MOODY'S INVESTORS SERVICE

RATING METHODOLOGY

Moody's Approach to Rating Structured Finance Interest-Only (IO) Securities

Table of Contents:

EXECUTIVE SUMMARY 1
INTRODUCTION 2
ASSESSING CREDIT RISK OF IOS BY IO TYPE 2
LOSS BENCHMARKS 4
MOODY'S RELATED PUBLICATIONS 6

Analyst Contacts:

NEW YORK +1.212.553.1653

Deryk Meherik +1.212.553.1075
Senior Vice President/Manager
deryk.meherik@moodys.com

Keith Banhazl +1.212.553.1485
Managing Director – Structured Finance
keith.banhazl@moodys.com

» contacts continued on the last page

MOODY'S CLIENT SERVICES:
New York: +1.212.553.1653
Tokyo: +81.3.5408.4100
London: +44.20.7772.5454
Hong Kong: +852.3551.3077
Sydney: +612.9270.8100
Singapore: +65.6398.8308

ADDITIONAL CONTACTS:

Website: www.moodys.com

This rating methodology replaces "Moody's Approach to Rating Structured Finance Interest-Only (IO) Securities" dated June 8, 2017. In the update, Moody's has changed its approach for selecting loss benchmarks when assigning ratings and for monitoring outstanding ratings of structured finance IO securities. Moody's has also made a limited number of minor edits, which do not change the substance of the methodology.

Executive Summary

Our rating methodology for interest-only securities (IOs)[1] is designed to capture both current and expected credit performance of the referenced securities or assets. A summary of the rating framework applicable to global structured finance IOs is as follows:

EXHIBIT 1

Summary of IO Type and Rating

IO Type	Rating
» IOs referencing a single bond	» Same rating as the current rating on the referenced bond
» IOs referencing multiple bonds, including WAC IOs and Support IOs referencing all bonds	» Weighted average of the current rating[A,B] of all referenced bonds based on current balances. For referenced bonds that have been written down due to realized losses, we will use the current balances grossed up by the realized losses. The rating is subject to the constraint that it would not be more than five notches above the rating of the referenced bond with lowest credit quality.
» IOs referencing a single pool	» Lowest of: (i) the highest current tranche rating on bonds that are outstanding backed by the referenced pool; or (ii) the rating corresponding to the pool's expected loss (EL), or (iii) the rating corresponding to the pool's realized loss. The rating is subject to the constraint that it would not be more than five notches above the rating that would be assigned based on an assessment of the pool's default probability[C].
» IOs referencing multiple pools	» Similar to IOs referencing a single pool with all losses calculated using weighted average of the reference pools, i.e., lowest of: (i) the highest current tranche rating on bonds that are outstanding backed by the reference pools, (ii) the rating corresponding to the weighted average of the pools' ELs based on current balances, or (iii) the rating corresponding to the weighted average of the pools' realized losses based on original balances. The rating is subject to the constraint that it would not be more than five notches above the rating that would be assigned based on an assessment of the pools' default probability.
» Planned Amortization Class (PAC) IOs	» Highest current rating of the referenced bond(s).[D]
» Support IOs referencing only bonds not referenced by the PAC IO	» C (sf)

A. Computed by taking the weighted average 10-year Idealized Cumulative Expected Loss Rates of the referenced bonds (see the Moody's Related Publications section for details) and comparing the result to the 10-year Idealized Cumulative Expected Loss Rates associated with each rating category.
B. A bond that has had its rating withdrawn because its balance has been written down to zero will be treated as having an outstanding rating equal to C (sf) and a balance equal to the sum of the write downs.
C. In pools where there is an expectation of loss resulting from one or more assets, the assessment of the default probability would typically be commensurate with Ca as this is the first rating level at which the probability of default is 100% based on Moody's Idealized Cumulative Expected Default Rates table (see the Moody's Related Publications section for details).
D. As long as the planned amortization schedule aligns with our expectations of future pool performance (principal paydowns, prepayments, recoveries, losses).

Source: Moody's Investors Service

THIS METHODOLOGY WAS UPDATED ON APRIL 5, 2019. WE HAVE AMENDED THE TITLE OF THE METHODOLOGY AND THE TITLE OF THE REPLACED METHODOLOGY. WE HAVE ALSO MADE SOME MINOR FORMATTING CHANGES.

