MOODY'S
INVESTORS SERVICE

RATING METHODOLOGY

US Property Assessed Clean Energy (PACE) Securitizations Methodology

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This rating methodology replaces *US Property Assessed Clean Energy (PACE) Securitizations Methodology* published in March 2021. We clarified our approach on guarantees in the "Pool Size" section, and we made limited editorial updates.

Scope

This rating methodology applies to securities backed by US Property Assessed Clean Energy (PACE) assessments.

In this methodology, we explain our approach to assessing credit risks for securities backed by US Property Assessed Clean Energy (PACE) assessments secured by first-ranking property liens.[1]

The methodology generally applies to PACE transactions in which at least 75% of securitized assessments are levied on residential properties and no single securitized assessment exceeds $1 million. The $1 million limit ensures that the portfolio is reasonably granular, even with PACE assessments secured over commercial properties. We typically apply these threshold tests at the time of transaction closing, taking account of prefunded acquisitions, if applicable.

We discuss the asset and liability analysis, including associated modeling, as well as other considerations. We also describe our monitoring approach.

[1] For transactions including primarily PACE assessments on commercial properties, see our methodologies for rating transactions backed by commercial real estate assets. A link to a list of our sector and cross-sector methodologies can be found in the "Moody's Related Publications" section.

Rating Approach

In this section, we describe the key characteristics of the assets and transaction structure, and we summarize our approach to assessing credit risks for securities backed by PACE assessments, including quantitative and qualitative factors that are likely to affect rating outcomes in this sector.

Overview

Under our rating approach, we first perform a lien-level analysis of the PACE assessments portfolio to derive a loss distribution that associates a probability with each potential future loss scenario. We then typically use a cash flow model to assess the structural features of the transaction based on a discrete number of scenarios drawn from the portfolio loss distribution.

The ratings we assign may differ from the model outputs to reflect our qualitative analysis of certain risks. For example, we incorporate the risk of property owners or government agencies taking legal action in relation to PACE origination practices.

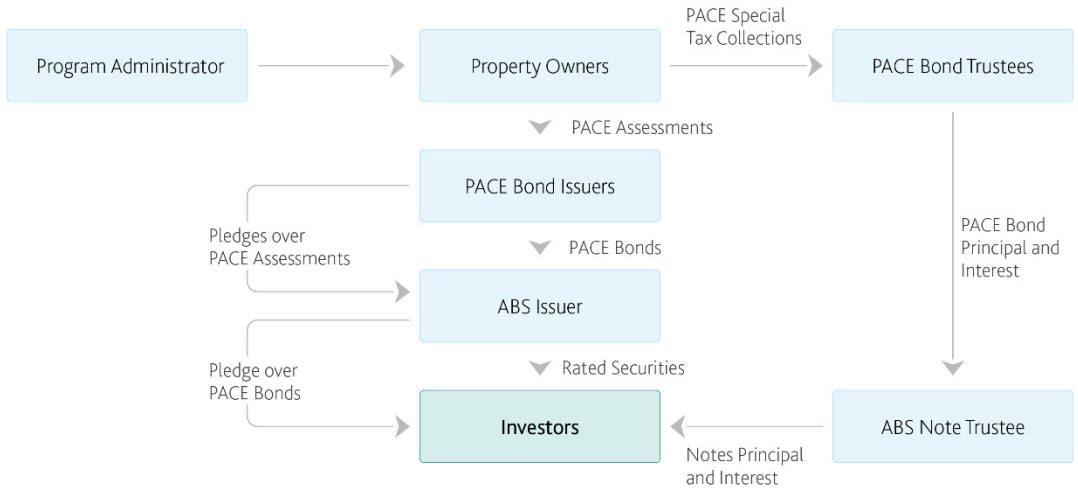
As with all rating methodologies, in applying this methodology, we will, where appropriate, consider other factors that we deem relevant to our analysis. For example, if actual performance or performance trends are not in line with the assumptions described in this methodology, we will reflect that in our analysis.

PACE Assessment Description and Typical Transaction Structure

PACE assessments are voluntary special taxes levied by local governments under state-approved programs for financing eligible upgrades to buildings, such as environmentally friendly home improvements. They accrue interest and typically amortize over a 5- to 30-year period. PACE programs are marketed to property owners by private companies appointed as program administrators by local governments. Property owners make PACE payments to county or municipal tax collectors along with general property taxes, and PACE assessments are secured by first-ranking property liens, except in the case of prior existing PACE assessments which could rank ahead of the securitized assessment. Unlike typical mortgage loans, PACE assessments do not accelerate upon foreclosure. Instead, PACE liens "run with the land," and delinquent PACE assessments are paid from foreclosure sale proceeds while the outstanding PACE assessments pass to the new property owners.

In a PACE transaction, a special purpose entity (SPE) issues securities and uses the proceeds to acquire PACE bonds issued by local government entities. PACE bonds are limited recourse obligations; the liability of the PACE bond issuer is limited to the amount of collections received from the PACE assessments that are pledged as security for the bonds.

EXHIBIT 1
Typical PACE Transaction Structure



Source: Moody's Investors Service

Key Risks

The key risks that we evaluate as part of our asset-level quantitative analysis include (1) default on PACE assessments and (2) a severe decline in property values.

A PACE assessment will default if the property owner fails to make scheduled PACE payments and the unpaid amounts are not covered by a mortgage servicer advance.

If a PACE assessment defaults, we generally assume the PACE bond issuer will foreclose. Any encumbrances that run with the land (including outstanding PACE assessments, delinquent PACE assessments and taxes, subject to applicable state laws) will affect how much the new buyer is willing to pay for the property because they will assume the relevant obligations. If, as a result of significant property price depreciation, these encumbrances (plus foreclosure costs) exceed the amount the buyer would otherwise be willing to pay, the PACE bond issuer would need to reduce the PACE balance to facilitate a sale of the property, resulting in a loss to the transaction.

Additional key drivers of risk that we evaluate include:

» Transaction Structure. Specific features, such as cash flow allocations, forms of credit enhancement and cash-trapping mechanisms, affect the expected loss for each tranche of securities. When modeling the transaction, we aim to capture the main structural features described in the transaction documentation.

» Legal Aspects. We assess potential legal risks arising from PACE assessments, in particular, risks of litigation by property owners or government agencies if PACE assessments on residential properties (R-PACE) are not originated in compliance with applicable consumer protection laws. In addition, we consider risks with respect to the assignment of the assets to the special purpose entity (SPE), bankruptcy remoteness of the SPE, and other jurisdiction-specific issues (e.g., commingling risk, set-off risk).

» Counterparty Risk/Operational Risk. Our assessment focuses on the risks posed by the main counterparties in a transaction such as servicer, cash manager, swap provider, and any associated structural mitigants, such as counterparty replacement triggers.

Asset-level Analysis and Related Modeling

In this section, we explain how we analyze the underlying assets that back PACE securitizations and how we estimate potential losses on those assets.

Overview

We use a default model and a severity model to determine a probability of default and loss given default for each PACE assessment, based on the characteristics of each property owner and of each property, and our assumptions about the future macroeconomic environment.

Portfolio Expected Loss and Portfolio Stressed Loss

The results of our asset-level analysis are an expected loss (Portfolio EL) and stressed loss (Portfolio SL) for the portfolio.

» The **Portfolio EL** reflects the loss we expect the portfolio to incur under the baseline economic projections (baseline scenario). When estimating the Portfolio EL, we generally use the baseline forecasts of local metropolitan statistical area (MSA)-level property price indices, such as the Home Price Appreciation index (HPA) provided by Moody's Economy.com (MEDC).

