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RATING METHODOLOGY

# US Tax Lien-Backed Securitizations Methodology

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This rating methodology replaces *US Tax Lien-Backed Securitizations Methodology* published in January 2020. We added a footnote for further transparency on our approach to monitoring transactions, and we made limited editorial updates. The updates do not change the substantive approach of the methodology.

## Scope

In this methodology, we describe our approach to rating securities backed by US tax liens. Tax lien transactions typically securitize a static pool of liens levied on residential, commercial properties or land for unpaid property taxes, assessments, sewer rents, sewer surcharges, water rents and other charges imposed by a municipality. The tax liens are typically senior to all other types of liens, charges and encumbrances on the related property or land, except for pari passu and subsequent tax liens which can be senior, pari passu or subordinate to securitized tax liens based on the jurisdictions.

Local or state laws govern the creation and sale of tax liens. Depending on the laws of the jurisdiction in which the property or land is located, tax liens can be placed for sale after a tax goes unpaid for a certain period. Holders of tax liens are entitled to interest, penalties, or both on the unpaid amounts until such amounts are paid ("redeemed") by the property owner. If a property owner does not redeem the lien within a specified period from the lien's date of sale (known as the redemption period), the lienholder has the right to demand the full amounts owed under the lien through foreclosure of the property, or what we will refer to as "liquidation." Therefore, asset-backed securities (ABS) that are backed by tax liens have two potential sources of cash flows from the underlying assets: (1) redemption and (2) liquidation proceeds.

## Rating Approach

The main risk to investors in tax lien ABS is that the aggregate cash flow from the redemptions or liquidations (or both) may be insufficient to cover the principal and interest due on the ABS notes. In analyzing that risk, we conduct a portfolio analysis, including a lien-by-lien assessment of the collateral backing the securitization, assessing two scenarios:

1) a "baseline" scenario that reflects our expectations of the cash flows from the underlying collateral in the baseline economic forecast. Our baseline scenario typically assumes flat US house prices (a general proxy for property price movements) over the life of the transaction. However, the baseline scenario may use the Moody's Economy.com (MEDC) forecast, for example in periods of economic stress in order to reflect the negative environment; and

2) a "Aaa stress" scenario that reflects our expectations of the cash flows from the underlying collateral in a severely stressed economic scenario.[1]

We aggregate the lien-by-lien results for each scenario to derive the portfolio's expected loss (Portfolio EL) and Aaa Loss, respectively.

The Portfolio EL and the Aaa Loss determine the portfolio loss distribution, which we typically assume to be lognormal.[2] This loss distribution associates a probability with each potential loss scenario for the collateral portfolio. The Aaa Loss may be different from the credit enhancement that is associated with a senior tranche in a specific transaction, as the Aaa Loss does not take into account the structural features of the transaction.

In the structural analysis of the transaction, we generally use a cash flow model to assess the structural features, including the types and amounts of credit enhancement, across a discrete number of scenarios drawn from the portfolio loss distribution. In that analysis, we determine the losses, if any, that would be incurred by investors in each of those scenarios. We weight the loss to investors in each cash flow scenario by the probability of that scenario (from the derived probability distribution) to determine an expected loss for the tranche (Tranche EL). We then combine the Tranche EL with the average life of the tranche to derive a model-indicated output based on a mapping against our Idealized Expected Loss table.[3]

As with all rating methodologies, in applying this methodology, where appropriate, we consider all factors that we deem relevant to our analysis. In addition to these quantitative assessments, our rating committees also consider various qualitative factors in their analysis. These may include legal risks, servicer risk, sponsor risk, as well as other operational risks, or the risk of changes in a relevant jurisdiction's tax law. As a result, the ratings may be different than the model output.





[1] For more information, see Appendix A.

[2] For more information, see Appendix B.

[3] For more information, see the discussion of Idealized Probabilities of Default and Expected Losses in *Rating Symbols and Definitions* (a link can be found in the "Moody's Related Publications" section) and in the "Loss Benchmarks" section.

## Asset-level Analysis and Related Modeling

### Tax Lien Description and Typical Transaction Structure

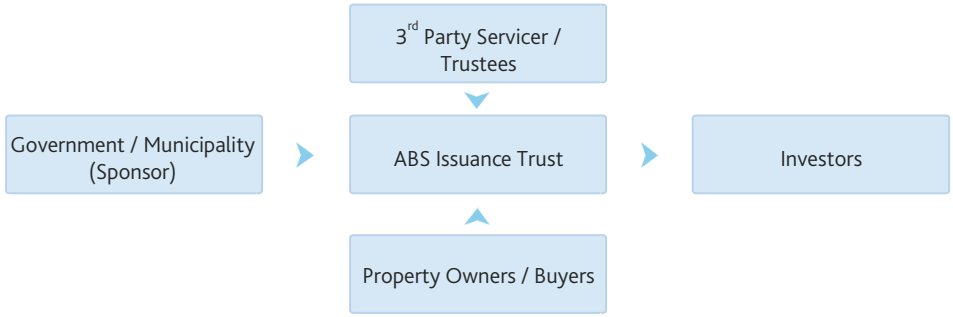
Tax liens are typically first-priority liens on property or land that arise from a government's right by law to seize property to satisfy unpaid property taxes and certain other municipal charges.

