced

	Ea	arly Policy Pat	th Expectation	ns	Late Policy Path Expectations				No Policy Path Expectations				
Year	% Physical Risk Priced	Early Policy	Late Policy	No Policy	% Physical Risk Priced	Early Policy	Late Policy	No Policy	% Physical Risk Priced	Early Policy	Late Policy	No Policy	
2020	0%	33%	33%	33%	0%	33%	33%	33%	0%	33%	33%	33%	
2021	100%	100%	0%	0%	100%	0%	50%	50%	100%	0%	50%	50%	
2022	100%	100%	0%	0%	100%	0%	50%	50%	100%	0%	50%	50%	
2023	100%	100%	0%	0%	100%	0%	50%	50%	100%	0%	50%	50%	
2024	100%	100%	0%	0%	100%	0%	50%	50%	100%	0%	50%	50%	
2025	100%	100%	0%	0%	100%	0%	50%	50%	100%	0%	50%	50%	
2026	100%	100%	0%	0%	100%	0%	50%	50%	100%	0%	50%	50%	
2027	100%	100%	0%	0%	100%	0%	50%	50%	100%	0%	50%	50%	
2028	100%	100%	0%	0%	100%	0%	50%	50%	100%	0%	50%	50%	
2029	100%	100%	0%	0%	100%	0%	50%	50%	100%	0%	50%	50%	
2030	100%	100%	0%	0%	100%	0%	50%	50%	100%	0%	50%	50%	
2031	100%	100%	0%	0%	100%	0%	100%	0%	100%	0%	0%	100%	
2032	100%	100%	0%	0%	100%	0%	100%	0%	100%	0%	0%	100%	
2033	100%	100%	0%	0%	100%	0%	100%	0%	100%	0%	0%	100%	
2034	100%	100%	0%	0%	100%	0%	100%	0%	100%	0%	0%	100%	

Example of a Baseline PD Term Structure Royal Dutch Shell PLC



Effect of Physical Climate Risk on EDFs Royal Dutch Shell PLC

Physical Risk: Increase in PD by Tenor

ROYAL DUTCH SHELL PLC | 427 Climate Score: 59



Physical Risk: PD Term Structure By Scenario ROYAL DUTCH SHELL PLC | 427 Climate Score: 59



Investor Expectations Assumption: Physical Climate damages not currently priced, but perfect scenario foresight occurs when announced

Effect of Transition Risk: Earnings and Asset Paths

Royal Dutch Shell PLC



Investor Expectations Assumption: Perfect scenario foresight occurs when announced

Effect of Transition Risk on EDFs

Royal Dutch Shell PLC



Investor Expectations Assumption: Perfect scenario foresight occurs when announced

Effect of Combined Climate Risk on EDFs

Combined Risk: Increase in PD by Tenor

ROYAL DUTCH SHELL PLC

Royal Dutch Shell PLC

Combined Risk: PD Term Structure By Scenario ROYAL DUTCH SHELL PLC



Investor Expectations Assumption: Physical Climate damages not currently priced, but perfect scenario foresight occurs when announced

Main Exercise for this Webinar

- » Within the Climate-Adjusted EDF Framework, analyze risk for the 40,000+ names in the Public EDF universe of global public companies
- » Identify the overall distribution of climate-adjusted risk and the important drivers of relative risk worldwide



Climate Risk Distributions across Scenarios and Time Horizons

Average Physical-Adjusted EDF Term Structures

Physical Risk: Mean Portfolio Increase in PD by Tenor



Investor Expectations Assumption: Perfect scenario foresight occurs when announced

Average Transition-Adjusted EDF Term Structures

Transition Risk: Mean Portfolio Increase in PD by Tenor



Investor Expectations Assumption: Perfect scenario foresight occurs when announced

Average Combined EDF Term Structures

Combined Risk: Mean Portfolio Increase in PD by Tenor



Investor Expectations Assumption: Perfect scenario foresight occurs when announced

