

**RESEARCH**

26 NOVEMBER 2019

**ABOUT**

*Research on the methodology to determine the Weighted Average Maturity of the contractual payments due under the tranche, and analyzing the impact on the risk weight calculation of a securitization transaction for the Ratings-Based Approach.*

<https://www.moodyanalytics.com/>

**Authors**

**Domitille de Coincy**  
Associate Director, Content Solutions - Structured

**Mike Mueller**  
Senior Director - Content Solutions - Structured

**Daniele Parla**  
Financial Engineer, Content Solutions - Structured

**Contact Us**

Americas  
+1.212.553.1658  
clientservices@moody.com

Europe  
+44.20.7772.5454  
clientservices.emea@moody.com

Asia (Excluding Japan)  
+85 2 2916 1121  
clientservices.asia@moody.com

Japan  
+81 3 5408 4100  
clientservices.japan@moody.com

# Calculation of Tranche Maturity for SEC-ERBA

## Introduction

The Basel 3 framework was developed as a response to the 2008 credit crisis. Some of its main foci are the risk-weighted assets (RWA), internal ratings and the setting of regulatory capital floors. The calculation of RWA can be done through different approaches according to the hierarchy below:



In this paper, we specifically explore the External Ratings Based Approach (ERBA). The ERBA is applied if the Internal Ratings-Based Approach (IRBA) may not be applied and if permitted in the relevant jurisdiction. ERBA assigns risk weights to rated securitization exposures based on qualifying CRA ratings, tranche seniority, interpolation for tranche maturities between 1-5 years, and adjustment for thickness of non-senior tranches.

This paper focuses on the calculation of tranche maturity for securitization exposures, and specifically on how different assumptions can impact the Weighted average Maturity (WAM) calculation and resulting RWA. Comparative results are presented from a sample dataset of 1000 ISINS across EMEA asset classes, countries and seniorities.

## Table of Contents

<b>Introduction</b>	<b>1</b>
<b>ERBA Overview</b>	<b>3</b>
Risk Weight for Senior Tranches	3
Risk Weight for Non-Senior Tranches	4
<b>Tranche Maturity Calculation</b>	<b>5</b>
<b>Assumptions for Calculating the WAM</b>	<b>6</b>
Applying Default and Prepayment assumptions	6
Running Macroeconomic Assumptions	6
Analysis	8
<b>Summary</b>	<b>11</b>

## ERBA Overview

When applying the SEC-ERBA, the RWA is defined by the external rating of the tranche, its seniority, thickness and its maturity as defined in article 68 of the “Basel III Document Revisions to the securitisation framework”<sup>1</sup>.

### Risk Weight for Senior Tranches

For long-term exposures for non-STC senior tranches, the risk weight should be calculated through a linear interpolation of their tranche maturity according to the table in Figure 1 below.

Figure 1 ERBA risk weight for long-term exposures for senior non-STC tranches

RATING <sup>2</sup>	SENIOR TRANCHE	
	TRANCHE MATURITY ( $M_T$ )	
	1 YEAR	5 YEARS
Aaa	15%	20%
Aa1	15%	30%
Aa2	25%	40%
Aa3	30%	45%
A1	40%	50%
A2	50%	65%
A3	60%	70%
Baa1	75%	90%
Baa2	90%	105%
Baa3	120%	140%
Ba1	140%	160%
Ba2	160%	180%
Ba3	200%	225%
B1	250%	280%
B2	310%	340%
B3	380%	420%
Caa1 / Caa2 / Caa3	460%	505%
Below Caa3	1250%	1250%

<sup>1</sup> <https://www.bis.org/bcbs/publ/d374.pdf>

<sup>2</sup> The rating grades shown are Moody’s Ratings, however this is only illustrative.

## Risk Weight for Non-Senior Tranches

For non-senior tranches, using the risk weight interpolated for the tranche maturity using the table in Figure 2 below, and using the tranche thickness, the risk weight should be calculated using the following formula:

$$\text{Risk Weight} = (\text{risk weight from Figure 2 adjusted to maturity}) \times (1 - \min(T; 50\%))$$

Where  $T$  is the tranche thickness.