- A tax lien is typically documented by a certificate showing the face value of the amount owed and the penalty rate.
- A tax lien certificate typically represents the right to collect on unpaid taxes or charges relating to a specific calendar year. Thus, a delinquent property owner may accumulate more than one year of tax liens over time.
- Tax liens are typically senior to first-priority mortgages and judgment liens but vary in priority among themselves based on the age of the lien and state law. In the case of New York City, for example, newer tax liens are ahead of older tax liens.
- In a case where the lienholder demands the full amounts owed under a lien through initiation of foreclosure proceedings and subsequent sale of the property or land, the lowest acceptable price that would satisfy all obligations outstanding is typically the full amount, including capitalized penalty interest owed under the tax lien, plus any foreclosure expenses and any other relevant outstanding tax liens and amounts.

In a typical transaction, a special purpose vehicle issues securities and uses the proceeds to acquire tax liens sold by local government entities. The liability of the issuer is limited to the amount of collections received from the specific tax liens that are pledged as security for the bonds. Credit enhancement in transactions often includes overcollateralization, subordination, reserves and excess spread.

EXHIBIT 1

**Typical Tax Lien Transaction Structure**




*Source: Moody's Investors Service*

Investors in tax lien securitizations have two potential sources of cash flows from the underlying assets:

1) Voluntary payment typically equal to 100% of the amount owed under the tax lien, and comprising a large majority of the cash flows in tax lien ABS transactions, or
2) Involuntary payment through the liquidation proceeds derived from foreclosing on the underlying property.

In this methodology, we refer to both voluntary and involuntary payments as "redemptions." The risk to investors is that the redemption proceeds may be insufficient to cover the interest and principal due on the ABS notes. To mitigate the risk of cash flow shortfalls, the ABS notes typically have credit enhancement that may include overcollateralization, subordination, advancing, reserves and excess spread.

## Key Risks

The main sources of risk for securities backed by pools of tax liens are:

**Property Value Declines**: A decline in property or land's value heightens the risk for ABS investors for two reasons. First, it may reduce the property owner's incentive to redeem a lien, to avoid losing the property through foreclosure. Second, a reduction in the property's value – and hence in the liquidation proceeds from a foreclosure sale – would make it more likely that the proceeds will be insufficient to pay the initial lien principal balance (ILPB).

We forecast property values, after adjusting for any initial valuation haircuts, using real estate indices to update property values through the transaction's life. The change in property values impact redemption rates and recoveries upon liquidation, with higher valuations typically leading to faster redemptions and higher recovery of cash flows upon liquidation.

**Redemption Rates**: Redemptions of liens are the primary source of cash flows to repay the securities. Liens that are not redeemed, or otherwise liquidated, do not generate any cash flows for the transaction.

**Macroeconomic Cycle**: Economic conditions, as typically reflected in US house price growth, impact both the rate of lien redemption and the amount of cash flows to the transaction. During prior periods of economic contraction and housing price declines, lien redemption rates decreased.

**Timing of Cash Flows**: Long redemption timelines – either driven by foreclosure or auction processes, and/or the economic cycle – affect the amount of redemptions and recoveries available to the transaction. This impacts pool losses and the timing of the note repayment.

### Lien Characteristics and Portfolio Composition Factors

The risk in tax lien portfolios depends upon the pool composition as defined by lien characteristics and macroeconomic factors that impact the macroeconomic cycle. The following risks are some of the drivers evaluated in our rating process:

- **Lien Age**: Lien age is the time from the oldest tax delinquency to each lien's sale date, the date at which the lien is sold to the transaction. Redemption rates may vary based on lien age, depending on jurisdiction.
- **Property Type and Concentrations**: Risks to cash flows and recovery timing varies across property types – i.e., residential, commercial, or vacant land – due to their respective historical levels of valuation volatility and market liquidity. Within portfolios, higher concentrations across certain property types may impact the return and timing of cash flows to the securitization.
- **Potential Uncertainties in Property Valuation**: Property valuations are typically provided by the relevant jurisdiction. Potential uncertainties in those valuations pose a risk to the transaction. We typically apply haircuts to initial valuations to account for potential uncertainties in the jurisdiction's valuation approach.
- **Lien to Value (LTV)**: The LTV is the ratio of the lien's initial principal balance and subsequent and pari passu liens plus penalty interest accruals, to the property valuation adjusting for the initial valuation

haircut. LTV is a risk indicator as liens with higher LTVs will generally have lower redemption rates and lower recoveries.[4]