Relative Risk Varies Widely within each Scenario



Average Transition-Adjusted EDF – High Exposure Sector Portfolio



Investor Expectations Assumption: Perfect scenario foresight occurs when announced

MOODY'S ANALYTICS

10 Yr Notch Difference

Average Combined-Adjusted EDF – High Exposure Sector Portfolio



Investor Expectations Assumption: Perfect scenario foresight occurs when announced



Drivers of Relative Physical Climate Risk

Global Average Four Two Seven Climate Score by Country

Country	Floods Score	Heat Stress Score	Hurricanes & Typhoons Score	Sea Level Rise Score	Water Stress Score	Wildfires Score	Total Climate Score
CHINA	65.7	25.9	38.5	29.8	50.0	20.8	61.0
ITALY	39.9	57.8	0.0	49.4	52.9	19.5	53.5
UNITED STATES	16.7	33.1	35.9	47.5	39.9	40.9	49.2
SOUTH AFRICA	12.1	47.6	0.0	6.3	42.0	42.9	23.5

Global Average Four Two Seven Climate Score by Country



Global Physical Risk Varies Widely within Countries



Hurricanes & Typhoons Risk Level - Real Estate and Construction sectors

Global Physical Risk Varies Widely within Countries



Relationship between Physical Risk Scores and Increase in EDFs

Physical Risk: Increase in 10Yr Forward PD by 427 Score



MOODY'S ANALYTICS

Climate Change and the Corporate sector 32

Relationship between Physical Risk Scores and Increase in EDFs

Physical Risk: Increase in 30Yr Forward PD by 427 Score



MOODY'S ANALYTICS

Climate Change and the Corporate sector 33



Drivers of Relative Carbon Transition Risk

Transition Risk Increases for High Exposure Sectors

	sector name	Mean of	1 Year PD li	ncrease	Mean of 10 Year PD Increase				
		Early Policy	Late Policy	No Policy	Early Policy	Late Policy	No Policy		
Ci Gi Ci	Coal to Liquid Refining	194.6%	-21.6%	-21.6%	2154.7%	2473.8%	-61.9%		
	Gas Processing	194.6%	-21.6%	-21.6%	2154.7%	2473.8%	-61.9%		
	Coal Extraction	353.5%	-36.5%	-36.5%	410.3%	882.0%	-76.0%		
	Delivered Coal	131.9%	-16.7%	-16.7%	164.5%	161.9%	-40.7%		
	Delivered Gas	449.4%	-4.1%	-4.1%	114.3%	434.4%	-50.2%		
	Oil and Natural Gas Extraction	68.2%	-9.4%	-9.4%	55.4%	211.6%	-49.8%		
5	Oil Refining	16.6%	-5.6%	-5.6%	22.0%	120.3%	-39.0%		
5	Delivered Refined Liquids	14.2%	-4.2%	-4.2%	10.7%	44.4%	-20.2%		
	Bicycles/Motorcycles	8.3%	-3.2%	-3.2%	6.8%	-2.8%	0.3%		
	Car Aoto Manufacturing	7.4%	-3.3%	-3.3%	5.5%	2.4%	-6.3%		
	Ship	19.6%	-2.7%	-2.7%	4.3%	-0.1%	33.3%		
	Freight Rail	3.6%	0.9%	0.9%	3.2%	-10.2%	37.8%		
	Mass Passenger Transport	1.6%	0.6%	0.6%	1.1%	-4.0%	16.2%		
	Flight	0.1%	0.8%	0.8%	-2.1%	0.2%	8.8%		
Ĩ	Freight Road	-2.9%	1.6%	1.6%	-2.5%	-2.2%	9.0%		
5	Nuclear Fuel Generation	-6.9%	4.1%	4.1%	-6.9%	-39.5%	495.9%		
	Fertilizer	-9.0%	11.6%	11.6%	-7.9%	-21.1%	149.7%		
	Concrete	-17.0%	12.3%	12.3%	-11.8%	-55.1%	565.0%		
	Electricity Production	-23.9%	18.5%	18.5%	-19.3%	-56.2%	1784.6%		
	Delivered Electiricty Industiral	-23.9%	18.5%	18.5%	-19.3%	-56.2%	1784.6%		
	Delivered Electiricty Building	-21.8%	19.2%	19.2%	-20.5%	-48.8%	1184.8%		
	Delivered Electiricty Transportation	-25.5%	23.7%	23.7%	-25.2%	-58.7%	1690.3%		