» The **Portfolio SL** reflects the loss we expect the portfolio to incur in the event of a severe economic stress scenario (stressed scenario), with adjustments for the concentration of the portfolio and a floor of 2% Portfolio SL.

We use the same general approach to derive both the Portfolio EL and the Portfolio SL; the primary difference is the economic assumptions we use in the model. In the stressed scenario, we reflect in our property value assumptions the realized MSA-level price changes from the loan origination date to the analysis date, as provided by MEDC. However, we cap any appreciation at 2% per year, meaning we do not give credit if prices have appreciated more than that. If prices have declined, we account for the full extent of the decline without any floor. We assume that individual property values have followed that path from the closing date of their respective loan to the analysis date. We then assume that individual property values follow the stressed local house price path into the future.

The measures of portfolio concentration that can directly affect the Portfolio SL do not affect the Portfolio EL. This is because concentration introduces correlated risks and increases our uncertainty regarding ultimate portfolio performance, but it does not directly impact the level of losses we expect as a central tendency of the portfolio.

We use the Portfolio EL and Portfolio SL to construct a portfolio loss distribution, which we typically assume to be lognormal. The lognormal loss distribution associates a probability with each portfolio loss scenario. (See Appendix A.)

PACE Assessments on Commercial Properties

In general, we apply the same modeling approach for PACE assessments levied on commercial properties (C-PACE) as for those levied on residential properties (R-PACE). In particular, we generally apply the same criteria for estimating:

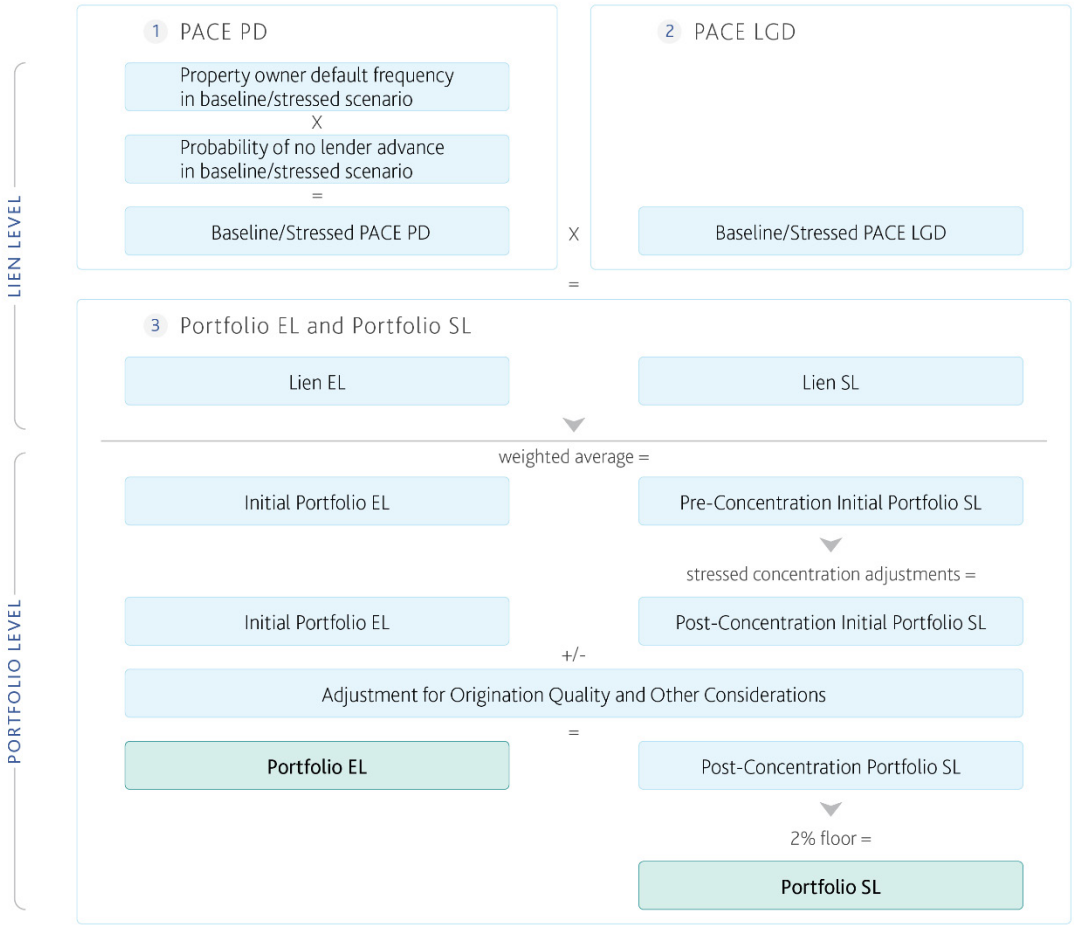
» property values, except: (1) we apply a reduction to property valuations derived from automatic valuation models (AVMs) rather than appraisals, typically 5%-20% for R-PACE and 15%-25% for C-PACE, and (2) in our stressed scenario, we apply a further 20% reduction to our assumed commercial property values at the point of our analysis.

» property owner default frequency, except that we use a FICO score assumption of 570 for all C-PACE.

Portfolio EL and Portfolio SL

We describe our asset analysis to derive the Portfolio EL and Portfolio SL of a portfolio consisting of PACE assessments using the following three steps (see Exhibit 2).

EXHIBIT 2
Deriving the Portfolio EL and Portfolio SL



Source: Moody's Investors Service

Step 1: PACE PD

In our first step to derive the Portfolio EL and Portfolio SL, we determine the probability of default (PACE PD) for each PACE assessment in the baseline and stressed scenario.

We calculate the PACE PD as the product of (a) the property owner default frequency and, (b) if there is a mortgage on the property, the probability that the mortgage servicer will not advance for delinquent PACE payments.

STEP 1.A: PROPERTY OWNER DEFAULT FREQUENCY

Properties with mortgages: For PACE assessments on properties with mortgages, we assume the property owner default frequency equals the probability that the property owner will default on the mortgage payments. As the available lien-level information for PACE transactions is usually more limited than for residential mortgage-backed securities (RMBS), we determine the probability that the property owner will default on their mortgage by using four key characteristics, namely (1) FICO score typically at the time of

PACE origination or if no FICO score is available, we assume a FICO score of 570, (2) combined loan-to-value ratio (CLTV) at the time of PACE origination, (3) type of mortgage loan – government-sponsored enterprise (GSE) loan or non-GSE loan – and (4) time since mortgage origination - in conjunction with the historical performance of loans in the national mortgage databases, as described in Exhibit 3.

We calculate CLTV at the time of PACE origination as the lesser of (1) 100% and (2) the sum of the PACE assessment, any other existing liens and the mortgage loan divided by the property value. To account for factors beyond these key characteristics, such as the term to maturity and credit spread at origination, we typically multiply the default frequency in the stressed scenario by 150% but without exceeding 100% default frequency.

Properties without mortgages: For PACE assessments on properties without mortgages, we generally assume that the property owner has a well-seasoned non-GSE mortgage loan and a CLTV equal to the original PACE balance divided by the property value at the time of PACE origination. We use these assumptions, together with the property owner's FICO score at the time of PACE origination, to determine the property owner default frequency in the same manner as for assessments on properties with mortgages. In the absence of a FICO score, we assume a FICO score value of 570.