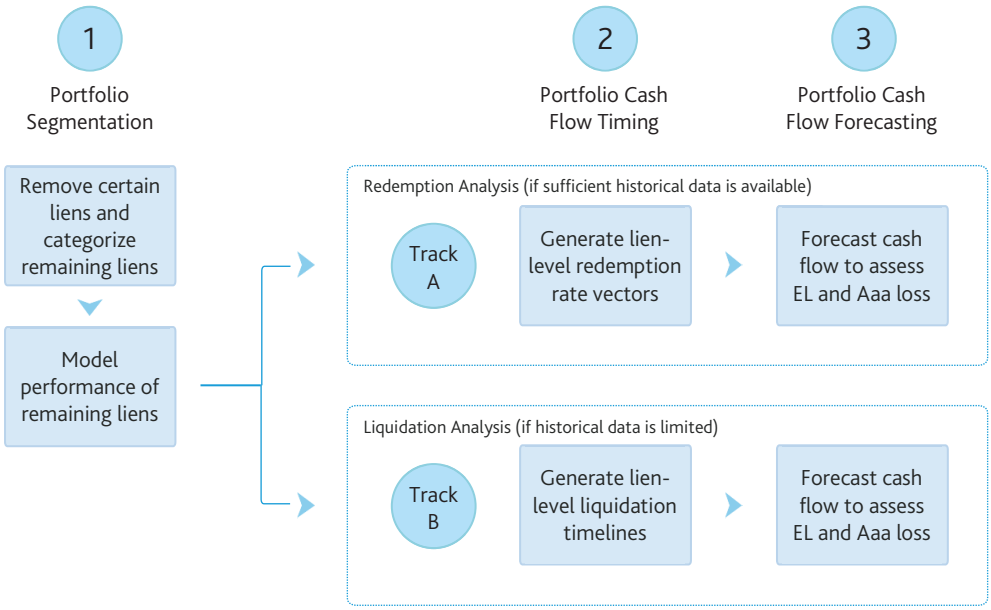
» **Geographic Concentration**: High geographic concentration in a lien portfolio exposes the portfolio to the risk of higher losses because local property price growth, economic conditions or other factors may affect redemption rates and recoveries upon liquidation in a way that differs from regional or national averages.

## Portfolio Analysis - Overview

Our portfolio analysis follows three steps: (1) portfolio segmentation, (2) cash flow timing, and (3) cash flow forecasting. Exhibit 2 below schematically presents our portfolio analysis that includes two tracks, a Redemption Analysis (track A) and a Liquidation Analysis (track B).

EXHIBIT 2

**Portfolio Analysis Schematic Overview**




*Source: Moody's Investors Service*

Redemption analysis: We apply a redemption analysis, (see track A in Exhibit 2) to estimate the redemption rates of liens. We use this analysis only if sufficient historical lien-level performance data on tax lien redemptions is available and deemed relevant to a transaction. In our redemption analysis, we consider both the voluntary payment of the lien or the liquidation of the property. If a lien does not redeem, we assume it remains outstanding through the maturity of the rated notes and therefore does not generate cash flow for the transaction.

Liquidation analysis: The liquidation analysis, (see track B in Exhibit 2) is used when we are presented with limited historical performance data and decide to assume that properties are generally liquidated. In this analysis, we make an assumption about the liquidation timing of each property type in the jurisdiction, the

[4] A simplified calculation is used for the lien to value for purposes of redemption modeling.

percentage of liens by property type liquidated, and of the liquidation proceeds for each lien given our house price forecasts.

Both analyses follow the same process. The analyses begin with (step 1) the segmentation of the initial tax lien portfolio where we identify liens that we would not expect to provide cash flows to the transaction and categorize the remaining liens by the relevant lien characteristics. For the remaining liens (step 2), we then forecast the timing of cash flows either from the redemption or liquidation analysis, and then (step 3) project asset cash flows. From this process we generate pool losses using our baseline and Aaa assumptions.

Below, we describe in further detail the analyses conducted at each step, for both the (A) redemption analysis and (B) liquidation analysis approach.

## Step 1: Portfolio Segmentation

For both analytical approaches, we first use available lien-level information (such as property type, property value, LTV and current bankruptcy/foreclosure status) to segment the tax lien portfolio into liens that we expect to not generate any cash flows versus liens that we expect to be cash flow generating. We use the following criteria to make this distinction:

### Liens That Will Not Generate Cash Flows

Liens on properties that are subject to bankruptcy proceedings, have LTV greater than 100% or property value less than the costs of liquidation or foreclosure will not generate cash flows for the transaction in our modeling approach. In the case of a bankruptcy of the property owner, the interest charged on a tax lien may be reduced ("crammed down") by the bankruptcy court.

### Liens That Will Generate Cash Flows

The remaining portion of the portfolio, i.e. liens that are expected to generate cash flows for the transaction through redemption or liquidation, are segmented by property type and jurisdiction in our modeling approach.

## Step 2: Cash Flow Timing

Depending on whether the (A) redemption or (B) liquidation analysis is applied, liens that generate cash flows are evaluated to determine the timing and amount of cash flows. Below, we describe both approaches and related assumptions.