[1] This Credit Rating Methodology is being implemented on a global basis, except in jurisdictions where certain regulatory requirements must be fulfilled prior to implementation in those jurisdictions.

All references to ratings in this methodology should be interpreted to include ratings and/or assessments of credit quality.

Introduction

A structured finance IO is a stream of cash flows that is a fraction of the interest flows from one or multiple referenced securities or assets in a structured finance transaction. Our approach to rating IOs addresses the risk of a reduction in cash flows payable to IO noteholders attributable to a deterioration of the performance of the bond(s) or pool(s) of asset(s) that the IO references. As such, our framework for rating IOs reflects the credit quality of the referenced bond(s) or asset(s).

When our rating of an IO bond addresses the credit risk associated with excess interest earned against the principal balance of specific securitization tranches/assets, and when this principal balance is zero, expected future excess interest payments are zero. As a result, in cases where the amount attributable to excess spread that is due to investors on the IO bond has been reduced to zero, either because some or all of the reference bonds or assets have been paid down and/or have incurred realized losses resulting in no further excess interest payable (WAC IO bonds in commercial mortgage-backed securitization (CMBS) transactions where interest is based on the WAC of the remaining loans in the pool, for example) or because the payment window on the IO bond has expired, we will treat the IO bond as having in effect matured and the ratings will be withdrawn. The IO rating and this methodology do not consider cash flows generated by prepayment penalties.

When applying this methodology, rating committees will consider these and additional qualitative and quantitative factors that they deem relevant when determining IO ratings, taking into account the unique circumstances and/or characteristics associated with each security.

Assessing Credit Risk of IOs by IO Type

- **IOs referencing a single bond.** The IO rating is the current rating of the bond it references when the risk to the IO holder is a direct pass-through of the credit risk of the reference bond.
- **IOs referencing multiple bonds, including WAC IOs and Support IOs that reference all bonds.** The IO bond references several or all bonds and typically receives excess interest generated (if any) by such bonds. The credit risk to the holder of this type of IO is reflected by the weighted average of the current ratings of all referenced bonds based on current balances. We compute this by taking the weighted average of the 10-year Idealized Cumulative Expected Loss Rates of the referenced bonds, and then comparing the result with the Idealized Cumulative Expected Loss Rates[2] at the same horizon. When comparing the result of the weighted average calculation to our Idealized Cumulative Expected Loss Rates, we apply our approach as set forth in the "Loss Benchmarks" section below.
- In cases where the referenced bonds have taken credit losses, the ratings on those bonds are considered to be impaired and this impairment needs to be reflected in the IO bond rating. To reflect the credit impact of write-downs after losses occur in our IO ratings, we gross up the referenced bond par balances for credit losses to ensure an appropriate weighting for the weighted average calculation. This includes bonds that have been 100% written down. For example, for a bond with a par balance of $1,000 that has experienced $200 in regular amortization and $800 in losses, we treat the bond as having a balance of $800 (instead of $0).

[2] For details, see the discussion of Idealized Probabilities of Default and Expected Losses in *Rating Symbols and Definitions* under the Moody's Related Publications section.