Figure 2 ERBA risk weight for long-term exposures for non-senior non-STC tranches

RATING <sup>3</sup>	NON-SENIOR TRANCHE	
	TRANCHE MATURITY ( $M_T$ )	
	1 YEAR	5 YEARS
Aaa	15%	70%
Aa1	15%	90%
Aa2	30%	120%
Aa3	40%	140%
A1	60%	160%
A2	80%	180%
A3	120%	210%
Baa1	170%	260%
Baa2	220%	310%
Baa3	330%	420%
Ba1	470%	580%
Ba2	620%	760%
Ba3	750%	860%
B1	900%	950%
B2	1050%	1050%
B3	1130%	1130%
Caa1 / Caa2 / Caa3	1250%	1250%
Below Caa3	1250%	1250%

For STC compliant securities, the resulting risk weight is subject to a floor risk weight of 10% for senior tranches, and 15% for non-senior tranches.

In both cases, the effective maturity has a floor of 1 year and a cap of 5 years; consequently, different maturities are restrained by these effective maturities limits. For instance, an effective maturity of 6 years must follow the 5 years rule.

$$\text{Risk Weight for a Maturity equal to } X = RW_{\text{year } 1} + (X - 1) \times \frac{RW_{\text{year } 5} - RW_{\text{year } 1}}{5 - 1}$$

Where  $X$  is equal to tranche maturity and  $RW$  stands for risk weight according to the tables above.

The definition of tranche maturity ( $M_t$ ) has implications for Risk weight calculations and therefore it is crucial to evaluate the impact of its calculation.

<sup>3</sup> The rating grades shown are Moody's Ratings, however this is only illustrative.

## Tranche Maturity Calculation

The tranche maturity is the effective maturity that is remaining and is expressed in years. In order to calculate it, the institution can choose between two possible ways as defined in article 22 of the “*Basel III Document Revisions to the securitisation framework*”:

- a. The weighted-average maturity of the contractual remaining cash flows of a tranche, is calculated using the following formula:

$$M_T = \frac{\sum_t t \times CF_t}{\sum_t CF_t}$$

Where  $CF_t$  denotes the cash flows (the sum of principal, interest and fees) contractually paid in the period  $t$  by the borrower.

This approach is also known as the Weighted Average Maturity, WAM, approach.

- b. Based on tranche final legal maturity, using the formula:

$$M_T = 1 + (M_L - 1) \times 80\%$$

Where  $M_L$  stands for the tranche final legal maturity.

The latter is easier to implement, but produces maturity levels consistently higher than the WAM approach regardless of the assumptions applied.

The below table shows the joint distribution of tranche maturity results for German Auto-ABS calculated using:

- a. WAM approach with Baseline macroeconomic scenario (see description of approach below).  
 b. Tranche Legal Maturity.

Figure 3 Joint distribution of tranche maturity for German Auto-ABS

		(b) Mt from Legal Maturity			
		Years	[2,3[	[3,4[	[4,5[
(a) Mt from Average Life (Baseline)	1	2.02%	0.00%	3.77%	14.66%
	]1,2[	0.05%	0.00%	3.76%	46.09%
	[2,3[	0.00%	0.00%	0.82%	7.84%
	[3,4[	0.00%	0.00%	0.23%	17.21%
	[4,5[	0.00%	0.00%	0.00%	0.75%
	5	0.00%	0.94%	0.00%	1.87%

As can be seen from the table above:

- » There are almost no cases where the Legal Maturity approach leads to lower tranche maturity (lower diagonal).
- » Almost half the tranches with a Legal Maturity implied WAM of 5 years have an Average Life implied maturity of 1-2 years.

## Assumptions for Calculating the WAM

In the below analysis, we are investigating the various assumptions that can be applied to calculate the WAM, as well as their feasibility and impacts on RWAs results.