### Redemption Timing Under the Redemption Analysis (Track A, Step 2)

Under the redemption analysis in Exhibit 2, track A, step 2, we model liens using a Cox proportional-hazard rates model (CPM) to forecast the proportion of liens that redeem (redemption rate) at each point in time under the assumption that they will otherwise remain outstanding. For this redemption analysis, we use lien-level data and issuer vintage performance data. The approach is calibrated on independent variables, namely lien age, LTV, and macroeconomic factors (US house prices) as the predicative variables.[5]

The long-term mean cumulative redemption rate is informed by issuer vintage redemption rates for the baseline. Redemption rates may be higher or lower than the historical long term mean. The cumulative redemption rates are typically lower than 100%, i.e. we assume that a portion of the liens will not be redeemed.

[5] Lien age is typically not considered in the case of vacant land, and the log of property value is used in lieu of LTV, where property values are updated by house price appreciation (HPA).

The redemption rate is formulated as a standard hazard function[6]:

FORMULA 1

$$h(t \mid X_{i,t}) = h_0(t)\, exp\big( X_{i,t} \cdot \beta \big)$$

Where:

» The resultant partial likelihood function is maximized over $\beta$, the model parameters.

» $X_{i,t}$ is the independent factor (i.e., lien age, LTV, HPA,[7] property value).

*Source: Moody's Investors Service*

And, the cumulative redemption rate, $R$, is given by:

FORMULA 2

$$R(t \mid X_{i,t}) = 1 - \exp\left( - \int_0^t h(s|X_{i,s})\, ds \right)$$

*Source: Moody's Investors Service*

## Liquidation Timing Under the Liquidation Analysis (Track B, Stage 2)

When the historical data provided by an issuer is not sufficient to calibrate a redemption model, and the data from other comparable jurisdictions is not directly relevant or cannot be transposed, we typically apply a liquidation analysis to the portfolio. In this analysis, liens are assumed to be liquidated based on our liquidation timeline assumptions.

We specify liquidation timelines for each lien type based on property classification (residential, commercial or vacant land) to project the period in which proceeds can be expected. These timelines account for foreclosure sale timeline restrictions and guidelines as provided in the liquidation timelines below.[8]

### LIQUIDATION TIMELINES

For residential properties, we follow time-to-foreclosure assumptions that are similar to the assumptions we use in our approach to rating US residential mortgage-backed securities. We typically differentiate between US states with judicial and non-judicial foreclosure processes, where the time to foreclosure will be longer for properties in judicial states than for properties in non-judicial states.[9]

For commercial properties, we use historical commercial property foreclosure timing data by jurisdiction as well as historical tax lien auction timing data, if available, to inform the time to liquidation and apply a stress to the timeline to account for the time needed to initiate the auction or liquidation process.

For vacant land, we use historical auction data, if available, to inform the time to liquidation, and we may stress according to the experience or process for the property's jurisdiction.



6 Cox, David R (1972). "*Regression Models and Life-Tables," Journal of the Royal Statistical Society, Series B. 34 (2): 187–220.*"

7 For model estimation, HPA typically refers to the national housing price index as may be represented by the National Association of Realtors Median Sales Price of Existing Single-Family Homes.

8 See Appendix A for indicatives ranges of liquidation timeline.

9 Judicial states are those states in the US where the foreclosure process is handled by the state's court system. The foreclosure process in those states takes longer than in non-judicial states where properties are foreclosed without court intervention.

## Step 3: Cash Flow Forecasting

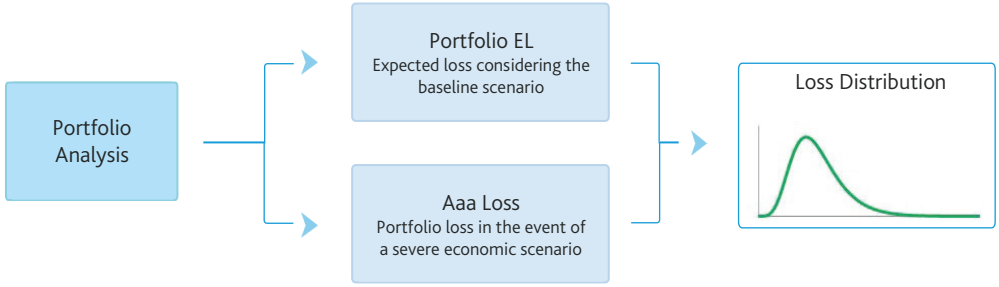
We project cash flows from the portfolio of liens across a number of scenarios, where the HPA, property stress declines and liquidation timelines are interpolated between the baseline and Aaa assumptions. These are used to calculate the scenario losses and to parameterize a lognormal distribution. We define the lien-by-lien cash flow, or "net redemption cash flow," as the lower of the initial lien principal balance plus accrued penalty interest (i.e., promised cash flow) and the forecasted property value adjusted for subsequent, pari passu liens and accrued penalty interests.[10]

We typically calculate the forecasted property value by applying a property valuation haircut to the lien's initial property value to account for the uncertainty of initial valuations.[11] This adjusted property value is then forecasted over the life of the transaction using either the house price appreciation or property price decline as specified for each scenario. (See "Appendix A: Assumptions" for details.)

