MOODY'S INVESTORS SERVICE

RATING METHODOLOGY

US Housing Finance Agency Issuer Ratings Methodology

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This rating methodology replaces the *U.S. Housing Finance Agency Issuer Rating Methodology* published in August 2018. While this methodology reflects many of the same core principles as the 2018 methodology, we changed the claims-payment assumptions for mortgage insurance used in our loan loss calculations (please see Appendix F). We also made very modest changes to how we score sub-factors and combine those scores to arrive at a scorecard-indicated outcome. In addition, editorial changes to enhance readability.

Introduction

In this rating methodology, we explain our general approach to assessing credit risk for US state and local housing finance agencies (HFAs), including the qualitative and quantitative factors that are likely to affect rating outcomes for recourse obligations issued by these entities.

We discuss the scorecard used for this sector. The scorecard[1] is a relatively simple reference tool that can be used in most cases to approximate credit profiles in this sector and to explain, in summary form, many of the factors that are generally most important in assigning ratings to issuers in this sector. The scorecard factors may be evaluated using historical or forward-looking data or both.

We also discuss other rating considerations, which are factors that are assessed outside the scorecard, usually because the factor's credit importance varies widely among the issuers in this sector or because the factor may be important only under certain circumstances or for a subset of issuers. In addition, some of the methodological considerations described in one or more cross-sector rating methodologies may be relevant to ratings in this sector.[2] Furthermore, since ratings are forward-looking, we often incorporate directional views of risks and mitigants in a qualitative way.

As a result, the scorecard-indicated outcome is not expected to match the actual rating for each issuer.

1 In our methodologies and research, the terms "scorecard" and "grid" are used interchangeably.

2 A link to an index of our sector and cross-sector methodologies can be found in the "Moody's Related Publications" section.

Our presentation of this rating methodology proceeds with (i) the scope of this methodology; (ii) an overview of HFAs; (iii) the scorecard framework; (iv) a discussion of the scorecard factors; (v) other rating considerations not reflected in the scorecard; (vi) the assignment of issuer-level and instrument-level ratings; (vii) methodology assumptions; and (viii) limitations.

In Appendix A, we describe how we use the scorecard to arrive at a scorecard-indicated outcome. Appendix B shows the full view of the scorecard factors, sub-factors, weights and thresholds. In Appendix C, we describe our analytical adjustments to HFA and their bond programs' financial statements. Appendix D describes the inputs and underlying assumptions incorporated into our loan loss calculations. In Appendix E, we discuss our approach for assessing the relative value of an HFA's multifamily mortgage loan pool through the use of benchmarking analysis. Appendix F describes our claims-payment assumptions for US mortgage insurance by rating level.

Scope of This Methodology

This methodology applies to US state and local housing finance agencies (HFAs) and is used to assign issuer ratings and ratings for recourse debt obligations, including general obligation bonds.

We have separate methodologies that discuss our general approach to rating obligations issued under HFA single-family housing and multifamily housing bond programs that are non-recourse to the HFA.[3] In cases where the single-family or multifamily housing program bonds have recourse to the HFA, we rate the bonds under this methodology, arriving at an issuer rating, but also consider how those bonds how would be rated under the HFA single-family or multifamily housing methodology, and the rating of those bonds is the higher of the two.

Overview of Housing Finance Agencies

HFAs are established by state or local law to help low- and moderate-income families attain affordable housing. The primary activity of HFAs has traditionally been to finance single-family mortgages for first-time homebuyers, or the construction, acquisition or rehabilitation of multifamily rental apartments for low-income tenants, through tax-exempt bonds. HFAs also offer a range of affordable housing programs to families of low and moderate incomes, including both single-family and multifamily mortgage products. Some HFAs have also been involved in other activities, such as issuing bonds for economic development, infrastructure, or privatized military housing, and administering housing programs funded by state or federal government.

In addition to bond programs that are a full faith and credit obligation of the HFA, an HFA may incur recourse obligations for other purposes, such as bank credit lines, derivatives and hedging agreements.

An HFA's bond programs, whether recourse or non-recourse, typically represent a substantial portion of an HFA's operations and balance sheet. In cases where the HFA has pledged the mortgage-related assets to the bond program, the HFA does not have direct access to these assets or cash flows.

[3] A link to an index of our sector and cross-sector methodologies can be found in the "Moody's Related Publications" section.

Scorecard Framework

The scorecard in this rating methodology is composed of four factors. Some of the four factors comprise a number of sub-factors.

EXHIBIT 1
US Housing Finance Agency Issuer Rating Scorecard Overview

Factor	Factor Weighting	Sub-factor	Sub-factor Weighting
Financial Position	40%	Balance Sheet Strength	20%
		Operating Performance	20%
Loan Portfolio	20%	Portfolio Performance and Asset Management	10%
		Portfolio Characteristics	10%
Risk Profile	20%	Risk Position	10%
		Risk Management Infrastructure	10%
Management and Operating Environment	20%	Management and Governance	15%
		Operating Environment	5%
Total	**100%**		**100%**

Source: Moody's Investors Service

Please see Appendix A for general information relating to how we use the scorecard and for a discussion of scorecard mechanics. The scorecard does not include every rating consideration.[4]

Discussion of the Scorecard Factors

In this section, we explain our general approach for scoring each scorecard sub-factor or factor, and we describe why they are meaningful as credit indicators.

Factor: Financial Position (40% Weight)

Why It Matters

The financial position of an HFA provides important indications of its ability to pay debt service and meet its other obligations through periods of financial stress, based on its balance sheet strength and operating performance.

This factor comprises two sub-factors:

Balance Sheet Strength

The ratio of risk-adjusted net assets to total bonds outstanding is a useful indicator of an HFA's balance sheet strength and ability to withstand financial stress. Potential causes of financial stress include (i) rapid mortgage prepayments, which may result in timing mismatches between the receipt of funds and bond redemptions, thereby introducing negative arbitrage between interest income received and interest expense paid; and (ii) high loan delinquencies that result in uninsured losses.

[4] Please see the "Other Rating Considerations" and "Limitations" sections.

Operating Performance

The ratio of net revenue to total revenue is an important indicator of an HFA's ability to maintain sufficient available resources to pay debt service when due. An HFA's profitability may come under pressure due to (i) low mortgage interest income; (ii) low investment earnings; (iii) negative arbitrage on bond proceeds or loan prepayments; or (iv) higher-than-expected funding costs.

How We Assess It for the Scorecard

BALANCE SHEET STRENGTH:

Scoring for this sub-factor is based on (i) the Risk-adjusted Net Asset Ratio (i.e, adjusted[5] net assets minus capital charges); and (ii) the sufficiency and stability of the HFA's financial resources to maintain its creditworthiness over time.

For the Risk-Adjusted Net Asset Ratio, the numerator is adjusted net assets minus capital charges, and the denominator is total bonds outstanding. We calculate or estimate adjusted net assets as the HFA's total adjusted assets less total combined liabilities. We use the average of the annual ratios for the most recent five years.

Capital charges consist of potential losses associated with risks and contingencies that could weaken the HFA's financial position. We net out capital charges to assess the resiliency of the balance sheet under stressful scenarios. Examples of capital charges include the following:

» Single-family and multifamily loan losses.[6]

» Cash flow deficiencies from bond programs.