EXHIBIT 3

Property Owner Default Frequency

1. We extracted two sets of historical performance data from the national mortgage databases: one for GSE loans and the other for non-GSE loans. We divided these two data sets into four seasoning categories: zero to two years; two to four years; four to six years; and six years or more.
2. For every loan type (GSE or non-GSE) and seasoning category, we determined the cumulative default frequency for each monthly cohort. The monthly cohort with the highest cumulative default informs our stressed scenario for the relevant loan type and category. The cohort with the median cumulative default informs our baseline scenario for that loan type and category.
3. For each loan type, seasoning category and scenario (baseline or stressed), we ran regressions with FICO and CLTV as dependent variables to estimate model parameters for predicting default frequencies.
4. For each PACE assessment in a transaction, default frequencies in the baseline and stressed scenarios are predicted using model parameters that are specific to the loan type and seasoning category. For the stressed scenario, we assume the property owner default frequency equals the lesser of (i) the model-derived default frequency multiplied by 150%, and (ii) 100%.

Source: Moody's Investors Service

Additional considerations: We do not consider the combined default frequency of two successive owners of the same property. In our baseline scenario, we assume that no more than one owner will default on a particular PACE assessment. In our stressed scenario, we assume that, even if two successive owners default, the likelihood of both defaults resulting in a loss on the PACE assessment is negligible; since the LTV for PACE assessments is typically small, such an outcome would require a very severe property value depreciation before the first default, followed by a further depreciation prior to the second default.

STEP 1.B: PROBABILITY OF MORTGAGE SERVICER NOT ADVANCING UNPAID PACE PAYMENTS

We assume a mortgage servicer will advance for delinquent PACE payments if it expects to achieve a positive recovery through mortgage foreclosure. A servicer will expect a positive recovery if, at the time of liquidation, the property value exceeds the sum of (i) the outstanding PACE balance; (ii) PACE interest and property taxes to accrue during the mortgage foreclosure period, and (iii) anticipated foreclosure costs. We assume the servicer will advance for the amounts described in (ii) to avoid any penalties.

When performing the calculation of the probability of no advance, we:

1. Assume that almost all defaults occur within five years from the point of our analysis.
2. Determine property values as described in the "Property Value Movements from PACE Origination to the Point of Default or Liquidation" section and the "Property Values at PACE Origination" section.
3. Calculate or estimate property taxes to accrue during the foreclosure period.
4. Estimate the costs of legal action and auction sales according to the property location. Our legal cost assumption is higher for judicial states, reflecting the additional costs associated with court proceedings. Judicial states are states where the mortgage foreclosure process is conducted through the state's court system. The foreclosure process in judicial states takes longer than in non-judicial states.
5. Use historical data on mortgage foreclosures to inform our assumptions regarding time to foreclosure, differentiating between (i) judicial and non-judicial states and between (ii) GSE and non-GSE loans, and applying different assumptions for our baseline and stressed scenarios.

For properties without mortgages, the probability of no servicer advance is set to 100% because there is no mortgage servicer.

Step 2: PACE LGD

The second step is to model the loss given default (PACE LGD) for each PACE assessment in the baseline and stressed scenarios. We generally assume that any loss will result from a voluntary reduction of the PACE balance by the PACE bond issuer in connection with a PACE foreclosure, and that the reduced PACE balance will be paid in full by successor property owners. We estimate the PACE LGD using Exhibit 4.

EXHIBIT 4

PACE LGD

$$PACE\ LGD = \max\left[\frac{(P + I + T + IP + FC - PV)}{P}, 0\right]$$

Where:

- P : outstanding PACE balance at the time of default
- I : delinquent PACE interest at the time of liquidation
- T: delinquent property taxes at the time of liquidation
- IP : interest and penalties that accrue on delinquent taxes up to liquidation
- FC : foreclosure costs
- PV : property value at the time of liquidation, determined as described in the "Property Value Movements from PACE Origination to the Point of Default or Liquidation" section and the "Property Values at PACE Origination" section

Source: Moody's Investors Service

When performing the PACE LGD calculation , we apply the criteria numbered 1-5 in Step 1.B above and in addition:

1. We assume that for PACE assessments on properties with mortgages, the property value at the time of default will have fallen to the point where the mortgage servicer declines to advance for delinquent PACE payments.
2. For properties with GSE mortgages, we increase our assumed foreclosure period by seven years to account for the risk that, under the federal foreclosure bar, the Federal Housing Finance Agency may withhold consent to a PACE-related foreclosure while acting as conservator.

Step 3: Portfolio EL and Portfolio SL

After calculating the PACE PD and PACE LGD in the baseline and stressed scenarios, we multiply them to determine the lien-level expected loss (Lien EL) and the lien-level stressed loss (Lien SL) for each PACE assessment, as shown in Exhibit 5.

EXHIBIT 5

Lien EL and Lien SL

$$Lien\ EL = \ PACE\ PD_{baseline} \times PACE\ LGD_{baseline}$$

$$Lien\ SL = \ PACE\ PD_{stressed} \times PACE\ LGD_{stressed}$$

Source: Moody's Investors Service

We then derive a portfolio-level loss in each baseline and stressed scenario as the weighted average Lien EL and Lien SL, where the weights are based on each PACE assessment's share of the portfolio. For the baseline scenario, this calculation gives the model-derived Initial Portfolio EL and, for the stressed scenario, it gives the Pre-Concentration Initial Portfolio SL, as shown in Exhibit 6.

EXHIBIT 6

Initial Portfolio EL and Pre-Concentration Initial Portfolio SL

$$Initial\ Portfolio\ EL = \frac{\sum Lien\ EL\ \times PACE\ Balance}{Portfolio\ Balance}$$

$$Pre-Concentration\ Initial\ Portfolio\ SL = \frac{\sum Lien\ SL\ \times PACE\ Balance}{Portfolio\ Balance}$$

Source: Moody's Investors Service

Next, we adjust the Pre-Concentration Initial Portfolio SL to account for the portfolio's concentration, as shown in Appendix B. We additionally account for geographic concentration in our property value projections, as described in the "Property Value Movements from PACE Origination to the Point of Default or Liquidation" section. Concentration is defined with respect to property owner and geographic concentration, with the latter considered at the ZIP code and MSA level.

We may adjust the Initial Portfolio EL and Post-Concentration Initial Portfolio SL to reflect our origination quality assessment and other considerations. We show these adjustments in Exhibit 7.

EXHIBIT 7

Portfolio EL and Post-Concentration Portfolio SL

$$Portfolio\ EL = \ Initial\ Portfolio\ EL \times Adjustment_{baseline}$$

$$Post-Concentration\ Portfolio\ SL = \ Post-Concentration\ Initial\ Portfolio\ SL \times Adjustment_{stressed}$$

Source: Moody's Investors Service

Finally, the Portfolio SL is given by the greater of the Post-Concentration Portfolio SL and a floor of 2%, as shown in Exhibit 8. The purpose of the floor is to account for risks that may not be fully incorporated in our model-based analysis, such as the relatively limited performance history of PACE assessments.

EXHIBIT 8

Portfolio SL

$$Portfolio\ SL = \max(Post - Concentration\ Portfolio\ SL, 2\%)$$

Source: Moody's Investors Service

Our final assumptions on the Portfolio EL and Portfolio SL may differ from the model outputs as we may consider other qualitative and quantitative factors in our analysis. For example, we may consider the results of historical performance data or benchmarking analysis against comparable portfolios.