We calculate the portfolio loss on the portfolio of liens for each of the scenarios. We define a loss as the difference between the discounted, forecasted lien cash flow for each scenario and the discounted value of the promised cash flow. The discounted losses are then used to calibrate an asset loss distribution based on the probabilities of each scenario in a lognormal distribution as illustrated in Exhibit 3 below.

EXHIBIT 3

**Portfolio Analysis**




*Source: Moody's Investors Service*

Below, we describe how we generate cash flows for the redemption and liquidation analyses. While both analyses use the same cash flow calculations, differences arise due to the forecasted timing of those cash flows, e.g. the timing of cash flows based on the redemption hazard model in the redemption analysis versus prescribed timing of cash flows in the liquidation analysis, as well as the severity implied by the different scenario stress under the redemption analysis or the liquidation analysis.

### Forecasting Pool Cash Flows Under the Redemption Analysis (Track A, Step 3)

We use the redemption analysis to determine periodic cash flows under each scenario. The cash flows for each period are the product of the periodic redemption rates, as per track A, step 2, and the net redemption cash flow for that period.

[10] Foreclosure costs are assumed to be part of the combined effects of the initial haircut and property stress declines.

[11] Initial valuations are typically provided by the municipality and not by a third-party appraiser, the valuation methods may vary by jurisdiction. Some examples include using an income approach for commercial properties, or a comparable sales approach for non-commercial properties.

### Forecasting Pool Cash Flows Under the Liquidation Analysis (Track B, Step 3)

We employ the liquidation analysis to derive cash flows available after liquidating each property or land backing the liens per the liquidation timeline described in track B, step 2. The cash flows are subject to a cap assumption on the cumulative liquidation percent determined for each property type, in order to reflect the fact that we expect to receive less than 100% of cash flows.[12] The caps were derived from historical redemption rates from the worst performing vintage and may be informed by additional data and adjusted to reflect differences between jurisdictions. The cash flow on the liquidation date for each lien is the net redemption cash flow.

To account for the risk of recessionary declines in property values, we generally apply stress declines to the property value after adjusting for the property valuation haircuts.[13] The stress ranges take into consideration factors such as market liquidity, geographic concentration and macroeconomic conditions.

## Structural Analysis and Liability Modeling

### Cash Flow Model

In the structural analysis of a tax lien ABS transaction, we typically use cash flow modeling to assess the cash flows projected from either the redemption or liquidation analysis onto the liability structure. This analysis typically considers all the operational and financing costs for servicing the pool of liens; these costs can be substantial and contribute to losses on the notes. As part of this analysis, we determine the expected loss of the ABS notes, which we use in conjunction with the note's average life. Our final rating may be different from the model output, as necessary, to incorporate risks that are not explicitly modeled in the cash flow model.

### Expected Loss of the ABS Notes

To determine the expected loss of an ABS note, we pass the asset cash flows generated in step 3 (above) to a liability model containing the structural payment priorities and rules for each scenario. The liability modeling is used to derive the loss to investors resulting from each scenario of the loss distribution. The model weights each loss scenario with the corresponding probability of the loss scenario, as determined previously in step 3, to calculate the note's expected loss. We combine the note's EL with a calculated average life to derive the model-indicated output based on a mapping against our Idealized Expected Loss table.[14]

Our liability modeling typically incorporates specific structural features, such as priority of payments, subordination, other forms of credit enhancement, triggers, servicing fees and other relevant elements.

### Loss Benchmarks

In evaluating the model output for tax lien ABS transactions subject to this methodology, we select loss benchmarks referencing the Idealized Expected Loss table[14] 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



[12] By construct, the liquidation analysis is expected to lead to lower cumulative pool cash flow compared to the redemption analysis.

[13] For more information, see Appendix A.

[14] For more information, see the discussion of Idealized Probabilities of Default and Expected Losses in *Rating Symbols and Definitions*. A link can be found in the "Moody's Related Publications" section.

of loss is computed as a 50/50 weighted average on a logarithmic scale. That is, the benchmark boundaries of loss appropriate for evaluating rating category *R* are given by:

FORMULA 3

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

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

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

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 $Rating\ Upper\ Bound_R$.

» $R\text{-}1$ 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.

*Source: Moody's Investors Service*

## Other Considerations

### Legal Risks

#### Legal Risks Relating to Tax Liens – Conformity with State Law

State law governs tax lien sales. We review whether a tax lien securitization is structured to ensure that the tax liens, notice requirements, tax lien auctions, bidding methods, redemption periods, and servicer processes with respect to foreclosure initiation conform to relevant state law.

#### Legal Risks Relating to the Securitization Structure

We assess legal risks which may affect the expected losses posed to investors. In particular, we consider the potential legal consequences of whether the issuer is bankruptcy remote. We review legal opinions at closing to help inform our views on the key legal risks identified in a transaction.