- In cases where the weighted average rating of the referenced bonds is more than five notches higher than the rating on the referenced bond with lowest credit quality, we would not rate the IO more than five notches higher than the referenced bond with lowest credit quality.
- Some IOs may reference different bonds over time. For example, an IO may reference securities with an original weighted average expected loss commensurate to a rating of Aa2 (sf) during the first two years, after which it references a single security with an original rating different from Aa2 (sf). In such situations, we may assign a Aa2 (sf) rating to the IO initially and disclose that when the IO begins to reference the security with initial rating different from Aa2 (sf), we will adjust the IO's rating accordingly.
- For IO PO bonds, which have both an IO component and a principal-only (PO) component, we determine the rating using a weighted average of the ratings of the two components. Unless the PO component has a more significant balance as compared to the balance of the bond referencing the IO we generally assign the weights of 95% and 5% to the IO and PO components, respectively, because the credit risk of the transaction is almost solely attributable to the performance of the IO component. In other instances where the balances are similar, we use equivalent weights.[3]
- **IOs referencing a single pool.** The IO bond references a single pool of assets and typically receives excess interest generated (if any) by such assets over amounts due to the bonds. The rating of these types of IOs is the lowest of (i) the highest current tranche rating on bonds that are outstanding backed by the reference pool; or (ii) the rating corresponding to the pool's EL; or (iii) the rating corresponding to the pool's realized losses. The rating is subject to the constraint that it would not be more than five notches above the rating that would be assigned based on an assessment of the pool's default probability[4]. This type of IO may also reference only a portion of the aggregate collateral pool (a "sub-pool"). Where the sub-pool amounts to 75% or more of the entire collateral pool, we treat the IO bond as linked to the entire pool. Where the sub-pool amounts to less than 75% of the entire collateral pool, and the collateral performance is comparable, we treat the IO bond as linked to the entire pool. However, if the performance is not comparable, we assess the IO based on the realized loss to date of the sub-pool (as a percentage of the original balance).
- IO bonds that are linked to guaranteed assets may retain the rating of the guarantor, such as Small Business Administration (SBA) IO bonds that are linked to US Government guaranteed loan assets.
- **IOs referencing multiple pools.** The IO bond references two or more pools of assets and typically receives excess interest generated (if any) by such pools of assets over amounts due to the bonds collateralized by each of the pools. This type of IO is found in US residential mortgage-backed securitization (RMBS) transactions. The ratings approach is similar to that of IOs referencing a single pool; however, a weighted average approach is used in calculating the referenced pools' future expected losses and realized losses. Specifically, the rating of these types of IOs is the lowest of (i) the highest current tranche rating on bonds that are outstanding backed by the reference pools, (ii) the rating corresponding to the weighted average of the pools' ELs based on current balances, or (iii) the rating corresponding to the weighted average of the pools' realized losses based on original balances. The rating is subject to the constraint that it would not be more than five notches above the rating that would be assigned based on an assessment of the pools' default probability. This type of IO may also reference only a sub-pool. See the "IOs referencing a single pool" section for our approach to sub-pools.

[3] The IO of IO PO bonds may reference pool(s) or bond(s).

[4] In pools where there is an expectation of loss resulting from one or more assets, the assessment of default probability would typically be commensurate with a Ca as this is the first rating level at which the probability of default is 100% based on Moody's Idealized Cumulative Expected Default Rates table (see *Rating Symbols and Definitions* under the Moody's Related Publications section for details).

- PAC IOs. This type of IO references various bonds over the life of the transaction, progressively protecting against amortization, prepayments, recoveries, and losses in that they reference fewer senior-most notes and junior-most notes over time. The rating of the PAC IO is the highest current rating of all the referenced bond(s) provided that (i) principal paydowns, recoveries, or losses have not eroded the originally planned notional balance schedule; and (ii) the reference schedule aligns with our view on future pool performance. PAC IOs are primarily used in the US CMBS market.
- Support IOs referencing only bonds not referenced by the PAC IO. This type of IO only references bonds and related excess interest proceeds not referenced by the accompanying PAC IO. Such support IOs absorb the first dollar of loss and recovery in a deal, creating extreme volatility in their cash flows which is commensurate with a C (sf) rating.

The reader should bear in mind that although we summarize the key IO types in this methodology, other IO types may exist. Our ratings are ultimately determined by a rating committee taking into account the unique circumstances and/or characteristics associated with each transaction. For example, some IOs reference both bonds and pools and we combine the methodologies described herein to rate such IOs.

In some transactions, for example in CMBS, certain IO classes are not scheduled to receive any payments until several years after transaction close. We will not rate an IO in situations in which the loan(s) or securities referencing the IO could reasonably be expected to be extinguished before the IO class receives any payments.

IO bonds will carry the rating of the credit support provider only if the guarantee covers the required full interest distribution amount that is not reduced due to credit-related reasons such as coupon reduction due to modifications or notional balance reduction due to losses.

IO ratings are subject to withdrawal for small pool in accordance with the primary methodology governing the structured finance asset class.