» For swaps, mark-to-market and collateral posting requirements where the rating trigger embedded in the agreement is within two notches of the HFA's current issuer or bond program rating level.

» Debt service of unsecured debt due in the next year.

OPERATING PERFORMANCE:

We calculate or estimate profitability based on the ratio of net revenue to total revenue. The numerator is total revenue minus total expenditures (excluding non-cash expenses, such as depreciation), and the denominator is total revenue. We use the average of the annual ratios for the most recent five years.

We also assess profitability based on the five-year trend of operating performance.

[5] Please see Appendix C for a description of our analytical adjustments to HFA financial statements.

[6] For further information, refer to Appendix D, which discusses the stress case loan loss projections used in our ratio analysis, and Appendix E, which discusses our benchmarking approach to assessing the value of an HFA's multifamily mortgage loans pool.

FACTOR
Financial Position (40%)

Sub-factor	Sub-factor Weight	Aaa	Aa	A	Baa	Ba	B and Below
Balance Sheet Strength	20%	HFA's balance sheet demonstrates very high (e.g. > 20% average over 5 years) risk-adjusted net asset as a % of bonds outstanding (Risk-Adjusted Net Asset Ratio)	HFA's balance sheet demonstrates high (e.g. 15% - 20% average over 5 years) Risk-Adjusted Net Asset Ratio	HFA's balance sheet demonstrates solid (e.g. 10%-15% average over 5 years) Risk-Adjusted Net Asset Ratio	HFA's balance sheet demonstrates satisfactory (e.g. 5%-10% average over 5 years) Risk- Adjusted Net Asset Ratio	HFA's balance sheet contains low (e.g. < 5% average over 5 years) Risk-Adjusted Net Asset Ratio but maintains sufficient coverage for risk factors	HFA's balance sheet has exhibited declines; Liabilities exceed risk-adjusted net assets (e.g. net assets are insufficient to mitigate potential risks)
		Strong and growing level of resources for maintaining HFA's creditworthiness under stressful circumstances	Ample and stable resources for maintaining HFA's creditworthiness under stressful circumstances	Solid levels of resources for maintaining HFA's creditworthiness under standard circumstances	Sufficient resources for maintaining HFA's creditworthiness under standard circumstances	Limited resources for maintaining HFA's creditworthiness under standard circumstances	Insufficient resources for maintaining HFA's creditworthiness under standard circumstances
Operating Performance	20%	Very high (e.g. above 15% average over 5 years) net revenues as a % of total revenues (Profitability)	High Profitability (e.g. 10% - 15% average over 5 years)	Solid Profitability (e.g. 5% - 10% average over 5 years)	Profitability may average below 5%. While there may be periods of losses, they are offset by risk adjusted net assets and not expected to continue	Consistent losses (negative Profitability) but they are offset by risk adjusted net assets; losses may continue in the near term	Consistent losses and net assets are not expected to cover losses
		Trends have been very favorable	Trends have been favorable	Trends have been consistent	Trends display modest weakness	Trends reveal increasing weakness	Trends reveal substantial weakness

Source: Moody's Investors Service

Factor: Loan Portfolio (20%)

Why It Matters

An HFA's portfolio of mortgage loans or MBS provides an important indication of the HFA's ability to pay debt service, because the loan portfolio typically represents the largest and highest-yielding asset on the HFA's balance sheet and the primary sources of revenue backing the HFA's bonds and other obligations. Loan delinquencies and loan losses greatly impact the HFA's ability to pay debt service.

An HFA's portfolio may be composed of different segments, and the three typical segments are single-family loans, multifamily loans, and MBS or credit-enhanced loans. The overall portfolio typically comprises multiple bond programs.

For HFA portfolios composed of nearly 100% MBS programs, the obligor or guarantor assumes the credit risks associated with the portfolio, and its rating is thus the key indicator of credit quality. Typically, these MBS are guaranteed by the Federal National Mortgage Association (Fannie Mae), the Federal Home Loan Mortgage Corporation (Freddie Mac) or the Government National Mortgage Association (Ginnie Mae). In the case of Ginnie Mae MBS, the guarantor is the US government, whereas Fannie Mae and Freddie Mac are US government-sponsored enterprises.

This factor comprises two sub-factors:

Portfolio Performance and Asset Management

Trends in foreclosure and delinquency rates are important indicators of the overall financial performance of the HFA's loan portfolio and the likely incidence of future defaults. The strength and effectiveness of an HFA's asset management provides an important indication of the likely performance of the underlying loan portfolio.

Portfolio Characteristics

Portfolio characteristics, such as the quality of insurance coverage for loans, and the diversity of loan vintages, indicate the level of insurance protection against loan losses and provide important insights into the stability of the HFA's portfolio. The breakdown of the types of mortgages, including the percentage of fixed-rate, level-payment loans relative to variable-rate or other non-level-payment loans, provides additional insights into the likelihood of loan delinquencies and home foreclosures. The percentage of multifamily loans that are exposed to construction or lease-up risk also provides indications of likely delinquency and foreclosure rates.

How We Assess It for the Scorecard

PORTFOLIO PERFORMANCE AND ASSET MANAGEMENT:

Scoring for portfolio performance is primarily based on the percentage of loans in the portfolio that are 90 or more days delinquent or that are in foreclosure, except in the case of portfolios comprising nearly 100% MBS, in which case our assessment is based on the rating of the MBS obligor or guarantor.[7]

We also incorporate into our assessment recent trends (e.g., over three to five years) in loan delinquencies and foreclosures. Declining delinquency and foreclosure rates or other favorable trends may have a positive impact on the sub-factor score. Increasing delinquency and foreclosure rates or other unfavorable trends typically have a negative impact on the sub-factor score.

In assessing the quality of asset management, we consider management's ability to provide quality data, meet all reporting requirements on a timely basis and maintain a track record of successful loan workouts. We also typically consider management's ability to address cash flow challenges and major capital needs.

Where an HFA's aggregate portfolio is composed of different segments or sub-portfolios, we use the weighted average of the scores for each segment or sub-portfolio to arrive at an overall score for this sub-factor. Each portfolio score is weighted by the percentage share of that portfolio relative to the total dollar amount of the aggregate portfolio.

PORTFOLIO CHARACTERISTICS:

We assess the strength of the portfolio based on a variety of considerations, which differ somewhat based on whether the portfolio is single-family, multifamily, or credit enhanced. Scoring for portfolio characteristics is primarily based on the quality and depth of mortgage insurance, and additional

7 We use the rating of the entity that corresponds to its obligation to the bond program, e.g., the senior unsecured rating if the guarantee is a senior unsecured obligation of the entity.

considerations can include loan-to-value[8] (LTV) ratios, the types of mortgages, and diversity of borrowers or loan vintages. In the case of portfolios comprising nearly 100% MBS, however, our assessment is based on the rating of the MBS obligor or guarantor.[9]

Mortgage Insurance

For single- and multifamily portfolios, we consider the quality of mortgage insurance, based on the credit quality of the provider and the protection it provides against losses stemming from delinquencies and foreclosures, as well as the depth of coverage, based on the percentage of loan amounts that benefit from the mortgage insurance.