### Bankruptcy of the Sponsor

We analyze whether the issuer will have full and timely access to the securitized receivables following the bankruptcy of the sponsor. Specifically, we consider whether the issuer will have a valid ownership or security interest that it can enforce during the sponsor's bankruptcy.

We thus assess the likelihood that the bankruptcy proceeding of a sponsor will delay or reduce the payments on the bonds. The degree to which the securitization has protection against these risks determines the extent to which its ratings can be higher than those of the sponsor's own rating.

### Bankruptcy Remoteness of the Issuer

We analyze whether the issuer is bankruptcy remote such that the likelihood of (1) a bankruptcy filing by or against it; or (2) substantive consolidation – that is, the pooling of the issuer's assets and liabilities with those of a bankrupt affiliate – is so low that it has no rating impact.[15]

If we determine that the issuer is not bankruptcy remote, we assess the potential rating impact on a case-by-case basis according to the likelihood of bankruptcy and the possible negative consequences for noteholders.

## Liquidity Risk

In our structural analysis, we analyze whether the available liquidity support in the transaction is sufficient to cover senior transaction expenses, such as lien administration expenses and interest on the bonds. Liquidity support is often provided by a liquidity facility, a cash reserve, or both. Liquidity facilities are generally provided by highly rated banks or other financial institutions.[16]

## Servicer Risk

In analyzing tax lien securitizations, we assess the ability of the servicer (or servicers) to perform many roles in the transaction, which vary from transaction to transaction and may include billings, collections, administration of foreclosures and real estate owned (REO) management. The servicer's ability depends on its familiarity and understanding of local laws regarding tax liens and foreclosure processes. In addition, we evaluate the risk posed by a potential bankruptcy of the servicer as part of our operational risk analysis, and any disruption or dislocation arising from a servicing transfer following a servicer financial stress.

## Sponsor Risk

We assess operational risk to analyze risks relating to transaction sponsors. The sponsor of a tax lien securitization, or an affiliate, generally makes representations and warranties regarding the tax liens sold to the securitization trust. It is generally obligated to buy back defective liens which have breached those representations and warranties. As part of our analysis, we examine the magnitude of the buyback obligations and the creditworthiness of the sponsor in fulfilling those representations and warranties and in performing its buyback obligations.



[15] For more information on how we assess bankruptcy remoteness, a link to a list of our sector and cross-sector methodologies can be found in the "Moody's Related Publications" section.

[16] For more information, see our cross-sector methodology that describes our general approach for assessing counterparty risks in structured finance transactions. A link to a list of our sector and cross-sector methodologies can be found in the "Moody's Related Publications" section.

### Environmental, Social and Governance Issues

Environmental, social and governance (ESG) considerations may affect the ratings of the transaction. Transactions that have high collateral concentrations in certain regions, such as the southern counties of Florida and California, may have material exposures to the effects of natural disasters, including hurricanes, wild fires and earthquakes. Uninsured damage caused by natural disasters can reduce property values and, in extreme cases, result in losses.

Since environmental events are not correlated with economic cycles, property value depreciation following a natural disaster is unlikely to exceed the projected depreciation in our stressed scenario. In addition, we adjust our stressed scenario projection to account for geographic concentration.

If, for a particular transaction, we determine that the exposure to natural disasters is not adequately addressed in our modeling approach, we will evaluate the risk in accordance with our cross-sector methodology that describes our general principles for assessing ESG issues.

## Monitoring

### Transaction Performance

We generally apply the key components of the approach described in this report when monitoring transactions, except for those elements of the methodology that could be less relevant over time, such as the review of the legal structure.

We typically receive periodic data on transaction-specific performance which we use to monitor transactions. We may give more weight to performance information for seasoned transactions, in particular when redemptions and bankruptcies or foreclosures are higher or lower than expected.

When monitoring the performance of outstanding tax lien ABS, we consider the performance of the underlying collateral, developments regarding the servicer and other participants in the transaction, and the amount and form of credit enhancement. The starting point is typically the monitoring of the collateral performance relative to our initial expectations.

Performance metrics that we typically track are the charge-off and redemption rates for the transaction, as well as the level of bankruptcies and foreclosures. We also take into account any material changes in the macroeconomic environment that could affect future performance. If we observe material changes in any of these factors, we may perform a more detailed analysis, potentially including modeling the transaction with updated and revised inputs.[17]



[17] For example, in methodologies where models are used, modeling is not relevant when it is determined that (1) a transaction is still revolving and performance has not changed from expectations, or (2) all tranches are at the highest achievable ratings and performance is at or better than expected performance, or (3) key model inputs are viewed as not having materially changed to the extent it would change outputs since the previous time a model was run, or (4) no new relevant information is available such that a model cannot be run in order to inform the rating, or (5) our analysis is limited to asset coverage ratios for transactions with undercollateralized tranches, or (6) a transaction has few remaining performing assets.