Origination Quality and Other Adjustments

As indicated above, when calculating the Portfolio EL or Portfolio SL, we may make adjustments to account for origination quality and other considerations under Exhibit 7. When assessing origination quality, we generally review the program administrator's underwriting guidelines, the past performance of PACE assessments originated by the administrator, and its policies and practices that could affect future PACE performance. For transactions with multiple administrators, we will assess the origination quality of each administrator.

Our adjustments for origination quality typically range from a 10% reduction to a 50% increase in our Initial Portfolio EL and Post-Concentration Initial Portfolio SL. We may increase the adjustments to account for other aspects of a PACE transaction that may impact the PACE performance, such as the servicing arrangement, and may determine different adjustments for the baseline and stressed scenarios.

Property Value Movements from PACE Origination to the Point of Default or Liquidation

We estimate property value at a future point of default or liquidation.

We first estimate the property value at the point of our analysis (the analysis value) as follows:

(1) In the baseline scenario, we typically take the value at PACE origination and apply the realized MSA-level HPA as provided by MEDC up to the analysis date.

(2) In the stressed scenario, we apply the same approach as for the baseline scenario, except that we cap the MSA-level HPA at 2% per year, meaning we do not give credit to the extent that prices have appreciated more than that. If prices have declined, we would account for the full extent of the decline without any floor. We also reduce the analysis value for commercial properties by 20%.

(3) We then project future price movements to obtain assumed indexed property values at the point of default or liquidation as follows:

   (3.1) In the baseline scenario, we use forecast data on HPA indices at the MSA-level provided by MEDC. These forecasts are updated on a monthly basis. To achieve stability in our Portfolio EL estimates, we typically use the average of the six most recent forecasts.

   (3.2) In the stressed scenario, we assume that from the time of our analysis forward, the analysis value declines by 30% to 60% (depending on the geographic concentration of the portfolio) over a 30-month period, remains flat for the following 30 months, gradually rises over the following 120 months to the analysis value, and then continues to appreciate at 3% per year.

The initial value decline is determined based on the geographic concentration of the portfolio, as described in Exhibit 9.

EXHIBIT 9

$$Value\ decline\ over\ the\ first\ 30\ months = \frac{(0.60 + (MIN[EN(MSA), 30] - 1)] * 0.2897)}{MIN[EN(MSA), 30]}$$

Where:

EN(MSA) : effective number[2] of MSAs. See Appendix B for a definition of the effective number of MSAs.

Source: Moody's Investors Service

Hence, if the portfolio is located in one MSA, we stress local property prices by a 60% decline; if the portfolio has 30 or more effective MSAs, we stress local property prices by a 30% decline; and if the portfolio has an intermediate number of effective MSAs, the local property decline is given by an average decline, which assumes that one MSA has a 60% decline and all other MSAs have a 28.97% decline. For example, if the effective number were two, we would assume an average decline of 44.5%.

In both the baseline and stressed scenarios, we apply a haircut to the indexed property value at the point of default or liquidation according to the type of mortgage and degree of leverage at the time of default. Historical mortgage loan data suggests that properties financed by different types of mortgages tend to achieve different sale proceeds as a fraction of their indexed value. For PACE assessments on properties without mortgages, we generally assume that non-GSE mortgages financed them. For properties with mortgages, we base the leverage at default on the mortgage loan balance; for properties without mortgages, we base it on the PACE balance.

We assume a positive correlation between the degree of leverage (mortgage LTV) and the gross recovery rate (that is, the realizable rate as a percentage of the indexed property value), so the higher the leverage, the lower the haircut we apply.[3] We floor the gross recovery rate at 25% and cap it at 94%.

We may make further adjustments for residential properties to account for other factors, such as occupancy and property types. In the absence of available information on properties in the portfolio, we generally (1) assume each of them is a second home; and (2) apply suitably conservative assumptions on the portfolio's composition by property type.

Property Values at PACE Origination

Appraised Valuations

When the property value at PACE origination is a formal appraisal valuation, we use it directly as the property value at PACE origination.

Automated Valuations

When the property value at PACE origination is based on an automated valuation model (AVM) rather than an appraisal, we estimate a property value at PACE origination (PV_t) as described below.

[2] See the explanation for the effective number in the "Pool Size" section.

[3] This assumption is supported by historical data. For more information, see the Moody's Related Publications section.

For properties with mortgages, we estimate PV_t as follows:

EXHIBIT 10

$$PV_t = MAX[MIN\ (MV_t, AVM\ Cap), AVM\ Floor]$$

Where:

MV_t : mortgage-implied property value at PACE origination, which we determine by projecting MV_o to the PACE origination date using the observed MSA-level HPA indices

MV_o : mortgage-implied value at mortgage origination, which we determine using MB_o in combination with LTV_m. If mortgage origination dates are unavailable, we apply a suitably conservative assumption.

MB_o : either (1) actual mortgage balance at mortgage origination or (2) if this is not available, an assumed mortgage balance as of mortgage origination, which we obtain by reverse-amortizing the mortgage balance from PACE origination to mortgage origination on the basis of a 30-year term and a mortgage interest rate equal to the median rate for similar mortgages in the national mortgage databases

LTV_m : median loan-to-value derived from national mortgage data for the relevant mortgage origination year and FICO category of the property owner, which is based on the property owner's FICO score at PACE origination

AVM Cap : the AVM value at PACE origination after applying a haircut.

AVM Floor : the AVM value at PACE origination after applying a haircut.

Source: Moody's Investors Service

To assess the AVM Cap, we reduce the AVM value by a haircut which typically ranges from 5% to 20% for R-PACE and 15% to 25% for C-PACE. The AVM Cap is determined at each property level. In determining the appropriate haircut for each PACE assessment, we consider relevant information for assessing the quality of the AVM valuations, such as the capabilities and performance records of the valuation model provider, the existence of regulations on the use of AVM valuations, and any validation or evaluation process established by the program administrators.

To assess the AVM Floor, we reduce the AVM value by a haircut which typically ranges from 20% to 40% and which is not lower than the haircut applied in the AVM Cap calculation. In the AVM Floor calculation, the same haircut is applied to all PACE assessments.

For properties without mortgages, we estimate PV_t as follows:

EXHIBIT 11

$$PV_t = \text{MAX}[\text{MIN}(PCV_t, AVM\ CAP)\ , AVM\ Floor]$$

Where:

PCV_t : PACE-implied property value at PACE origination, which we determine using PB_t in combination with PTV_m

PB_t : original PACE balance for the relevant property

PTV_m : average PACE-to-value (i.e., PACE balance divided by property value) for properties with mortgages, which we determine using PB_t and PV_t (as defined above) for properties with mortgages

AVM Cap : see Exhibit 10

AVM Floor : see Exhibit 10

Source: Moody's Investors Service

If there are other prior existing PACE liens on a property, we make downward adjustments to the property value (PV_t) estimated as described above to account for their impact on PD and LGD. The adjustments are expressed as a haircut to property values to account for the increment in CLTV caused by other PACE liens.

Structural Analysis and Liability Modeling

In this section, we explain how we analyze the structural features of a PACE securitization, including how we model and allocate cash flows to different classes of securities, taking into account asset cash flows and available credit support.

Overview

When we complete our portfolio analysis, we analyze the transaction structure, cash flow waterfall and level of credit protection available to the relevant tranches to determine their ratings. We typically use a cash flow model to assess the major features of a transaction's liability structure in conjunction with asset performance.