In assessing the quality of the mortgage insurance, we consider the type of insurance, which can be insurance from US government programs, private sector mortgage insurance (PMI) or, in some cases, insurance from a state insurance fund. The depth of insurance coverage is based on the percentage of loans that are covered as well as the coverage level for those loans. Mortgage insurance generally covers a percentage of the outstanding principal balance of the loan, lost interest for a certain period, and allowable expenses incurred in obtaining the title to the property and in selling the property (e.g., legal fees, maintenance and sales costs).

The quality and depth of coverage varies with the different forms of mortgage insurance available. Federal insurance programs include insurance or guarantees from the Federal Housing Administration (FHA), the Veterans Administration (VA), and the US Department of Agriculture's Rural Development Program (RD). Mortgage insurers backed by the federal government have historically paid their claims fully and on time for the life of the bonds, and therefore, we have typically considered the insurance provided by these programs to be of the highest quality.[10] PMI typically provides coverage for a specific percentage of lost principal as well as specified levels of lost interest and expenses. HFAs generally have minimum requirements for the depth of PMI coverage for their bond programs, often expressed as an amount that brings the bond program's exposure down to a set percentage of defaulted principal. For PMI, the quality of the insurance is primarily based on the insurer's Insurance Financial Strength Rating.

Loan-to-Value

For single-family portfolios, we consider LTV ratios. We consider ratios below 80% to be low. It is below this percentage that lenders typically have not required mortgage insurance. Above this level, we consider LTVs to be high.

Types of Mortgages

For single- and multifamily portfolios, we also consider the type of mortgage loans.

Mortgages in HFA single-family portfolios are primarily fixed-rate, level-payment loans that amortize fully over 30 years. Loan portfolios with higher percentages of fixed-rate, 30-year loans typically receive higher scores for this sub-factor. However, some HFAs originate loans with different amortization terms, including fixed-rate, level-payment loans that amortize over 40 years; step-rate

8 For the purpose of this ratio throughout the life of the loan, we consider the loan amount, which changes as it is repaid, relative to the original purchase price of the home.

9 We use the rating of the entity that corresponds to its obligation to the bond program, e.g., the senior unsecured rating if the guarantee is a senior unsecured obligation of the entity.

10 In all cases, the scoring is based on our assessment of the efficacy of the insurance in mitigating risks and the credit quality of the provider. Our assessment of a provider could change over time in accordance with that provider's track record or changes in its rating or the rating of its supporter.

loans, which are loans with interest rates that step up in stated amounts and at predetermined intervals over the first three to five years of the loan term; and interest-only loans, which are fixed-coupon loans that pay only interest for a fixed period (generally three to five years) and then amortize fully with level payments over their remaining terms. Loan portfolios with higher percentages of these other amortization profiles, which are considered weaker loan types, typically receive lower scores for this sub-factor.

For multifamily portfolios, we also consider loan terms and payment structures as well as the percentage of the portfolio composed of unenhanced loans for properties that are under construction or in lease-up phase. These loans present a different risk profile than stabilized (or traditional) loans to established multifamily housing properties and may result in a higher likelihood of default.

Diversity of Loan Vintage and Borrowers:

For single-family portfolios, we also consider the diversity of loan vintages, i.e., the diversity of the years the loans were originated (e.g., over the past 20 years, or over the past 3 years). Portfolios that include more loans with long-dated originations typically receive higher scores for this sub-factor, because there is generally a higher likelihood of a rise in property values since the loans were originated. Higher home equity values indicate a higher likelihood that proceeds from a sale of the property would be sufficient to pay the loan and a lower likelihood of loan delinquency.

For multifamily portfolios, we typically consider the geographic distribution of borrowers within the state or the HFA's service area. Multifamily housing portfolios that are diversified geographically are typically better able to manage through the business cycle without a significant weakening of overall asset quality. We also typically consider the property type securing the loans in the multifamily portfolio. Typically, most of the properties in the portfolio are affordable rental properties with income restrictions on tenants for compliance with tax rules, and there is typically high demand for affordable housing. Other types of properties, such as assisted living properties, can change the risk profile of the portfolio, because they have different supply and demand characteristics and may be more complex to operate and maintain.

Where an HFA's aggregate portfolio is composed of different segments or sub-portfolios, we use the weighted average of the scores for each segment or sub-portfolio to arrive at an overall score for this sub-factor. Each portfolio score is weighted by the percentage share of that portfolio relative to the total dollar amount of the aggregate portfolio.

FACTOR

Loan Portfolio (20%)

Sub-factor	Sub-factor Weight	Aaa	Aa	A	Baa	Ba	B and Below
Portfolio Performance and Asset Management	10%	Very strong portfolio performance (90+ days delinquent and in-foreclosure rates are typically less than 2%); trends have been very favorable	Strong portfolio performance (90+ days delinquent and in-foreclosure rates are typically 2%-5%); trends have been favorable	Good portfolio performance (90+ days delinquent and in-foreclosure rates are typically 5%-8%); trends may display modest weakness	Satisfactory portfolio performance (90+ days delinquent and in-foreclosure rates are typically 8%-12%); trends reveal increasing weaknesses	Weak portfolio performance (90+ days delinquent and in-foreclosure rates are typically 12%-20%); trends reveal substantial weaknesses	Very weak portfolio performance (90+ days delinquent and in-foreclosure rates are typically > 20%); trends reveal extreme weaknesses
		Strong and effective asset management with ability to provide quality data, meet all reporting requirements on a timely basis and a proven track record of successful loan workouts	Experienced asset management with ability to provide quality data, meet all reporting requirements on a timely basis and a proven track record with successful loan workouts	Good asset management with ability to provide data, meet most reporting requirements on a timely basis and a satisfactory record with successful loan workouts	Satisfactory asset management (may have limited staff) with occasional lapses on reporting requirements and a satisfactory record with successful loan workouts	Asset management may be inexperienced and have limited staff; lapses in meeting reporting requirements and a spotty record with successful loan workouts	Inexperienced asset management with very limited staff; challenged in meeting reporting requirements and no record with successful loan workouts
		Portfolio contains nearly 100% MBS (where the obligor or guarantor is Aaa)*1					
Portfolio Characteristics	10%	More than 75% of loans carry highest quality mortgage insurance; for single family, low Loan-to-Values (LTVs)	More than 65% of loans carry highest quality mortgage insurance; for single family, low LTVs	More than 50% of loans carry highest quality mortgage insurance; for single family, low LTVs	Less than 50% of loans carry highest quality mortgage insurance; for single family, low LTVs; may contain up to 70% of unenhanced affordable multifamily housing loans	Low quality mortgage insurance; for single family, high LTVs; primarily unenhanced affordable multifamily housing loans	A substantial portion of the portfolio does not have mortgage insurance; for single family, high LTVs
		More than 90% of loan types are fixed-rate, level-payment; for multifamily, stabilized, fully amortizing loans with no construction or lease-up risk	75%-90% of loan types are fixed-rate, level-payment; for multifamily, majority of loans are stabilized and fully amortizing, with less than 10% of unenhanced construction loans or lease-up risk	60%-75% of loan types are fixed-rate, level-payment; for multifamily, majority of loans are stabilized and fully amortizing, with less than 20% of unenhanced construction loans or lease-up risk	50%-60% of loan types are fixed-rate, level-payment; for multifamily, majority of loans are stabilized and fully amortizing, with less than 30% of unenhanced construction loans or lease-up risk	40%-50% of loan types are fixed-rate, level-payment; for multifamily, some loans are not fully amortizing, with up to 40% of unenhanced construction loans or lease-up risk	Less than 40% of loan types are fixed-rate, level-payment; for multifamily, most loans may not be fully amortizing, of which majority are unenhanced construction loans or lease-up risk
		Extremely well-distributed portfolio regarding vintages (single family) and borrowers (multifamily)	Very well-distributed portfolio regarding vintages (single family) and borrowers (multifamily)	Well-distributed portfolio regarding vintages (single family) and borrowers (multifamily)	Slightly concentrated portfolio, regarding vintages (single family) and borrowers (multifamily)	Concentrated portfolio in weaker vintages (single family) and borrowers (multifamily)	Very concentrated portfolio regarding weak vintages (single family) and borrowers (multifamily)
		Portfolio contains nearly 100% MBS (where the obligor or guarantor is Aaa)*1					