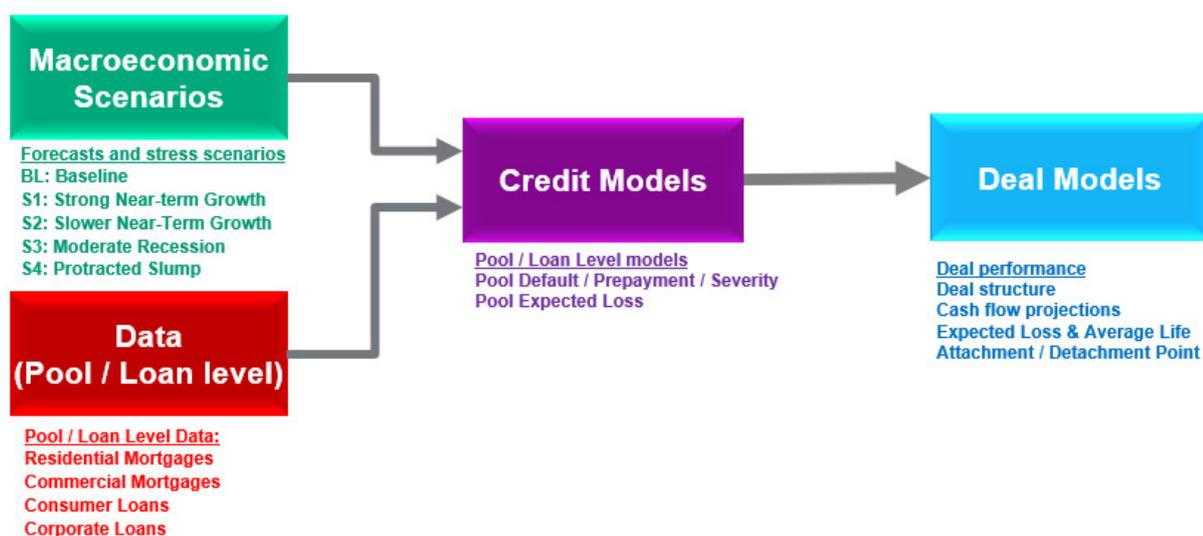
### Applying Default and Prepayment assumptions

When forecasting cashflows of securitizations, the waterfall model requires default and prepayment vectors to generate collateral cashflows. The current "Draft Guidelines on the determination of the WAM of a tranche"<sup>4</sup> recommends applying zero future prepayments and zero future defaults to collateral cashflows.

### Running Macroeconomic Assumptions

Future pool performance for securitization under a macroeconomic scenario is forecasted using a credit model. The forecasted prepayment and default vectors will be used to project collateral cash flows, which are then passed through the waterfall model of the securitization to derive tranche cashflows. Figure 4 below shows the methodology used to determine the WAM using macroeconomic forecasts.

Figure 4 Historical and Forecasted default (CDR) for Italy MBS Prime



### Macroeconomic Forecasts

The economic forecasts are generated using a macroeconomic model which captures both interconnectedness among economic regions and country-specific idiosyncracies. Moody's Analytics Global Macroeconomic Model produces forecasts for more than 15,000 time series across 100+ countries that collectively constitute more than 95% of global GDP<sup>5</sup>. While the model structure is similar across countries, the framework allows for country-specific variations of key equations and for inclusion of tailpipe equations for variables important for some countries.

Moody's Analytics uses its global forecasting framework to quantify its economic outlook in the form of a Baseline forecast, generated on a monthly basis. The forecast is produced based on globally consistent assumptions that reflect the view regarding the economic outlook. The global assumptions are augmented by region and country-specific assumptions if required. The Baseline is used as an anchor for Moody's Analytics suite of scenarios that captures the key risks to the global outlook.

<sup>4</sup> <https://eba.europa.eu/sites/default/documents/files/documents/10180/2883227/52eb10d7-085d-4401-8b74-cec60d710b7d/EBA-CP-2019-08%20CP%20on%20the%20draft%20GLs%20for%20the%20determination%20of%20WAM.pdf?retry=1>

<sup>5</sup> For more details please refer to M. Hopkins, "Moody's Analytics Global Macroeconomic Model Methodology", March 2018. <https://www.moodyanalytics.com/-/media/whitepaper/2018/global-macroeconomic-model-description-short-version>.

### **Credit Models**

A credit model is an analytic tool to assess credit risk and measure performance over different macroeconomic scenarios for portfolios of different asset classes. Moody's Analytics Credit models solution consists of loan-level and pool-level econometric models for performance variables like delinquencies, CPR, CDR, and severities<sup>6</sup>.

### **Waterfall Models**

Each security receives cashflows according to the priority of payments described in its deal waterfall. Moody's Analytics' solution includes extensive deal libraries with accurate and validated waterfalls and collateral data updated every payment period which facilitates cash flow analytics on structured transactions<sup>7</sup>.