The cash flow model incorporates asset performance assumptions on loss timing and prepayments. It also incorporates transaction-specific structural features such as capital structure, priority of payments, credit enhancement, liquidity support, portfolio performance triggers, and servicing fees.

We base the rating of each tranche on the expected loss (tranche EL) that investors could incur by the legal final maturity. The tranche EL considers both the probability and the severity of credit losses that investors could incur.[4]

To determine the tranche EL, the cash flow model calculates the loss to investors resulting from each portfolio loss scenario of the collateral loss distribution. The model then weights each loss with the corresponding probability of loss scenario and aggregates the weighted losses to calculate the tranche's expected loss. We combine the tranche EL with the average life of the tranche to derive the model-implied output based on a mapping table, Moody's Idealized Cumulative Expected Loss table.[5]

Cash Flow Analysis

The cash flow analysis captures nuances in the structure, such as excess spread, triggers, and loss allocation, all of which influence the cash flows (and losses) to the securities. The primary input for the cash flow analysis is the collateral loss distribution obtained from the asset analysis and modeling, as described earlier.

We use a discrete number of portfolio loss scenarios defined by the collateral loss distribution as inputs to our cash flow model, along with different prepayment and loss-timing assumptions, to determine the sensitivity of our ratings to various scenarios. We typically use 12 combinations of these assumptions for each loss point. The scenarios combine three loss-timing curves and four prepayment curves. Depending on the circumstances specific to a particular transaction, we may run more or fewer scenarios or scenarios different from those we describe below, including some delinquency scenarios.

Loss Timing

Typically, for each loss point that we input in the cash flow model, we apply the three loss-timing scenarios in Exhibit 12: front-ended, base, and back-ended. These curves represent the relative temporal distribution of the loss under that scenario. For our cash flow modeling, we typically assume that all recoveries on defaulted PACE assessments will be realized at the time of the property liquidation and that no subsequent assessment payments will be made.

[4] For more information, see *Rating Symbols and Definitions.* A link can be found in the "Moody's Related Publications" section.

[5] For more information, see the "Loss Benchmarks" section.

EXHIBIT 12

Loss-Timing Assumptions

Percentage of total losses incurred by year since issuance

Year	Front-Ended	Base	Back-Ended
1	8%	3%	0%
2	35%	20%	4%
3	29%	25%	22%
4	15%	20%	25%
5	7%	15%	18%
6	4%	9%	13%
7	1%	5%	11%
8	1%	3%	7%
Total	100%	100%	100%

Source: Moody's Investors Service

Prepayment Rates

We typically run multiple prepayment scenarios to simulate the potential timing of realized prepayments. First, we determine a base-case prepayment rate for the transaction from which we derive prepayment timing curves that we apply over its life. Exhibit 13 shows the four prepayment timing curves for a base-case prepayment rate of 20%. Our base-case prepayment rate assumption for a particular transaction is based on historical data and pool characteristics. We may also assume a higher base-case prepayment rate to limit the benefit given in the model to excess spread. We model incremental yearly changes in prepayment rates corresponding to monthly increases throughout the year.

EXHIBIT 13

Example of Prepayment Timing Curve for 20% Prepayment Rate

Year	Back	Flat	Drop	Climb
1	18%	20%	15%	20%
2	15%	20%	10%	22%
3	12%	20%	10%	24%
4	8%	20%	10%	25%
5	7%	20%	10%	27%
6	8%	20%	10%	27%
7	10%	20%	10%	27%
8	12%	20%	10%	27%
9	13%	20%	10%	27%
10	13%	20%	10%	27%

Source: Moody's Investors Service

Liquidity Risk

We analyze whether the available liquidity support in the transaction is sufficient, as borrower payments may be received as infrequently as annually. We evaluate structural features that address timely payment of interest and principal such as a combination of principal and interest borrower collections for the transaction waterfall, servicer advancing, reserve funds or liquidity facilities.[6] We may also stress the level and timing of delinquencies in the analysis to assess liquidity risk.

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

Rating Committee Considerations

The model generates cash flow and losses for the relevant asset-backed security (ABS) in various scenarios. Rating committees review the model outputs based on Moody's Idealized Cumulative Expected Loss table[7] and consider the dispersion of model outputs in various scenarios. If the model outputs include no more than two different ratings and the ratings are not more than one notch apart, then rating committees typically consider the mode of the model outputs. If the outputs show a tie, then rating committees commonly consider the lower of the two outputs. Rating committees assess all other model outputs on a case-by-case basis.

Model outputs are one factor considered by rating committees, which may make qualitative adjustments to the outputs when merited. In addition, rating committees may make further quantitative adjustments to model inputs to consider other factors that we deem relevant to our analysis.

Commingling Risk

Tax authorities of US counties or municipalities collect PACE assessments together with ad valorem property taxes and periodically remit the collections to PACE bond issuers. Typically, multiple counties and municipalities collect PACE assessments in a PACE transaction. If they are permitted to commingle collections with their general funds pending remittance to the PACE bond issuers, the default of a county or municipality may result in a loss or delay of cash flows to the investors.

We model commingling risk per our cross-sector methodology on assessing counterparty risks in structured finance transactions, typically subject to the following assumptions:

» The probability of commingling loss is given by the weighted average rating (or credit estimate[8]) of the three largest counties or municipalities, as determined by their relative share of PACE assessments in the securitized portfolio at the time of transaction closing. If any of the three largest counties or municipalities is unrated or rated lower than A3, we may perform additional analysis.

» The percentage of the portfolio that will be commingled is based on six-month collections of a fraction of the portfolio corresponding to the minimum of: (i) the aggregate percentage of the three largest counties or municipalities at closing and (ii) 50%. We determine the three largest counties or municipalities according to the portfolio composition at closing, taking account of expected or actual prefunded acquisitions, if applicable. The maximum exposure depends on both the amount of securitized PACE assessments within the county or municipality and the frequency of both scheduled PACE installment payments by property owners and remittance payments by the county or municipality to the PACE bond issuer.

Prefunding

In PACE transactions with prefunding, some of the issuance proceeds are set aside in a prefunding account used to purchase additional PACE bonds during a prefunding period. Our prefunding assumptions are transaction-specific, based on an administrator's historical portfolio mix, consistency in originations and constraints on the characteristics of additional loans in the transaction. For transactions with multiple administrators, we will assess these factors for each administrator. We consider the prefunding eligibility criteria, such as limits on property type, geographic concentration and FICO scores. We also consider restrictions on the percentage of C-PACE assessments.

[7] For more information, see the "Loss Benchmarks" section.

[8] In this methodology, references to the ratings of counties or municipalities include credit estimates. For more information, see our cross-sector methodology on the use of credit estimates. A link to a list of our sector and cross-sector methodologies can be found in the "Moody's Related Publications" section.

We generally assume that additional PACE bonds will be acquired near the end of the prefunding period. We may run "non-acquisition" scenarios in which amounts deposited in the prefunding account are used to repay outstanding asset-backed securities on the last day of the prefunding period.

Loss Benchmarks

In evaluating the model output for PACE transactions, we select loss benchmarks referencing the Idealized Expected Loss table[9] 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 weighted average on a logarithmic scale. That is, the benchmark boundaries of loss appropriate for evaluating rating category *R* are given by:

EXHIBIT 14

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

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

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

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.

Source: Moody's Investors Service

[9] 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.

Other Considerations

Along with our asset, structural and liability analysis, we consider other quantitative and qualitative factors in our credit analysis such as legal risks, transaction counterparties, reliability and completeness of historical and portfolio data, and environmental, social and governance (ESG) considerations.