Transition Risk Increases for Low Exposure Sectors

	sector name	Mean of 1 Year PD Increase		Mean of 10 Year PD Increase		Increase	sector name	Mean of 1 Year PD Increase		Mean of 10 Year PD Increase				
		Early Policy	Late Policy	No Policy	Early Policy	Late Policy	No Policy		Early Policy	Late Policy	No Policy	Early Policy	Late Policy	No Policy
	UTILITIES NEC	2.0%	-0.9%	-0.9%	1.6%	29.8%	-20.3%	PLASTIC & RUBBER	-4.3%	2.3%	2.3%	-5.2%	-0.2%	6.0%
	UTILITIES, GAS	-0.5%	1.2%	1.2%	0.9%	71.5%	-27.0%	FURNITURE & APPLIANCES	-4.3%	2.3%	2.3%	-5.3%	-1.2%	7.1%
	MINING	0.1%	-0.1%	-0.1%	-0.2%	10.4%	-8.1%	MEDICAL SERVICES	-3.5%	1.9%	1.9%	-5.3%	-0.7%	6.7%
	STEEL & METAL PRODUCTS	-0.3%	0.2%	0.2%	-0.9%	18.2%	-13.2%	PRINTING	-4.6%	2.5%	2.5%	-5.3%	-1.5%	7.5%
	CHEMICALS	-1.3%	0.7%	0.7%	-2.1%	13.9%	-9.3%	FINANCE COMPANIES	-5.0%	2.8%	2.8%	-5.3%	-1.9%	8.4%
	CONSTRUCTION MATERIALS	-1.8%	0.9%	0.9%	-2.4%	12.6%	-8.4%	CONSUMER SERVICES	-4.5%	2.4%	2.4%	-5.3%	-1.4%	7.5%
	UNASSIGNED	-1.8%	1.0%	1.0%	-2.8%	3.8%	0.2%	LESSORS	-3.9%	2.1%	2.1%	-5.4%	-0.9%	7.2%
	COMPUTER SOFTWARE	-2.7%	1.4%	1.4%	-3.9%	-1.0%	5.3%	MACHINERY & EQUIPMENT	-4.6%	2.4%	2.4%	-5.4%	-1.0%	7.0%
	PHARMACEUTICALS	-2.5%	1.3%	1.3%	-3.9%	0.1%	4.1%	APPAREL & SHOES	-4.9%	2.6%	2.6%	-5.5%	-1.7%	7.9%
	FINANCE NEC	-2.6%	1.4%	1.4%	-3.9%	-0.6%	5.3%	CONSUMER PRODUCTS	-3.7%	1.9%	1.9%	-5.5%	-1.3%	7.5%
	LUMBER & FORESTRY	-3.0%	1.6%	1.6%	-4.0%	5.0%	-0.6%	PUBLISHING	-4.6%	2.5%	2.5%	-5.5%	-1.9%	8.3%
	AGRICULTURE	-3.3%	1.7%	1.7%	-4.1%	1.5%	2.8%		-4.9%	2.6%	2.6%	-5.6%	-1.2%	7.8%
	INVESTMENT MANAGEMENT	-2.2%	1.3%	1.3%	-4.2%	-1.3%	7.0%	HOTELS & RESTALIBANTS	-4.5%	2.070	2.076	-5.6%	0.8%	5.4%
	SEMICONDUCTORS	-3.1%	1.6%	1.6%	-4.2%	0.7%	3.8%		1 2%	2.4%	2.4%	5.7%	1.2%	0.5%
)	PAPER	-3.6%	1.9%	1.9%	-4.2%	7.7%	-2.7%		-4.2/0	2.470	2.4/0	-J.770	-1.2/0	6.3%
	MEDICAL EQUIPMENT	-2.6%	1.4%	1.4%	-4.4%	-0.7%	5.5%		-3.3%	3.0%	3.0%	-3.6%	1.6%	0.0% E 10/