## Pool Size

We will not assign nor maintain ratings on tax lien securitizations with the following characteristics:

» For transactions that do not have support mechanisms, such as credit enhancement floors or reserve fund floors: once the underlying pool has decreased to an effective number[18] of obligors of 75[19] or below

» For transactions with reserve fund or credit enhancement floors that partially compensate for the increased exposure to single obligors: when the underlying pool has decreased to an effective number of obligors of 50[20] or below

However, we will make exceptions for securities with ratings that do not rely on our assessment of individual obligor creditworthiness, such as those that benefit from a full and unconditional third-party guarantee, whether at pool or note level,[21] or for securities that benefit from full cash collateralization.



[18] The effective number is a measure of the pool diversity that looks beyond the nominal number of obligors in a pool to take into account the actual size of their liens and express this number in terms of equally sized exposures. $Effective\ Number\ of\ n\ Obligors$=1/$\sum_{i=1}^{n}$(Wi)^2 where $Wi$ is the weight of obligor i in the total pool.

[19] If we cannot obtain the effective number, we will use a threshold of 130 obligors instead. If we cannot obtain the effective number of obligors, we will use the effective number of liens instead.

[20] If we cannot obtain the effective number, we will use a threshold of 90 obligors instead.

[21] However, for structured finance securities with full support from a financial guarantor, if the financial guarantor's rating is below investment grade, we would expect to withdraw the rating of the security after withdrawing its underlying rating.

# Appendix A: Assumptions

## Redemption Analysis

### Macroeconomic Scenarios

The redemption analysis as described under track A above uses a forecast of house price growth rates to project redemption rates and property valuations. We use the forecasts for the baseline and Aaa scenarios.

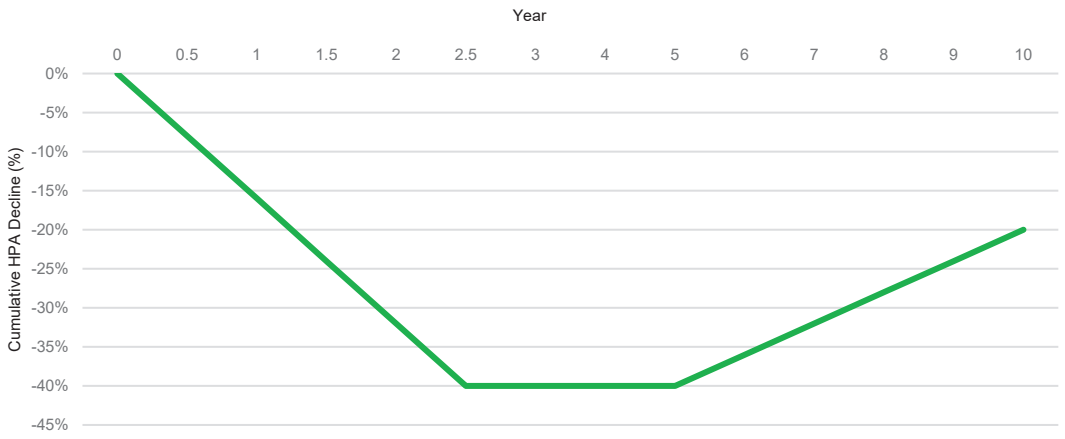
### House Price Appreciation (HPA)

In the baseline scenario, we generally assume that property prices remain flat over the life of the transaction. In periods of economic stress, we may use the Moody's Economy.com (MEDC) forecast in order to reflect the negative environment.

In the Aaa stress scenario, we use an HPA scenario consistent with the Aaa scenario in our approach to rating US residential mortgage-backed securities. We use this stress assumption for all types of properties accounting for the high level of geographic concentration as is typical of tax lien portfolios. This implies prices decline by 30% to 60% (depending on the portfolio concentration and property type, as well as consideration of historical price declines in the related jurisdictions) over a 30-month period, remain flat at their respective trough for the next 30 months and then increase back to the levels at the time of analysis by month 180.

EXHIBIT 4

**Illustrative HPA Aaa Scenario for a Concentrated Pool**




*Source: Moody's Investors Service*

## Baseline Cumulative Redemption Rates

The redemption analysis as described under track A above uses a baseline cumulative redemption rate to project redemption rates for each property type. The baseline assumption for each property type is informed by issuer vintage historical long-term cumulative redemption rates by property type. This implies that non-redeemed liens will not generate cash flows and may contribute to asset losses.

## Property Valuation Haircuts

We typically apply haircuts to the property values provided by the jurisdiction. These haircuts account for uncertainties that may be due to the initial valuation, which may employ limited appraisals. These haircuts vary by property type while considering the jurisdiction, local economy, market liquidity, amongst other considerations. The exhibit below provides the ranges of haircuts considered by property type.

EXHIBIT 5

**Indicative Property Valuation Haircuts**

| | Residential | Commercial | Vacant Land |
|---|---|---|---|
| Haircut | 0-5% | 15-25% | 15-30% |

*Source: Moody's Investors Service*

## Liquidation Analysis

### Liquidation Rate Caps

The liquidation analysis as described under track B above caps cumulative cash flow obtained from the liquidation of the portfolio by property type. Cash flows are subject to a cap on the cumulative liquidation percent determined for each property type, as historical experience highlights that not all properties redeem or are liquidated. The indicative caps are specified in the exhibit below, and may be adjusted to reflect differences between jurisdictions.