Legal Risks

We assess potential legal risks that may affect the expected losses to investors. In particular, we consider (1) the risk of litigation by property owners or government agencies, (2) the possibility of a successful challenge to the constitutionality of PACE programs, (3) specific legal risks applicable to C-PACE, (4) the robustness of the transaction's legal structure, and (5) the bankruptcy remoteness of the issuer. Considering these risks, we may position ratings at lower levels than we would in other instances.

Risk of Litigation by Property Owners or Government Agencies

If R-PACE assessments are not originated in compliance with applicable consumer protection laws, property owners or government agencies, such as the Consumer Financial Protection Bureau (CFPB), may pursue legal action with potentially negative consequences, such as damage claims reducing cash flows to investors in securities backed by PACE assessments. We generally assign ratings below Aaa to account for this risk as described below.

For each PACE transaction, we determine a level of confidence in the likelihood and potential consequences of successful PACE-related legal challenges by property owners or government agencies ("legal confidence").

Our assessment of legal confidence primarily involves consideration of (1) the degree of certainty regarding the application of consumer protection laws to PACE in the relevant state(s); and (2) the administrator's origination practices. We may also consider other relevant factors, including transaction-specific features such as credit enhancement to cover damage claims.

APPLICATION OF LEGAL REQUIREMENTS TO PACE

A lack of certainty regarding the legal requirements for PACE presents the risk that PACE program administrators may inadvertently violate laws and regulations. However, uncertainty regarding the application of certain legal requirements to PACE has minimal impact on our analysis when there is little chance that the consequences of violating those requirements could lead to a disruption in transaction cash flows, or when we expect the requirements will be complied with. The violation of certain consumer laws may, for example, give rise to liability for PACE administrators only (in which case, successful claimants will not be entitled to reduce the payments they owe to PACE bond issuers).

We generally do not assign Aaa ratings to securities backed by PACE assessments unless:

» with respect to any consumer law requirements that, based solely on the wording of the relevant provisions, apply or may apply to the securitized PACE assessments, there is very high legal certainty (derived from the relevant provisions, market practice over a long-term period and/or PACE-specific appellate court precedents) regarding whether and how they apply to PACE; or

» to the extent this certainty is lacking, there is very high confidence that the application of such requirements to PACE would not have adverse consequences for investors. For example, when the origination of all R-PACE assessments in a securitized portfolio is governed by PACE-specific state or federal laws requiring administrators to conduct ability-to-pay checks, disclosures to property owners and background checks on contractors, we may have very high confidence that the PACE administrator will be motivated to implement responsible origination standards such that any consumer protection

laws prohibiting broad types of conduct – such as unfair, abusive or fraudulent acts - will not be violated, despite uncertainty regarding whether or how those laws apply to PACE.

The widespread adoption of certain market practices for a sustained period and without any non-frivolous legal challenges can provide legal certainty on the application to PACE of consumer laws that prescribe specific requirements, such as the making of disclosures. However, we generally do not use market practices as a source of certainty for the application of consumer protection laws prohibiting broad types of conduct – such as unfair, abusive or fraudulent acts – as even a long period of settled market practice may not provide certainty on the application of these laws to PACE.

Lower rating levels may tolerate greater legal uncertainty. For example, provided there are PACE-specific laws prescribing ability-to-pay, disclosure and contractor-vetting standards with respect to a sufficient percentage of the securitized portfolio (the threshold percentage), the degree of legal certainty may be consistent with a particular broad rating category despite uncertainty as to whether any particular consumer protection laws apply to PACE.

We determine separate threshold percentages for Aa and single-A rating categories on a transaction-specific basis according to the quality of the administrator's origination practices (see the "Administrator's Origination Practices" section). For Aa ratings, the threshold percentage typically ranges from 85% to 95%, and, for single-A ratings, it typically ranges from 25% to 70%. When the quality of the administrator's practices is at or only marginally above the minimum required standard for investment-grade ratings, the threshold percentages lie at the higher end of each range. Conversely, when the quality of the administrator's practices materially exceeds the required minimum standard for investment-grade ratings, the threshold percentages lie at lower levels within each range. If for a particular transaction we establish that the threshold percentage for a broad rating category is satisfied, we then determine a specific rating level within that category as being consistent with the legal certainty for the transaction. We base this determination on whether and by how much the threshold percentage is exceeded.

PACE assessments on commercial properties generally count toward satisfaction of the threshold percentage, regardless of the properties' location. However, we may exclude C-PACE assessments from the count if legal developments or transaction-specific characteristics suggest heightened consumer protection risks exist.

We do not apply the threshold percentage continuously; rather, barring a significant shift in the composition of the securitized portfolio, we apply them at the transaction closing only (accounting for expected or actual prefunded acquisitions, if applicable).

ADMINISTRATOR ORIGINATION PRACTICES

We evaluate the administrator's origination practices in various ways, such as a comprehensive operational review of the administrator's policies and procedures, the administrator's experience and track record over a suitable period, and in consideration of a lien-level third-party diligence report (TPR) if available. For transactions with multiple administrators, we will assess the origination quality of each administrator. Our assessment of origination practices may affect the ratings we assign. We generally do not assign investment-grade ratings to securities backed by PACE assessments, unless:

» the program administrator has adequate policies and procedures for implementing any applicable PACE-specific state or federal laws;

» the administrator has policies and procedures for (1) determining that customers have a reasonable ability to make PACE payments, (2) disclosing the key features of PACE assessments, including the potential effect on refinancing or selling properties and (3) performing reasonable background checks on contractors; and

» a TPR confirms adequate compliance with the administrator's policies and procedures, or an equivalent verification of the administrator's practices provided by a reputable third party. If a TPR does not review all of the assessments in the transaction, the size of the review sample and the methodology the firm used to select it to determine the effectiveness of the review. We would, for example, consider a randomly selected sample computed using at least a 95% confidence level, a 5% precision level and a 5% assumed error rate as an adequate sample.

Constitutionality of PACE

We assess whether each PACE statute complies with applicable laws. Specifically, we consider whether state courts will recognize that PACE liens rank ahead of pre-existing mortgage loans and run with the land following the property foreclosure. In this regard, we review transaction-related legal opinions and court validation rulings, as appropriate.

In our legal analysis, we generally assume there is no realistic prospect that a mortgage lender will successfully claim that a PACE statute is unconstitutional under federal law. This assumption is based on relevant court precedent and the legitimate public purpose underlying PACE legislation.

Commercial PACE Legal Risks

A key legal consideration for C-PACE assessments is whether mortgage lender consent or acknowledgment is required, and if so, if it has been obtained before the property owner receives the PACE financing. Commercial mortgage loan agreements generally prohibit property owners from incurring additional indebtedness on the property that is senior to the mortgage, and many expressly prohibit the incurrence of PACE debt.

We typically assess whether the transaction is exposed to a risk of litigation or foreclosure action being brought by the mortgage lender due to a lack of lender consent or acknowledgment. We may consider, for instance, the following factors: (1) if the transaction documents require lender consent or acknowledgment to be obtained for C-PACE assessments included in the portfolio, and (2) if a TPR or an equivalent report by a reputable third party confirms adequate compliance with the administrator's policies and procedures related to obtaining lender consent or acknowledgment concerning C-PACE assessments.