*1 If the obligor or guarantor were rated lower than Aaa, the score would be the broad alpha or alphanumeric category that corresponds to the rating.

Source: Moody's Investors Service

Factor: Risk Profile (20%)

Why it Matters

An HFA's risk profile provides important indications of management's tolerance for operating risk and its capacity to manage that risk in order to meet its financial goals.

This factor comprises two sub-factors:

Risk Position

An HFA's risk position is important because many HFAs, in their mission to help low- and moderate-income borrowers access affordable housing, create debt structures and engage in activities that increase operating risk.

Risk Management Infrastructure

Risk management infrastructure is important because it can mitigate or exacerbate an HFA's existing operating risk position. HFA risk management policies, procedures and oversight greatly contribute to current and likely future levels of risk to an HFA's bond programs.

How We Assess It for the Scorecard

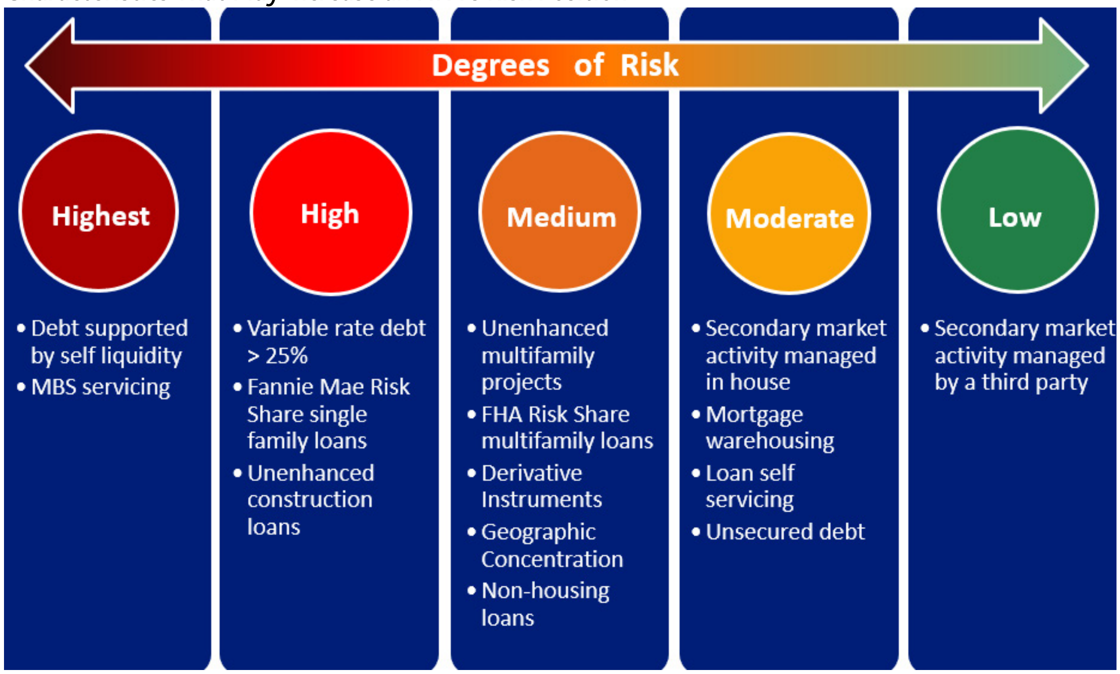
RISK POSITION:

Our assessment is qualitative, based on the scoring descriptions by broad alpha category in the table below. We consider 15 characteristics that may indicate the HFA has a higher operating risk position (see Exhibit 2). We group these characteristics into five broad risk categories: "Highest," "High," "Medium," "Moderate" and "Low." We classify the first five characteristics into the "Highest" or "High" categories because of their potential to immediately drain liquid resources and impede full and timely payment of debt service.

The sub-factor score is informed by a simple tool that weights each characteristic in the scoring of this sub-factor according to our general opinion of its risk level. The higher the risk level, the greater the weight in the tool-generated score, and the greater the notional weight we place on the characteristic in our assessment of risk position.

For this sub-factor, an HFA with none of the 15 risk characteristics typically receives a score of Aaa. An HFA with five or fewer of these characteristics and no more than two characteristics in the "Highest" or "High" categories typically receives a score in the Aa category. An HFA with eight or fewer characteristics and no more than three in the "Highest" or "High" categories typically receives a score in the A category. An HFA with 10 or fewer characteristics and no more than four in the "Highest" or "High" categories typically receives a score in the Baa category. An HFA with more than 10 of these characteristics, including all five in the "Highest" or "High" categories, typically receives a Ba or B score for this sub-factor.

EXHIBIT 2
Characteristics That May Increase an HFA's Risk Position



Source: Moody's Investors Service

RISK MANAGEMENT INFRASTRUCTURE:

In assessing an HFA's risk management infrastructure, we consider the depth and expertise of management, the risk governance structure, succession planning, the level of awareness that senior managers and the board have regarding risk management initiatives, and the role of risk management in the HFA's decision-making process.

Our assessment is typically informed by the following considerations:

» Whether management conducts comprehensive strategic planning.

» Senior management's and the board's awareness of current and potential risks facing the HFA.

» Procedures for reporting key management decisions to the board.

» The level of the board's oversight of management and approval of key decisions.

» Processes for selecting senior staff and conducting their periodic performance evaluations.

» Management succession planning.

» Presence of an effective internal audit function and the extent of its independence from management.

The sub-factor score is typically assigned in the alpha category for which the issuer has the greatest number of characteristics; but to achieve a score in a category at the higher end of the scale, a majority of the considerations typically fall in that category. There may be cases in which one characteristic is sufficiently important to a particular issuer that it is determinative of the sub-factor score, such as the existence of key person risk.

For illustrative purposes, below are typical profiles of risk management infrastructure that would be likely to score Aa, respectively.