	BUSINESS SERVICES	-3.5%	1.9%	1.9%	-4.5%	-0.7%	5.6%	FOOD & BEVERAGE	-4.2%	2.3%	2.3%	-5.9%	1.0%	5.1%
	SECURITY BROKERS & DEALERS	-4.2%	2.4%	2.4%	-4.6%	-1.7%	7.3%	TELEPHONE	-4.5%	2.4%	2.4%	-6.0%	-1.3%	8.3%
	ELECTRONIC EQUIPMENT	-4.2%	2.2%	2.2%	-4.6%	-0.5%	5.6%	CONSTRUCTION	-6.8%	3.8%	3.8%	-6.0%	-1.1%	8.7%
	TRANSPORTATION	-3.8%	2.0%	2.0%	-4.7%	5.9%	-0.7%	CONSUMER DURABLES RETL/WHSL	-5.3%	2.9%	2.9%	-6.1%	-1.5%	8.6%
	ENTERTAINMENT & LEISURE	-3.9%	2.1%	2.1%	-4.7%	-1.3%	6.6%	BROADCAST MEDIA	-4.9%	2.6%	2.6%	-6.2%	-2.0%	9.1%
	MEASURE & TEST EQUIPMENT	-3.1%	1.7%	1.7%	-4.8%	-0.9%	6.5%	CONSUMER PRODUCTS RETL/WHSL	-5.4%	2.9%	2.9%	-6.2%	-1.7%	8.9%
	REAL ESTATE INVESTMENT TRUSTS	-2.7%	1.4%	1.4%	-4.8%	0.2%	5.3%	AUTOMOTIVE	-5.8%	3.1%	3.1%	-6.3%	-1.0%	8.1%
	TEXTILES	-5.6%	3.0%	3.0%	-4.8%	1.7%	3.7%	TOBACCO	-3.1%	1.6%	1.6%	-6.4%	-0.6%	8.0%
	COMPUTER HARDWARE	-4.3%	2.3%	2.3%	-4.9%	-0.9%	6.4%	CABLE TV	-4.7%	2.5%	2.5%	-6.4%	-1.8%	9.3%
	ELECTRICAL EQUIPMENT	-4.3%	2.3%	2.3%	-5.0%	-1.4%	7.4%	FOOD & BEVERAGE RETL/WHSL	-5.1%	2.8%	2.8%	-6.8%	-0.8%	8.7%
	AEROSPACE & DEFENSE	-3.9%	2.1%	2.1%	-5.0%	-1.4%	7.1%	INSURANCE - LIFE	-9.9%	6.4%	6.4%	-9.4%	-2.8%	17.4%
	REAL ESTATE	-3.8%	2.1%	2.1%	-5.0%	-0.6%	6.8%	BANKS AND S&LS	-10.3%	7.1%	7.1%	-10.8%	-3.0%	23.5%

Results Vary Within Sectors



Case Study: Natural Gas Electricity Production



Average Price and Costs, Early Policy

Average Price and Costs, No Policy



Case Study: Natural Gas Electricity Production





Additional Drivers of Relative Firm Specific Climate Risk

Drivers of Relative Firm Risk

» Dominant firms with high baseline market share are more able to weather lower cost competitiveness driven by changing energy and carbon prices.

» We do not see a clear differential by industry for the relationship between the magnitude of asset shocks and the severity of physical climate events.