Potential environmental issues affecting the subject property are another risk for C-PACE assessments. The discovery of previously unknown contamination can cause a property value to decrease significantly and subject property owners and lenders to liability for clean-up costs. In addition, the government could restrict future uses of the property. In assessing whether these risks are sufficiently mitigated, we may consider, for instance, the following factors: (1) if the transaction documents require an environmental report (e.g., a Phase 1 environmental site assessment or similar report) to be provided or an environmental insurance policy to be issued on the commercial properties; (2) if an environmental report will be ordered before initiating foreclosure proceedings, and if the foreclosure will not be initiated if such report indicates any environmental issue that could result in liability to the issuer; and (3) if a TPR or an equivalent report by a reputable third party confirms adequate compliance with the administrator's policies and procedures regarding environmental reports and insurance policies.

Transaction Legal Structure

We assess whether, in the event of the bankruptcy of a PACE bond issuer, the securitized PACE assessments may be available to satisfy the claims of its general creditors. Our risk analysis may include a review of the security arrangement and substantive consolidation legal opinions rendered by transaction counsel.

Bankruptcy Remoteness of the ABS Issuer

We analyze whether the ABS 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. If we determine that the ABS 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 investors.[10]

Counterparty Risks

We consider and integrate various counterparty-related risks at different stages throughout our credit analysis. More specifically, the risks we consider include hedge counterparties, operational risks, commingling risk, account banks and set-off risk (as applicable).[11]

Operational risks can arise from various potential sources, including disruption to cash flows caused by the financial distress of a service provider to the PACE transaction. As part of our analysis, we consider the financial disruption risk and the roles of servicers, cash managers, calculations agents, trustees, administrators and similar parties.

In particular, our operational risk analysis accounts for the impact of servicing arrangements on securitization performance. For PACE transactions, servicing activities include (i) maintaining databases on the PACE assessments and providing reports, (ii) submitting PACE payment amounts to local governments for inclusion on property tax bills, (iii) tracking delinquencies and mailing notices to delinquent property owners, (iv) modifying PACE assessments, and (v) initiating foreclosure proceedings if necessary. Multiple parties typically perform these functions. For example, the assessment administrator may be responsible for the first three functions listed above, the program administrator (usually an affiliate of the sponsor) may be responsible for modifications, and the PACE securities issuer may be responsible for initiating foreclosure proceedings. Such proceedings are often performed by outside foreclosure counsel.

We typically evaluate whether the relevant parties have demonstrated an ability to perform their servicing functions over a certain period. Transaction parties proactive in loss mitigation can help reduce liquidation timelines, minimize expenses, and maximize recoveries for PACE securitizations.

In addition, we generally assess servicing arrangements such as the servicing fee structure, advancing requirements, servicer oversight, and criteria for modifying PACE assessments. In certain transactions, PACE assessments can only be modified if the sponsor deposits funds into a reserve account to cover investors for any modification shortfalls. The extent of this guaranty is typically capped at a certain percentage of the initial principal balance of PACE assessments. In evaluating the credit enhancement provided by such arrangements, we consider the financial strength and incentives of the entities responsible for making modifications and associated reimbursements.

Based on our review of the servicing arrangement, we adjust our assumptions when appropriate.

Data Quality

A key element of our asset analysis is an evaluation of the PACE assessment characteristics. In assessing those characteristics, we typically rely on data provided by the transaction sponsor. Consequently, our analysis depends on whether the data are likely to provide an accurate representation of the PACE assessment characteristics. To evaluate the quality of the data the sponsor provides at the time of initial ratings, we review the origination quality, obtain third-party diligence reports when available, and analyze

[10] For more information, see our cross-sector methodology on bankruptcy remoteness criteria for special purpose entities 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.

[11] For more information, see our methodology 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.

the representations and warranties of the transaction. Based on our data quality analysis, we may adjust our assumptions at the lien level or transaction level, when appropriate.[12]

Environmental, Social and Governance Issues

Environmental, social and governance (ESG) considerations may affect the ratings of PACE transactions. PACE 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 and earthquakes. Uninsured damage caused by natural disasters can reduce property values and, in extreme cases, result in losses on PACE assessments.[13]

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 (see the "Property Value Movements from PACE Origination to the Point of Default or Liquidation" section).

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 per our cross-sector methodology that describes our general principles for assessing ESG issues.

Monitoring

In this section, we describe our approach when monitoring transactions. We generally apply the same key components as we apply when assigning ratings, except for those elements of the methodology that could be less relevant over time.

Transaction Performance

We generally apply the key components of the approach described in this report, including the model-based portfolio analysis, when monitoring PACE transactions.[14] Our monitoring analysis also considers changes, if any, to other factors such as legal or operational risks that may affect the ratings on the PACE bonds.

We expect to receive periodic transaction-specific performance data and use it in our analysis. We evaluate various performance metrics, such as PACE balances, delinquency rates, default rates, prepayment, and the overall number of assessments. For delinquent PACE assessments, we generally assume a property owner default frequency of 100%.

When portfolio performance data are provided on an aggregate basis (rather than at lien level), we generally:

» allocate defaults and delinquencies to those assessments whose assumed property owner default frequencies are closest to the portfolio's median property owner default frequency under the stressed scenario;

[12] For more information, see our methodology for evaluating data quality 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.

[13] For more information, see our methodology that describes our general principles for assessing ESG issues.. A link to a list of our sector and cross-sector methodologies can be found in the Moody's Related Publications" section.

[14] 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.

» allocate prepayments to the loans with the lowest property owner default frequencies under the stressed scenario; and

» allocate scheduled payments according to amortization schedules.

Portfolio Composition

Over the life of a transaction, the portfolio composition could change, resulting in a decrease of the R-PACE sub-pool relative to the C-PACE sub-pool. For pools with material exposure to commercial properties, we evaluate the split between R-PACE and C-PACE and the performance metrics for each sub-pool separately. In case of a significant increase in the share of C-PACE in the portfolio, we will require more granular information on PACE assessments on commercial properties, and we may assess the C-PACE exposure in more detail.

Pool Size

In assessing pool diversity for PACE transactions, we look beyond the nominal number of property owners in a pool to take into account the actual size of the property owner's liens. We express this pool diversity measurement, referred to as the effective number, in terms of equal-sized exposures, using the formula in Exhibit 15.

We typically use lien-level information to calculate an effective number of property owners or assessments When property owner information in unavailable, we will use PACE assessment information to determine diversity.

EXHIBIT 15

$$Effective\ Number\ of\ n\ Property\ Owners\ (or\ Assessments) = {}^{1}/_{\sum_{i=1}^{n}(W_i)^2}$$

Where:

» W_i is the weight of a property owner (or assessment) i in the total pool.

Source: Moody's Investors Service

We do not assign nor maintain ratings on securities from PACE transactions with the following characteristics:

» Transactions without support mechanisms, such as a credit enhancement floor or reserve fund floor, when the underlying pool has decreased to an effective number of property owners or PACE assessments of 75 or below. If we cannot obtain the effective number, we will use a threshold of 130 instead.

» Transactions with a reserve fund or credit enhancement floor, which partially compensates for the increased exposure to single property owners, when the underlying pool has decreased to an effective number of property owners or PACE assessments of 50 or below. If we cannot obtain the effective number, we will use a threshold of 90 instead.

However, we 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 security level,[15] or for securities that benefit from full cash collateralization.

[15] For more information, see our rating methodology for assessing transactions based on a credit substitution approach. A link to a list of our sector and cross-sector methodologies can be found in "Moody's Related Publication" section.