Typical characteristics of issuers scoring Aa in this sub-factor: (i) long-range strategic planning is conducted and updated regularly; (ii) risk management staff is tenured, exhibits strong talent, and is reinforced with robust succession planning; (iii) senior management does not change with gubernatorial elections; (iv) selection and periodic evaluation of senior staff is governed by established, effective processes; (v) investments, debt, liquidity, and counterparty exposure are all governed by detailed written policies that are enforced and reviewed regularly; (vi) potential risks to programs are well understood and supported by regular reporting and data monitoring; (vii) losses from delinquencies and defaults are proactively mitigated with outreach and mortgage counseling to delinquent borrowers at an early stage to maintain program financial stability; (viii) staff has authority to act quickly where appropriate.

FACTOR

Risk Profile (20%)

Sub-factor	Sub-factor Weight	Aaa	Aa	A	Baa	Ba	B and Below
Risk Position	10%	Very conservative risk position. Minimal operational and credit risks that are unlikely to affect an HFA's financial strength, as indicated by an HFA that has none of the risk factors categorized below:	Conservative risk position with limited operational and credit risks which may have nominal effect on an HFA's financial strength as measured by an HFA that has five or less of the specific risk factors and no more than two from the top two broad categories below:	Moderate risk position with several operational and credit risks which could affect an HFA's financial strength as measured by an HFA that has eight or less of the specific risk factors and no more than three from the top two broad categories below:	Satisfactory risk position. Numerous operational and credit risks that may weaken an HFA's financial strength, as indicated by an HFA that has ten or fewer of the specific risk factors and no more than four from the top two broad categories below:	Aggressive risk position. Substantial operational and credit risks that may deteriorate an HFA's financial strength, as indicated by an HFA that has twelve or fewer of the specific risk factors and all five in the top two broad categories below:	Very aggressive risk position. Significant operational and credit risks that are highly likely to deteriorate an HFA's financial strength, as indicated by an HFA that has more than twelve of the specific risk factors and all five in the top two broad categories below:
		1 Highest: Debt supported by self-liquidity or MBS servicing					
		2 High: Variable-rate debt > 25%, Fannie Mae risk-sharing single family loans, or unenhanced construction loans					
		3 Medium: Unenhanced multifamily projects, FHA risk-sharing multifamily loans, derivative instruments, geographic concentration, or non-housing loans					
		4 Moderate: Secondary market activity managed in-house, mortgage warehousing, whole loan self-servicing, or unsecured debt					
		5 Low: Secondary market activity managed by a third party					
Risk Management Infrastructure	10%	Superior management depth and risk governance structure with abundant talent and robust succession planning	Very good management depth and risk governance structure with strong talent and excellent succession planning	Good management depth and risk governance structure with satisfactory talent and succession planning	Key person risk may be present; although there is limited succession planning, it is expected that key positions could be covered and filled quickly	Key person risk is present with limited succession planning; no risk governance structure	Key person risk is present with no succession planning; no risk governance structure
		Very high awareness of new and existing risk initiatives by both the board and senior management	High awareness of new and existing risk initiatives by both the board and senior management	Solid awareness of new and existing risk initiatives by both the board and senior management	Adequate awareness of new and existing risk initiatives by both the board and senior management	Poor awareness of new and existing risk initiatives by both the board and senior management	No awareness of new and existing risk initiatives by both the board and senior management
		Risk management is a key component of decision-making process	Risk management is a major component of decision-making process	Risk management is an important component of decision-making process	Risk management is part of the decision-making process	Risk management is occasionally considered in the decision-making process	No risk management discussion

Source: Moody's Investors Service

Factor: Management and Operating Environment (20%)

Why It Matters

The quality of an HFA's management and its operating environment is important because it provides important indications of management's likely future performance in stressed operating environments.

The factor comprises two sub-factors.

Management and Governance

HFA management's understanding of the complexity of its loan portfolios and bond programs, including the portfolio characteristics and debt structure, as well as its ability to handle the related risks, provide important indications of whether it will be able to maintain the financial position of its programs and overall financial operations. Oversight from a capable and experienced governing board is also critical for maintaining the HFA's risk-management policies and financial position.

A record of consistency, including whether management has demonstrated a willingness to act swiftly and address challenges, provides insight into management's likely future performance in stressed situations and can be an indicator of management's tendency to depart significantly from its stated plans and guidelines.

Operating Environment

The quality of an HFA's operating environment greatly influences its exposure to risks that are often outside of its control. The HFA's relationship with different levels of government and its competitive standing in the housing market provide insight into its ability to operate within its particular environment. State and local real estate conditions indicate the stability of property values in the market and the likelihood of loan losses.

How We Assess if for the Scorecard

MANAGEMENT AND GOVERNANCE:

In assessing this factor, we consider management's understanding of and ability to adapt to its bond programs' financial strengths and challenges, typically based on the depth of the management team's expertise and on its tenure. Management's knowledge of and compliance with federal and state regulations and the implications of non-compliance are also important. While we recognize that HFAs often use third parties to assist them in these tasks, we typically assess the level of management's involvement, its oversight of the third parties and its understanding of products provided to them from outside sources.

In addition, we consider the financial resources and personnel available to the HFA to support the financial position of its bond programs. We typically assess management's ability and willingness to use resources to support its bond programs, based on its track record. For example, we may consider whether the HFA management has provided additional funds to a bond program facing difficulties, has provided grants to mortgagors, or has maintained sufficient staff levels to monitor programs even if revenue or activity from these programs has declined. We may also consider the HFA's loan underwriting process and portfolio monitoring practices.

In assessing governance, we consider the governing board's makeup and level of involvement in the policies and activities of the HFA. Considerations may include the process of board selection and the frequency of meetings, the procedures for reporting and approving key decisions at the board level, the experience level of board members, the use of an internal audit function, and board-approved policies on investments, debt management and liquidity.

OPERATING ENVIRONMENT:

In assessing this sub-factor, we consider the HFA's relationships with the state government, federal entities and local governments within its state. These relationships may contribute to, or detract from, the financial strength of an HFA and its programs. For example, a state may compel an HFA to transfer funds to the state (more likely where the state is having difficulty balancing its budget or has de-prioritized affordable housing) or to take on additional fiscal responsibilities, putting pressure on the HFA's financial operations. HFAs may come under additional pressures due to a change in state executive or legislative leadership that results in the turnover of senior staff, which can undermine HFA autonomy. The stronger the HFA's relationships are with its corresponding governments, the better able it will be to maintain its autonomy and financial position.

We consider the strength of the HFA's presence in the state's housing market, typically based on the levels of, and changes in, demand for an HFA's services. We may consider the HFA's market share and product diversification, its ability to compete with conventional lenders, and its capacity to manage unexpected changes in market dynamics. An HFA with large market share within the state and strong name recognition typically receives a high score for this sub-factor.

We consider state and local real estate conditions and trends for single- and multifamily housing. We assess the history of home price growth or decline in a state or region, typically placing greater weight on trends over the past three to five years, primarily based on data for house price appreciation or depreciation, including data from the Federal Housing Finance Agency. We also consider the projected time frame for stabilization in home prices, typically based on economic data for local housing markets across a state. We also review data on multifamily housing vacancies.

We may consider more granular information when available, such as breakdowns of the geographic location of the loans within the state, or loan-by-loan data for the portfolio, to assess housing price changes and other real estate metrics on a more detailed level.