Drivers of Relative Firm Risk

» Firms with higher baseline asset volatility have higher realized asset shocks from physical climate shocks

» Firms that are more highly leveraged will have a great credit impact from the same shock in transition-adjusted cash flows.

Overall Takeaways

» Climate Change has the potential for material credit effects for all corporate names in a portfolio

» The magnitude of climate shocks varies widely across names, time horizons, and scenarios, and is concentrated in the most heavily affected firms and extreme outcomes.

Climate PD Converter Module



MOODY'S analytics





moodysanalytics.com

© 2021 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 CREDIT RATINGS AFFILIATES ARE THEIR CURRENT OPINIONS OF THE RELATIVE FUTURE CREDIT RISK OF ENTITIES, CREDIT COMMITMENTS, OR DEBT OR DEBT-LIKE SECURITIES, AND MATERIALS, PRODUCTS, SERVICES AND INFORMATION PUBLISHED BY MOODY'S (COLLECTIVELY. "PUBLICATIONS") MAY INCLUDE SUCH CURRENT OPINIONS. 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 OR IMPAIRMENT. SEE APPLICABLE MOODY'S RATING SYMBOLS AND DEFINITIONS PUBLICATION FOR INFORMATION ON THE TYPES OF CONTRACTUAL FINANCIAL OBLIGATIONS ADDRESSED BY MOODY'S CREDIT RATINGS, CREDIT RATINGS DO NOT ADDRESS ANY OTHER RISK, INCLUDING BUT NOT LIMITED TO: LIQUIDITY RISK, MARKET VALUE RISK. OR PRICE VOLATILITY, CREDIT RATINGS, NON-CREDIT ASSESSMENTS ("ASSESSMENTS"), AND OTHER 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. AND/OR ITS AFFILIATES, MOODY'S CREDIT RATINGS, ASSESSMENTS, OTHER OPINIONS AND PUBLICATIONS DO NOT CONSTITUTE OR PROVIDE INVESTMENT OR FINANCIAL ADVICE, AND MOODY'S CREDIT RATINGS, ASSESSMENTS, OTHER OPINIONS AND PUBLICATIONS ARE NOT AND DO NOT PROVIDE RECOMMENDATIONS TO PURCHASE, SELL, OR HOLD PARTICULAR SECURITIES, MOODY'S CREDIT RATINGS, ASSESSMENTS, OTHER OPINIONS AND PUBLICATIONS DO NOT COMMENT ON THE SUITABILITY OF AN INVESTMENT FOR ANY PARTICULAR INVESTOR, MOODY'S ISSUES ITS CREDIT RATINGS, ASSESSMENTS AND OTHER OPINIONS AND PUBLISHES ITS 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, ASSESSMENTS, OTHER OPINIONS, AND 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, ASSESSMENTS, OTHER OPINIONS OR 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.

MOODY'S CREDIT RATINGS, ASSESSMENTS, OTHER OPINIONS AND PUBLICATIONS ARE NOT INTENDED FOR USE BY ANY PERSON AS A BENCHMARK AS THAT TERM IS DEFINED FOR REGULATORY PURPOSES AND MUST NOT BE USED IN ANY WAY THAT COULD RESULT IN THEM BEING CONSIDERED A BENCHMARK.

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 its 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 CREDIT RATING, ASSESSMENT, 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 credit rating, agreed to pay to Moody's Investors Service, Inc. for credit ratings opinions and services rendered by it fees ranging from \$1,000 to approximately \$5,000,000. MCO and Moody's Investors Service also maintain policies and procedures to address the independence of Moody's Investors Service and have also publicly reported to the SEC an ownership interest in MCO of more than 5%, is posted annually at <u>www.moodys.com</u> 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 338569 (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.

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 credit rating, agreed to pay to MJKK or MSFJ (as applicable) for credit ratings opinions and services rendered by it fees ranging from JPY125,000 to approximately JPY550,000,000.

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