Appendix A: Lognormal Distribution

We use the two outputs, Portfolio EL and Portfolio SL, from our asset analysis to determine a portfolio loss distribution. This distribution specifies the probability of each potential future loss scenario for the portfolio. For PACE portfolios, we typically assume that the portfolio loss distribution is lognormal and use two parameters to determine it:

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

» Portfolio SL: defined as the subordination of a theoretical senior tranche targeting a Aaa (sf) rating (or, if applicable, the highest rating level that is consistent with the legal confidence for the transaction).

We assume that the loss distribution is censored at the lesser of 100% and twice the Portfolio SL. We then find the lognormal distribution which satisfies the following two conditions: (1) its median is equal to the Portfolio EL, and (2) the expected loss above the Portfolio SL point (and in consideration of the censoring described above) is equal to the loss associated with the Aaa (sf) level from Moody's Idealized Cumulative Expected Loss table evaluated at the appropriate horizon, or, if applicable, the highest rating level that is consistent with the legal confidence for the transaction.

The horizon used for calibrating the loss distribution is generally given by the minimum of the following:

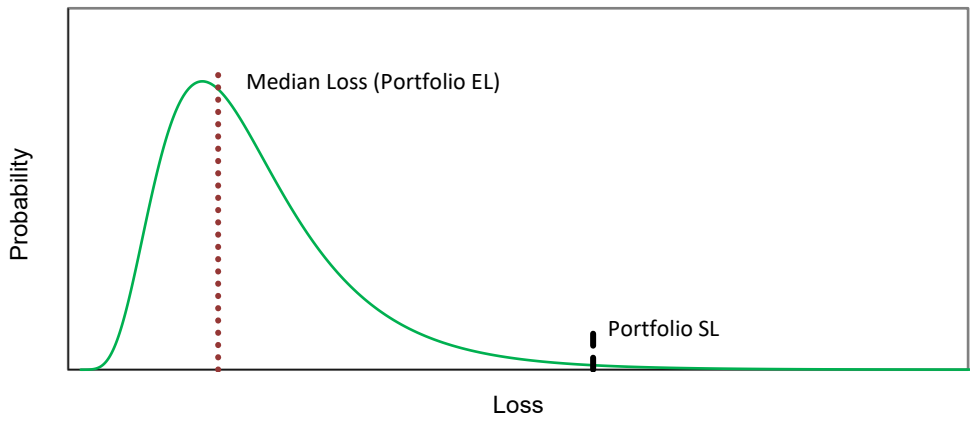
» A maximum time horizon set at 30 years.

» The remaining life of the transaction (determined using the legal final maturity of the tranche with the longest life).

» The weighted average life of the portfolio assuming no defaults and a 5% annual prepayment rate. For defaulted assessments, we calculate this item using the weighted average liquidation duration in the baseline scenario.

EXHIBIT 16

General Shape of the Lognormal Loss Distribution



Source: Moody's Investors Service

Appendix B: Concentration Adjustment Factors

For concentrations, we measure the degree of concentration by the portfolio's effective number (EN), which is the reciprocal of the Herfindahl-Hirschman Index measured by property owner, ZIP code or MSA aggregations. We apply adjustment factors for portfolio concentrations if (i) the EN of property owners is less than 3,000, (ii) the EN of ZIP codes is less than 3,000, or (iii) the EN of MSAs is less than 60.

EXHIBIT 17

Post-Concentration Initial Portfolio SL

$$PostConcentration\ Initial\ Portfolio\ SL = Concentration_{PropertyOwner} \times Concentration_{ZipCode} \times Concentration_{MSA}$$

Where:

- $\text{Concentration}_{\text{PropertyOwner}}$: $\text{PreConcentration Initial Portfolio SL}^{\text{BA}*(\ln(\text{BC})-\ln(\text{HHI}(\text{PropertyOwner})))}$
- $\text{Concentration}_{\text{ZipCode}}$: $\text{PreConcentration Initial Portfolio SL}^{\text{ZA}*(\ln(\text{ZC})-\ln(\text{HHI}(\text{ZipCode})))}$
- $\text{Concentration}_{\text{MSA}}$: $\text{PreConcentration Initial Portfolio SL}^{\text{MA}*(\ln(\text{MC})-\ln(\text{HHI}(\text{MSA})))}$
- BA : Adjustment factor for property owner concentration
- ZA : Adjustment factor for ZIP code concentration
- MA : Adjustment factor for MSA concentration
- BC : Effective property owner count for a diversified portfolio
- ZC : Effective ZIP code count for a diversified portfolio
- MC : Effective MSA count for a diversified portfolio
- $\text{EN}(\text{PropertyOwner}) : \frac{1}{\Sigma(\text{BW}_\text{M})^2}$
- $\text{EN}(\text{ZipCode}) : \frac{1}{\Sigma(\text{ZW}_\text{M})^2}$
- $\text{EN}(\text{MSA}) : \frac{1}{\Sigma(\text{MW}_\text{M})^2}$
- BW_M : Weight of the total exposure to property owner M in the portfolio
- ZW_M : Weight of the total exposure to ZIP code M in the portfolio
- MW_M : Weight of the total exposure to MSA M in the portfolio

Source: Moody's Investors Service

Appendix C: Information Scope

At transaction closing, we expect to receive information at lien level as described in Exhibit 18.

EXHIBIT 18

Lien-level Information

Lien-level Information	Commentary
PACE Loan Term	At closing
PACE Interest Rate	At closing
PACE Original Loan Amount	At closing
PACE Loan Origination Date	At closing
PACE Loan Type (Residential = 0, Commercial = 1)	At closing
PACE Loan Current Balance	At closing
Annual Property Tax Amount	At closing
Property ZIP Code	At closing
Primary Property Owner's FICO at PACE Origination	At closing
Property Value (AVM or Appraisal value) at PACE Origination	At closing
Property Value By Appraisal (Formal Appraisal = 1, Otherwise = 0)	At closing
AVM Provider (if AVM is used)	At closing
Mortgage Balance at PACE Origination	At closing
Mortgage Loan Type (one of the following 3 options: Non-GSE, GSE, No mortgage)	At closing
Additional PACE liens	At closing
Combined LTV at PACE Origination	At closing
Occupancy Type	At closing, additional information
Property Type	At closing, additional information
Mortgage Loan Origination Date	At closing, additional information
Mortgage Balance at Mortgage Origination	At closing, additional information
Mortgage Interest Rate	At closing, additional information
Mortgage Legal Term	At closing, additional information

Source: Moody's Investors Service

Additionally, we expect to receive information on the portfolio mix throughout the life of a transaction, including the split between R-PACE and C-PACE and their distribution across different states. We also expect to continuously receive other transaction-specific performance data for R-PACE and C-PACE separately, such as PACE balances, delinquency rates, default rates, prepayments, and the overall number of assessments, as described in Exhibit 19.

EXHIBIT 19

Pool-level Information

Pool-level Information	Commentary
Number of PACE Assessments	Ongoing
Number of property owners	Ongoing
Total PACE asset balance	Ongoing
Prepayment Rates	Ongoing
Delinquent Rates	Ongoing
Default Rates	Ongoing
C-PACE as % of total balance	Ongoing
State concentration	Ongoing

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 credit 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.

A description of the asset modeling framework, can be found in the following technical supplement: *US Property Assessed Clean Energy (PACE) Securitizations: Probability of Default and Loss Severity Given Default Modeling*.

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 is available here.

» contacts continued from page 1

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