---

<sup>6</sup> <https://www.moodyanalytics.com/solutions-overview/credit-risk/credit-risk-modeling>

<sup>7</sup> <https://www.moodyanalytics.com/solutions-overview/structured-finance/structured-finance-sell-side-solutions>

## Analysis

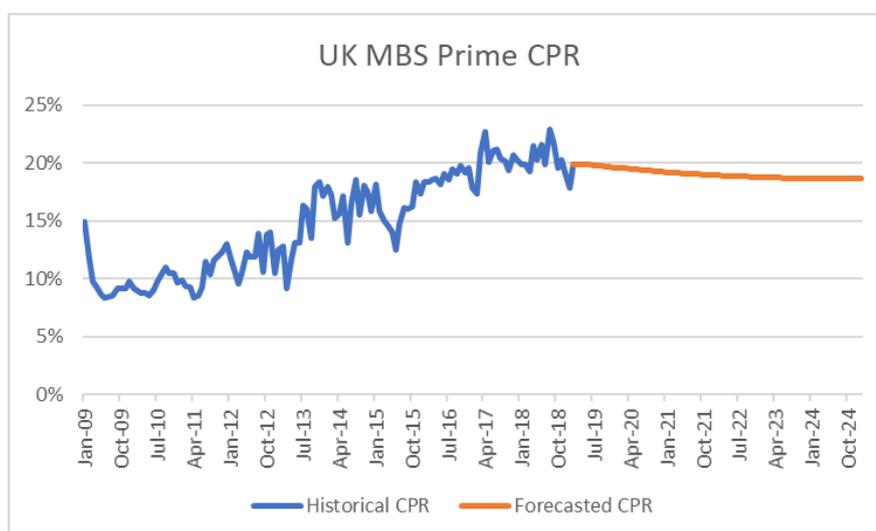
### Historical pool performance

An assumption of zero prepayments will project pool performance quite differently to historically observed performance. The historical average of reported Constant Prepayment Rate (CPR) in the Moody's Analytics EMEA active universe of securitized collateral pools as of end of October 2019 is 13.8%.

Across the Moody's Analytics EMEA active universe of securities, there are multiple cases of significant differences in average reported CPR, for example Slate No 1 plc (UK RMBS) has a reported average CPR since issuance of around 15.6%, while VCL 26 (German Auto leases) has a reported average CPR since issuance of around 1.6%.

On the other hand, forecasted CPR for each asset class and region derived from a macroeconomic scenario is much more in line with historical reported CPR. For example, the chart below compares historical performance data and forecasted data for UK MBS Prime.

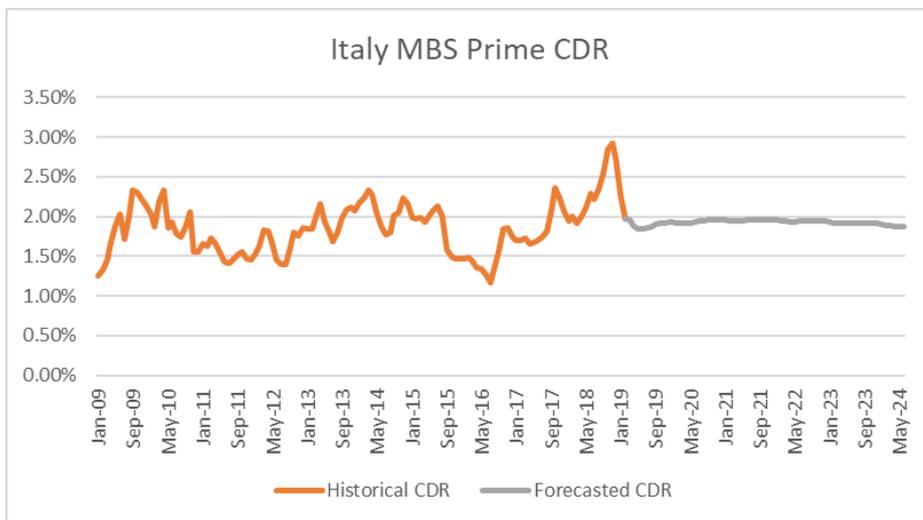
Figure 5 Historical and forecasted prepayment (CPR) for UK MBS Prime



The above chart shows the prepayment rate forecast for the average UK MBS Prime – 2015 vintage over the next five years, under a Baseline macroeconomic scenario. Here, the model does not take into account any specific pool fixed effects.