EXHIBIT 6

**Indicative Liquidation Rate Caps**

| Residential | Commercial | Vacant Land |
|---|---|---|
| 80% | 75% | 70% |

*Source: Moody's Investors Service*

## Property Valuation Haircuts and Stress Declines

We typically apply haircuts to the property values provided by the jurisdiction. This haircut accounts for uncertainties that may be due to the initial valuation, which may employ limited appraisals. These haircuts are similar to the valuation haircuts used in the redemption analysis and vary by property type as shown in the exhibit below.

EXHIBIT 7

**Indicative Property Valuation Haircuts**

| | Residential | Commercial | Vacant Land |
|---|---|---|---|
| Haircut | 0-5% | 15-25% | 15-30% |

*Source: Moody's Investors Service*

To account for the risk of recessionary declines in property values in the Aaa scenario, we apply stress declines to the property value (after adjusting for the property valuation haircuts.) These stress declines along with the property valuation haircuts are given in the exhibit below and provide the means to account for the liquidation of properties and associated costs inclusive of those under foreclosure.

EXHIBIT 8

**Indicative Property Aaa Stress Declines**

| | Residential | Commercial | Vacant Land |
|---|---|---|---|
| Decline | 30-60% | 45-55% | 60-75% |

*Source: Moody's Investors Service*

The ranges for stress declines allows for adjustments to account for different geographical regions, portfolio concentrations, asset quality and property types. For residential properties, we would typically use a 30% decline for a diversified portfolio and up to a 60% decline for a pool that is fully concentrated in one MSA, per our RMBS rating methodology. For commercial and vacant land, the stress decline would be specific to the pool and jurisdiction considering market liquidity, property uses, local economy among other considerations.

## Indicative Liquidation Timelines

We specify liquidation timelines that account for foreclosure sale timeline restrictions and guidelines as provided below. Such timelines may be adjusted to reflect differences amongst jurisdictions.

EXHIBIT 9

**Liquidation Timeline for Baseline and Aaa Scenarios**

| | (Months) | | | |
|---|---|---|---|---|
| | Residential + Judicial | Residential + Non Judicial | Commercial | Vacant Land |
| Baseline | 36 | 24 | 24 | 60 |
| Aaa | 50 | 36 | 50 | 72 |

*Source: Moody's Investors Service*

## Appendix B: Lognormal Distribution

We use the two outputs, Portfolio EL and Aaa Loss, from our portfolio analysis to determine a collateral loss distribution. This distribution specifies the probability of each potential future loss scenario for the portfolio:

» Portfolio EL: assumed to be the median central tendency of the lognormal loss distribution

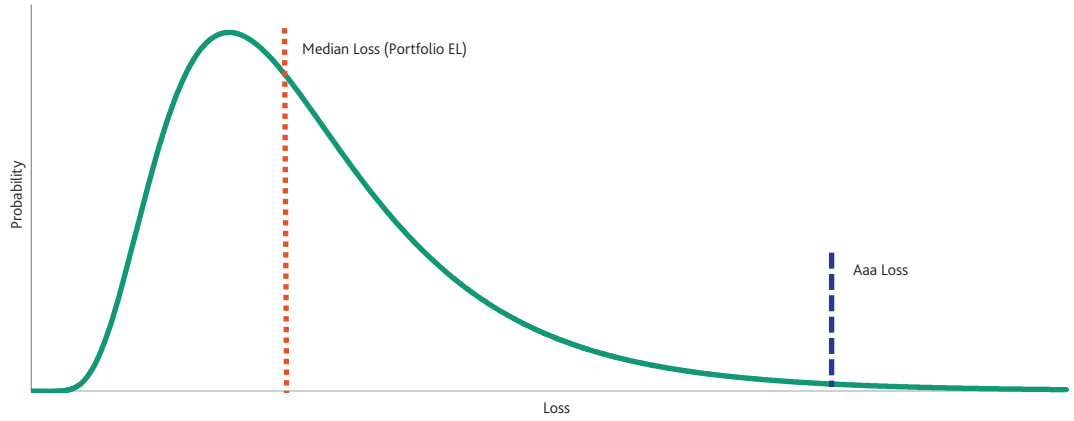
» Aaa Loss: defined as the subordination of a theoretical synthetic senior tranche targeting a rating equal to the Aaa for the transaction

» We then find the lognormal distribution which satisfies the following two conditions: (i) its median is equal to the Portfolio EL, and (ii) the expected loss above the Aaa Loss point (and in consideration of the censoring described above) is equal to the loss associated with the Aaa level from our idealized expected loss tables evaluated at the appropriate horizon.

The horizon used for calibrating the loss distribution is generally given by the average time at which principal dollars will be generated by the pool.

EXHIBIT 10

**General Shape of the Lognormal Loss Distribution**




*Source: Moody's Investors Service*

## Moody's Related Publications

Credit ratings are primarily determined through the application of 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. A list 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.

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