IO ratings will generally be C (sf) where the IO bond's coupon rate or notional balance is subject to a calculation that reduces the required interest distribution to zero, and the non-payment of interest continues for 12 consecutive months; regardless of whether payment of interest resumes.

Loss Benchmarks

In evaluating the model output for IO securities, we will use the expected loss benchmarks approach relevant to the underlying asset class as applicable. Please consult the relevant Moody's methodology for the structured finance asset class underlying an IO security for information about the loss benchmarks approach used for that asset class.

In the case of RMBS and CMBS IOs, for example, we select loss benchmarks referencing the Idealized Expected Loss table[5] using the Standard Asymmetric Range, in which the lower-bound of loss consistent with a given rating category is computed as an 80/20 weighted average on a logarithmic scale of the Idealized Expected Loss of the next higher rating category and the Idealized Expected Loss of the given rating category, respectively. For initial ratings and upgrade rating actions, the upper-bound of loss consistent with a given rating category is computed as an 80/20 weighted average on a logarithmic scale of the Idealized Expected Loss of the given rating category and the Idealized Expected Loss of the next lower rating category, respectively. When monitoring a rating for downgrade, the upper-bound of loss is computed as a 50/50

5 For details, see the discussion of Idealized Probabilities of Default and Expected Losses in *Rating Symbols and Definitions* under the Moody's Related Publications section.

weighted average on a logarithmic scale. That is, the benchmark boundaries of loss appropriate for evaluating rating category R are given by:

$$[1]\ Rating\ Lower\ Bound_R = exp\{0.8 \cdot \log(Idealized\ Expected\ Loss_{R-1}) + 0.2 \cdot log(Idealized\ Expected\ Loss_R)\}$$

$$[2]\ Initial\ Rating\ Upper\ Bound_R = exp\{0.8 \cdot \log(Idealized\ Expected\ Loss_R) + 0.2 \cdot log(Idealized\ Expected\ Loss_{R+1})\}$$

$$[3]\ Current\ Rating\ Upper\ Bound_R = exp\{0.5 \cdot \log(Idealized\ Expected\ Loss_R) + 0.5 \cdot log(Idealized\ Expected\ Loss_{R+1})\}$$

Where:

- *Rating Lower Bound$_R$* means the lowest Idealized Expected Loss associated with rating R and the expected loss range of rating R is inclusive of the *Rating Lower Bound$_R$*.
- *Initial Rating Upper Bound$_R$* means the highest Idealized Expected Loss associated with rating R that is either initially assigned or upgraded and the expected loss range of rating R is exclusive of the *Rating Upper Bound$_R$*.
- *Current Rating Upper Bound$_R$* means the highest Idealized Expected Loss associated with rating R that is currently outstanding and the expected loss range of rating R is exclusive of the *Rating Upper Bound$_R$*.
- *R-1* means the rating just above *R*.
- *R+1* means the rating just below *R*.
- The Rating Lower Bound for Aaa is 0% and the Rating Upper Bound for C is 100%. These are not derived using the formula.

Moody's Related Publications

Credit ratings are primarily determined by sector credit rating methodologies. Certain broad methodological considerations (described in one or more cross-sector rating methodologies) may also be relevant to the determination of credit ratings of issuers and instruments. An index of sector and cross-sector credit rating methodologies can be found here.

For data summarizing the historical robustness and predictive power of credit ratings, please click here.

For further information, please refer to *Rating Symbols and Definitions*, which includes a discussion of Moody's Idealized Probabilities of Default and Expected Losses, and which is available here.

» contacts continued from page 1

Analyst Contacts:

NEW YORK +1.212.553.1653

Amy Tobey +1.212.553.7922
Senior Vice President/Manager
amelia.tobey@moodys.com

NEW YORK +1.212.553.1653

Ola Hannoun-Costa +1.212.553.1456
Vice President-Senior Credit Officer/Manager
ola.hannouncosta@moodys.com

Kruti Muni +1.212.553.7989
Associate Managing Director
kruti.muni@moodys.com

Report Number: 1111179

ADDITIONAL CONTACTS:
Frankfurt: +49.69.2222.7847
Madrid: +34.91.414.3161
Milan: +39.02.3600.6333
Paris: +33.1.7070.2229