Similarly, forecasted CDR for a specific asset class and region derived from a macroeconomic scenario is much more in line with historical reported CDR. For example, the chart below compare historical performance data and forecasted data for Italy MBS Prime.

**Figure 6** Historical and Forecasted default (CDR) for Italy MBS Prime



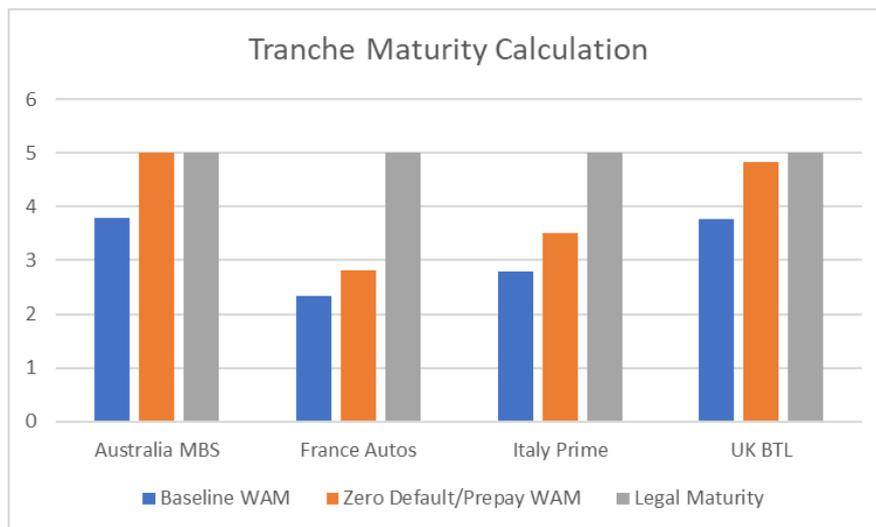
The above chart shows the default rate forecast for the average Italian MBS Prime – 2015 vintage over the next five years, under a Baseline macroeconomic scenario. Here, the model does not take into account any specific pool fixed effects.

**Impact on Tranche Maturity Result**

We have run analysis on the effect of different scenario assumptions on WAM and RWA calculations across a dataset of 1000 sampled securities from nine countries, and fifteen asset classes, the “Research Dataset”. Securities were randomly sampled within their group of asset class and country. The number of deals selected for each group depended on the size of the group in the Moody’s Analytics EMEA universe of structured finance securities.

For the Research Dataset, running zero default/prepayment assumption leads to a 3.2 years higher WAM compared to running a Baseline Macroeconomic scenario. This is illustrated by the chart below which compares the regional impact on Tranche Maturity when running a Baseline scenario, a zero default/prepayment assumption or when using the legal maturity approach.

Figure 7 Tranche Maturity Calculated using Baseline, zero default/prepayment and legal maturity



**Impact on RWA Result**

As a result the derived average RWA in the Research Dataset is 3.35 percentage points higher when running zero default/prepayment. Results vary widely by asset class, region and seniority.

Running zero default/prepayment assumptions and comparing with results when running a Baseline scenario, we notice the following:

- » Asset Class: The MBS Prime asset class, which is the most heavily represented asset class in our Research dataset with 366 tranches, exhibited an average RWA 3.9 percentage points higher when running zero default/prepayment compared to Baseline.
- » Region: Deals with collateral based in the Italy exhibited the greatest regional sensitivity, with an average RWA 7.6 percentage point higher when running zero default/prepayment compared to Baseline.
- » Seniority: junior tranches across all countries and asset classes are most significantly impacted with an average RWA of 3.25 percentage point higher when running zero default/prepayment compared to Baseline.

The two charts below compare the regional impact on RWA for senior and non-senior tranches when calculating maturity running a Baseline scenario, a zero default/prepayment assumption or when using the legal maturity approach.