In addition, we consider the general economic conditions of the state, reflected in key economic indicators that affect the housing market and trends in mortgage loan performance and origination. We also consider employment growth and other economic indicators to assess the likelihood of home price stability in the future. Data points such as the state or local unemployment rate are useful indicators of likely delinquencies and foreclosures. Changes in interest rate levels can affect an HFA's profitability and its ability to finance mortgage loans through debt.

FACTOR

Management and Operating Environment (20%)

Sub-factor	Sub-factor Weight	Aaa	Aa	A	Baa	Ba	B and Below
Management and Governance	15%	Superior management with substantial financial and personnel resources available to maintain and grow the HFA's financial position	Strong management with significant financial and personnel resources available to maintain the HFA's financial position	Solid management with significant financial and personnel resources to maintain the HFA's financial position	Adequate management with sufficient financial and personnel resources to maintain the HFA's financial position	Poor management or oversight with limited financial or personnel resources	Lack of management or oversight with very limited financial or personnel resources
		Ability and willingness to act swiftly and appropriately to address challenges	Ability and willingness to act promptly and appropriately to address challenges	Ability and willingness to act appropriately and in a timely manner to address challenges	Ability and willingness to act appropriately to address challenges, potentially with delays	Minimal board involvement	Minimum to no board involvement
		Superior governance with highly experienced and involved board members providing oversight	Strong governance with very experienced and involved board members providing oversight	Capable governance with experienced and involved board members providing oversight	Capable governance with experienced and involved board members providing oversight	Weak governance with less experienced board members providing minimal oversight	Very weak governance with inexperienced and uninvolved board members
Operating Environment	5%	Strong relationship with state and federal governments; no potential for a required transfer of funds to the state for other purposes (required transfer) in the near term	Strong relationship with state and local governments; little to no potential for a required transfer in the near term	Good relationship with state and federal governments; some potential for a required transfer in the near term	Cordial relationship with state and federal governments; potential required transfer in sight	Weak relationship with state and federal governments; potential required transfer in sight; minimal future prosperity potential	Very weak relationship with state and federal governments; imminent required transfer in sight
		Very strong presence in the state's housing market	Strong presence in the state's housing market	Good presence in the state's housing market	Satisfactory presence in the state's housing market	Weak presence in the state's housing market	Extremely weak presence in the state's housing market
		Very strong housing fundamentals with projected favorable trends; and home price appreciation or decline of less than 5% (from peak); and less than 5% state multifamily vacancy rates	Strong housing fundamentals with projected favorable trends; may have 5%-10% in home price declines (from peak), or state multifamily vacancy rates 5%-10%	Good housing fundamentals with projected stabilizing trends; may have 10%-15% in home price declines (from peak), or state multifamily vacancy rates 5%-10%	Satisfactory housing fundamentals with projected stabilizing trends; may have 15%-20% in home price declines (from peak) or state multifamily vacancy rates 10%-15%	Weak housing fundamentals with projected negative trends; or 20%-40% in home price declines (from peak) or state multifamily vacancy rates 15%-20%	Very weak housing fundamentals demonstrating extremely negative trends; or over 40% in home price declines (from peak) or state multifamily vacancy rates over 20%
		Employment and other economic indicators support stability in the housing market	Employment and other economic indicators support stability in the housing market	Employment and other economic indicators show some weakness in the housing market	Employment and other economic indicators show weakness about housing market	Employment and other economic indicators are substantially below the national average	Employment and other economic indicators are far below the national average

Source: Moody's Investors Service

Other Rating Considerations

Ratings may include additional factors that are not in the scorecard, usually because the factor's credit importance varies widely among the issuers in the sector or because the factor may be important only under certain circumstances or for a subset of issuers Such factors include financial controls and the quality of financial reporting; assessments of governance, environmental and social considerations; and possible government interference from other levels of government. Regulatory, litigation, liquidity and technology risk as well as changes in demographic and macroeconomic trends also affect ratings.

Following are some examples of additional considerations that may be reflected in our ratings.

Very High or Low Risk Adjusted Net Asset Ratio

In assessing an HFA's balance sheet strength and ability to meet its debt obligations, we may consider whether it has a very high or very low risk-adjusted net asset ratio compared with most HFAs. Where an HFA has a very high risk-adjusted net asset ratio relative to most HFAs, the actual rating may be higher than the scorecard-indicated outcome. Where an HFA has a very low risk-adjusted net asset ratio relative to most HFAs, the actual rating may be lower than the scorecard-indicated outcome.

Highly Favorable or Unfavorable Multiyear Trends

Positive or negative multiyear trends can result in a significant improvement or weakening of an HFA's loan portfolios or financial metrics over the near to medium term. Where multiyear trends indicate a significant change in an HFA's loan portfolio quality or financial metrics over time, the actual rating may be different from the scorecard indicated outcome.

Expectation of Significant Improvement or Weakening of Loan Portfolio Quality

The quality of an HFA's loan portfolios may significantly improve or weaken over time. For example, an HFA may be transitioning one or more of its loan portfolios to consist mostly or entirely of MBS, which may have the effect of strengthening the loan portfolio substantially. Conversely, the HFA may be introducing loan types into its bond programs that are significantly weaker than the existing portfolio, which may indicate a decline in portfolio quality. Where we assess that the quality of an HFA's loan portfolios is significantly improving or weakening, the actual rating may be different from the scorecard-indicated outcome.

Strong Market Share and Brand Name Recognition within State

Some HFAs have a very strong share of the state housing market relative to other state HFAs, particularly if they have considerable brand name recognition and dominate the state's affordable housing sector. Where an HFA has very strong market share and brand name recognition, the actual rating may be different from the scorecard-indicated outcome.

New Activities That Are Expected to Generate Additional Revenue or New Risks

The primary activity of HFAs has traditionally been to finance single-family mortgages for first-time homebuyers through tax-exempt bonds, but HFAs also offer a range of affordable housing programs to families of low and moderate income. Some of these activities may generate additional revenue, but they may also increase the HFA's operating risk. For example, an HFA that expands into making small-business loans may face additional risks because this may be an area outside its core expertise. Where an HFA expands its programs to new activities that are likely to generate new revenue and positive net income, or that increase its operating risk, the actual rating may be different from the scorecard-indicated outcome.

Counterparty Risk

HFAs often enter into agreements with various counterparties for their bond programs, including investment providers, liquidity providers and swap counterparties. Exposure to one or more weak counterparties increases the risk to the HFA's bond programs due to investment losses or the termination of any liquidity or swap agreements. The HFA's rating may also be close to thresholds that result in contract termination or in collateral posting requirements, which could sharply reduce the HFA's liquidity. These events could result in a structural mismatch between revenue and debt service. Where an HFA's contractual arrangements are concentrated with a single counterparty or with several weak counterparties, or where the HFA's rating is close to triggering thresholds in counterparty agreements, the actual rating may be lower than the scorecard-indicated outcome.

Extraordinary Weakness in the HFA's Relationship with the State

In the Operating Environment scorecard sub-factor, we consider the strength of an HFA's relationship with its corresponding state government. In cases where an HFA has a weak relationship with the state, the HFA may be subject to financial and operating interference that greatly impedes its ability to maintain its bond and other programs. Where an HFA's relationship with its state government is extraordinarily weak, the importance of this weakness may be greater than the standard scorecard weight and the actual rating may be lower than the scorecard-indicated outcome.