Figure 8 RWA comparison for senior tranches using Baseline, zero default/prepayment and legal maturity

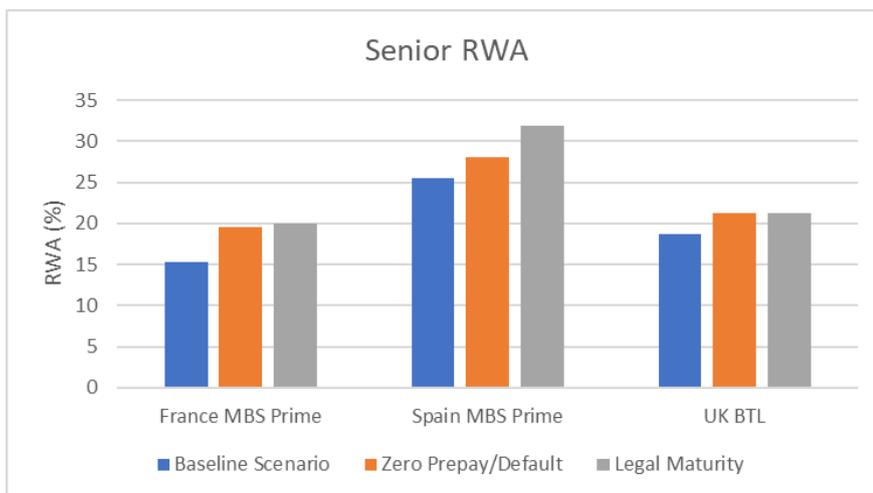
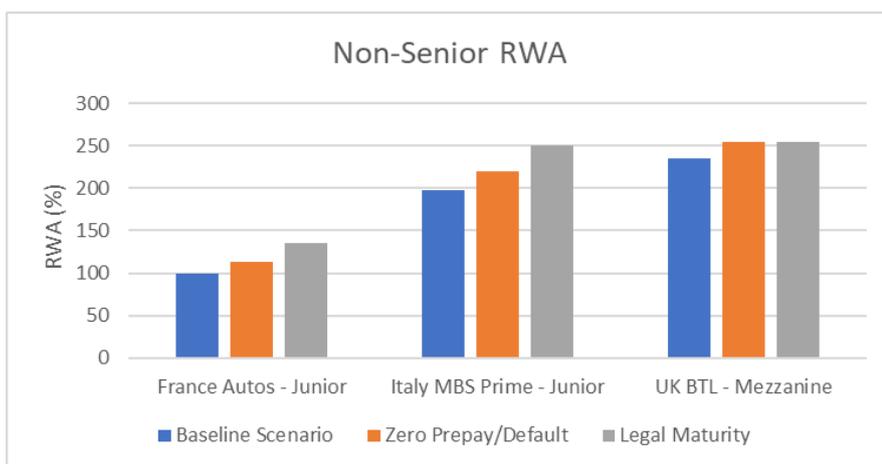


Figure 9 RWA comparison for non-senior tranches using Baseline, zero default/prepayment and legal maturity



The average RWA of a zero default/prepayment based approach is higher across various regions and assets.

To confirm that results are not driven by the choice of macroeconomic scenario, we ran the same analysis on other Moody's Analytics scenarios. On the Research Dataset, the use of a Moderate Recession scenario resulted in RWA levels 0.63 percentage points higher than a Baseline scenario, while a Protracted Slump resulted in 0.9 percentage points higher. We concluded that the choice of scenario has relatively low impact on the results.

### Summary

Banks implementing ERBA can choose to use the calculated WAM method to compute tranche maturity (WAM) using cash flow projections, in order to obtain some RWA relief in exchange for investing in the more analytical approach. We have assessed the impact on RWA of a zero default and prepayment assumption on a sample of 1000 ISINs, and it produced results that were consistently less conservative than using the Legal Maturity and consistently more conservative than a macroeconomic approach.

© 2019 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 OR IMPAIRMENT. SEE MOODY'S RATING SYMBOLS AND DEFINITIONS PUBLICATION FOR INFORMATION ON THE TYPES OF CONTRACTUAL FINANCIAL OBLIGATIONS ADDRESSED BY MOODY'S RATINGS. 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.

CREDIT RATINGS AND MOODY'S 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 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 CREDIT 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 ratings opinions and services rendered by it fees ranging from \$1,000 to approximately \$2,700,000. 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.com](http://www.moody.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.

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 ratings opinions and services rendered by it fees ranging from JPY125,000 to approximately JPY250,000,000.

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