Regulatory and Policy Considerations

HFAs and their counterparties are subject to varying degrees of regulatory oversight. Effects of these regulations may entail limitations on operations and higher costs. Regional differences in regulation, implementation or enforcement may advantage or disadvantage particular issuers. Our view of future regulations plays an important role in our expectations of future financial metrics as well as our confidence level in the ability of an issuer to generate sufficient cash flows relative to its debt burden over the medium and longer term. In some circumstances, regulatory considerations may be a rating factor outside the scorecard, for instance when regulatory change is swift. Changing political considerations may also affect ratings. For instance, if federal policy changes affect funding of housing programs, ratings in this sector could be affected.

Environmental, Social and Governance (ESG) Issues

Environmental, social and governance considerations may affect the ratings of transactions in this sector, including underlying asset values. While governance is considered in the Management and Governance factor, a material weakness in governance can be more important than the standard scorecard weight, and the actual rating may be lower than the scorecard-indicated outcome. For information about our approach to assessing ESG issues, please see our methodology that describes our general principles for assessing these risks.[11]

Financial Controls

We rely on the accuracy of audited financial statements to assign and monitor ratings in this sector. The quality of financial statements may be influenced by internal controls, including the proper tone at the top, centralized operations, and consistency in accounting policies and procedures. Auditors' reports on the effectiveness of internal controls, auditors' comments in financial reports and unusual restatements of financial statements or delays in regulatory filings may indicate weaknesses in internal controls.

[11] A link to an index of our sector and cross-sector methodologies can be found in the "Moody's Related Publications" section.

Liquidity

Liquidity is an important rating consideration for all transactions in this sector, although it may not have a substantial impact in discriminating between two issues with a similar credit profile. Liquidity issues can arise when there are meaningful mismatches in the timing of cash receipts and cash outlays. We form an opinion on likely near-term liquidity requirements and the propensity of the HFA's bond transactions to introduce liquidity shortfalls from the perspective of both sources and uses of cash. Ratings can be heavily affected by extremely weak liquidity. For additional insight into general principles for assessing liquidity, please see the liquidity cross-sector rating methodology.[12]

Event Risk

We also recognize the possibility that an unexpected event could cause a sudden and sharp decline in the fundamental creditworthiness of a transaction, which may cause actual ratings to be lower than the scorecard-indicated outcome. Event risks — which are varied and can include natural disasters, legal judgments, cyber-crime events and abrupt changes in state or federal policy — can overwhelm even a stable HFA. In assessing event risk for this sector, we typically consider the nature of the disruption and the amount of lost revenue.

Assigning Issuer-Level and Instrument-Level Ratings

After considering the scorecard-indicated outcome, other rating considerations and relevant cross-sector methodologies, we typically assign an issuer rating. We may also assign instrument ratings for recourse debt obligations, including general obligation bonds, which are typically the senior-most instrument. More junior debt instrument ratings may be notched down from the senior instrument-level rating.

Assumptions

Key rating assumptions that apply in this sector include our view that sovereign credit risk is strongly correlated with that of other domestic issuers, that legal priority of claim affects average recovery on different classes of debt sufficiently to generally warrant differences in ratings for different debt classes of the same issuer, and the assumption that access to liquidity is a strong driver of credit risk.

Our forward-looking opinions are based on assumptions that may prove, in hindsight, to have been incorrect. Reasons for this could include unanticipated changes in any of the following: the macroeconomic environment, general financial market conditions, industry competition, disruptive technology, or regulatory and legal actions.

Limitations

In the preceding sections, we have discussed the scorecard factors, many of the other rating considerations that may be important in assigning ratings, and certain key assumptions. In this section, we discuss limitations that pertain to the scorecard and to the overall rating methodology.

12 A link to an index of our sector and cross-sector methodologies can be found in the "Moody's Related Publications" section.

Limitations of the Scorecard

There are various reasons why scorecard-indicated outcomes may not map closely to actual ratings.

The scorecard in this rating methodology is a relatively simple tool focused on indicators for relative credit strength. Credit loss and recovery considerations, which are typically more important as an issuer gets closer to default, may not be fully captured in the scorecard. The scorecard is also limited by its upper and lower bounds, causing scorecard-indicated outcomes to be less likely to align with ratings for issuers at the upper and lower ends of the rating scale.

The weights for each sub-factor and factor in the scorecard represent an approximation of their importance for rating decisions across the sector, but the actual importance of a particular factor may vary substantially based on an individual issuer's circumstances.

Factors that are outside the scorecard, including those discussed above in the "Other Rating Considerations" section, may be important for ratings, and their relative importance may also vary from issuer to issuer. In addition, certain broad methodological considerations described in one or more cross-sector rating methodologies may be relevant to ratings in this sector.[13] Examples of such considerations include the following: how sovereign credit quality affects non-sovereign issuers, the assessment of credit support from other entities, and the assignment of short-term ratings.

We may use the scorecard over various historical or forward-looking time periods. Furthermore, in our ratings we often incorporate directional views of risks and mitigants in a qualitative way.

General Limitations of the Methodology

This methodology document does not include an exhaustive description of all factors that we may consider in assigning ratings in this sector. Issuers in the sector may face new risks or new combinations of risks, and new strategies or structural features may be developed to mitigate risk. We seek to incorporate all material credit considerations in ratings and to take the most forward-looking perspective that visibility into these risks and mitigants permits.

Ratings reflect our expectations for the future performance of an issuer or transaction; however, as the forward horizon lengthens, uncertainty increases and the utility of precise estimates, as factor inputs or in other rating considerations, typically diminishes. In any case, predicting the future is subject to substantial uncertainty.

[13] A link to an index of our sector and cross-sector methodologies can be found in the "Moody's Related Publications" section.

Appendix A: Using the Scorecard to Arrive at a Scorecard-Indicated Outcome

1. Measurement or Estimation of Factors in the Scorecard

In the "Discussion of the Scorecard Factors" section, we explain our analytical approach for scoring each scorecard sub-factor or factor,[14] and we describe why they are meaningful as credit indicators.

The information used in assessing the sub-factors is generally found in or calculated from information in the issuer's financial statements or regulatory filings, derived from other observations or estimated by Moody's analysts. We may also incorporate non-public information.

Our ratings are forward-looking and reflect our expectations for future financial and operating performance. However, historical results are helpful in understanding patterns and trends of a company's performance as well as for peer comparisons. Historical financial ratios, unless otherwise indicated, are typically calculated based on the most recent annual statement for the program. However, the factors in the scorecard can be assessed using various time periods. For example, rating committees may find it analytically useful to examine both historical and expected future performance for periods of several years or more. In addition, qualitative sub-factors informed by financial ratios typically consider track record over the medium to long term as well as our expectations for future performance.

The quantitative credit metrics used in this methodology may incorporate analytical adjustments that are specific to a particular issuer.

2. Mapping Scorecard Factors to a Numeric Score

After estimating or calculating each sub-factor, the outcomes for each of the sub-factors are mapped to a broad Moody's rating category (Aaa, Aa, A, Baa, Ba, and B and below, also called alpha categories) and to a numeric score.

All sub-factors are qualitative, although some are informed by quantitative metrics. Sub-factor thresholds are described in broad alpha categories in the scorecard, but within that broad description for the Aa, A and Baa categories, they may be scored as strong (receiving the higher alphanumeric score in the alpha category), medium (receiving the middle alphanumeric score in the alpha category) or weak (receiving the lower alphanumeric score in the alpha category). For the Aaa, Ba, and B and below alpha categories, there is one numeric value for each alpha score. The numeric value of each alphanumeric or alpha score is shown in the table below.

Aaa	Aa1	Aa2	Aa3	A1	A2	A3	Baa1	Baa2	Baa3	Ba	B and Below
1	1.65	2	2.3	2.65	3	3.3	3.65	4	4.3	4.95	5.75

Source: Moody's Investors Service

The sub-factor score is typically assigned to the alpha category for which the issuer has the greatest number of characteristics. In most cases, to the extent that the characteristics falling outside the preponderant category are in lower alpha categories, the more likely the score will be weak within the alpha category. Conversely, to the extent that the characteristics falling outside the preponderant category are in higher alpha categories, the more likely the score will be strong within the alpha

[14] When a factor comprises sub-factors, we score at the sub-factor level. Some factors do not have sub-factors, in which case we score at the factor level.

category. However, there may be cases in which one characteristic is sufficiently important to a particular issuer that it is determinative of the factor score (including the positioning within the alpha category).

Where an HFA's aggregate portfolio is composed of more than one segment or sub-portfolio, we score the Portfolio Performance and Asset Management sub-factor and the Portfolio Characteristics sub-factor for each sub-portfolio. We use the weighted average of the scores for each sub-portfolio to arrive at an overall score for each of these sub-factors. Each sub-portfolio is weighted by the percentage share of that portfolio relative to the total dollar amount of the aggregate portfolio.

The Risk Position sub-factor score is informed by a simple tool that weights each characteristic in the scoring of this sub-factor according to our general opinion of its risk level. The higher the risk level, the greater the weight in the tool-generated score. The table below shows the score of a characteristic based on its assessed level of risk.

Highest	High	Medium	Moderate	Low
0.8	0.7	0.5	0.35	0.1

Source: Moody's Investors Service

The Risk Position score is the sum of the scores for the risk characteristics that an HFA exhibits, with a floor of 1.5. For example, an HFA with none of the 15 risk characteristics typically receives a score of 1.5. An HFA with two of the "Highest" risk characteristics and no others would typically receive a score of 1.6. These numeric scores provide guidance to the scoring of the Risk Position sub-factor but do not represent the final sub-factor score. An HFA that has five or fewer of these risk characteristics and no more than two characteristics in the "Highest" or "High" categories typically receives a score in the Aa category. An HFA with eight or fewer characteristics and no more than three in the "Highest" or "High" categories typically receives a score in the A category. An HFA with 10 or fewer characteristics and no more than four in the "Highest" or "High" categories typically receives a score in the Baa category. An HFA with more than 10 of these characteristics, including all five in the "Highest" or "High" categories, typically receives a Ba or B score for this sub-factor.

3. Determining the Overall Scorecard-Indicated Outcome

The numeric score for each sub-factor (or each factor, when the factor has no sub-factors) is multiplied by the weight for that sub-factor (or factor), with the results then summed to produce an aggregate numeric score. The aggregate numeric score is then mapped back to a scorecard-indicated outcome based on the ranges in the table below.

EXHIBIT 3

Scorecard-indicated Outcome

Scorecard-indicated Outcome	Aggregate Numeric Score
Aaa	1 ≤ x < 1.5
Aa1	1.5 ≤ x < 1.9
Aa2	1.9 ≤ x < 2.2
Aa3	2.2 ≤ x < 2.5
A1	2.5 ≤ x < 2.9
A2	2.9 ≤ x < 3.2
A3	3.2 ≤ x < 3.5
Baa1	3.5 ≤ x < 3.9
Baa2	3.9 ≤ x < 4.2
Baa3	4.2 ≤ x < 4.5
Ba	4.5 ≤ x < 5.5
B and Below	≥ 5.5

Source: Moody's Investors Service

For example, an issuer with an overall numeric score of 3.6 would have a Baa1 scorecard-indicated outcome.

Appendix B: US Housing Finance Agency Issuer Ratings Scorecard

	Factor or Sub-factor Weight	Aaa	Aa	A	Baa	Ba	B or Below
Factor: Financial Position (40%)							
Balance Sheet Strength	20%	HFA's balance sheet demonstrates very high (e.g. > 20% average over 5 years) risk-adjusted net asset as a % of bonds outstanding (Risk-Adjusted Net Asset Ratio)	HFA's balance sheet demonstrates high (e.g. 15% - 20% average over 5 years) Risk-Adjusted Net Asset Ratio	HFA's balance sheet demonstrates solid (e.g. 10%-15% average over 5 years) Risk-Adjusted Net Asset Ratio	HFA's balance sheet demonstrates satisfactory (e.g. 5%-10% average over 5 years) Risk-Adjusted Net Asset Ratio	HFA's balance sheet contains low (e.g. < 5% average over 5 years) Risk-Adjusted Net Asset Ratio but maintains sufficient coverage for risk factors	HFA's balance sheet has exhibited declines; Liabilities exceed risk-adjusted net assets (e.g. net assets are insufficient to mitigate potential risks)
		Strong and growing level of resources for maintaining HFA's creditworthiness under stressful circumstances	Ample and stable resources for maintaining HFA's creditworthiness under stressful circumstances	Solid levels of resources for maintaining HFA's creditworthiness under standard circumstances	Sufficient resources for maintaining HFA's creditworthiness under standard circumstances	Limited resources for maintaining HFA's creditworthiness under standard circumstances	Insufficient resources for maintaining HFA's creditworthiness under standard circumstances
Operating Performance	20%	Very high (e.g. above 15% average over 5 years) net revenues as a % of total revenues (Profitability)	High Profitability (e.g. 10% - 15% average over 5 years)	Solid Profitability (e.g. 5% - 10% average over 5 years)	Profitability may average below 5%. While there may be periods of losses, they are offset by risk adjusted net assets and not expected to continue	Consistent losses (negative Profitability) but they are offset by risk adjusted net assets; losses may continue in the near term	Consistent losses and net assets are not expected to cover losses
		Trends have been very favorable	Trends have been favorable	Trends have been consistent	Trends display modest weakness	Trends reveal increasing weakness	Trends reveal substantial weakness
Factor: Loan Portfolio (25%)							
Portfolio Performance and Asset Management	10%	Very strong portfolio performance (90+ days delinquent and in-foreclosure rates are typically less than 2%); trends have been very favorable	Strong portfolio performance (90+ days delinquent and in-foreclosure rates are typically 2%-5%); trends have been favorable	Good portfolio performance (90+ days delinquent and in-foreclosure rates are typically 5%-8%); trends may display modest weakness	Satisfactory portfolio performance (90+ days delinquent and in-foreclosure rates are typically 8%-12%); trends reveal increasing weaknesses	Weak portfolio performance (90+ days delinquent and in-foreclosure rates are typically 12%-20%); trends reveal substantial weaknesses	Very weak portfolio performance (90+ days delinquent and in-foreclosure rates are typically > 20%); trends reveal extreme weaknesses
		Strong and effective asset management with ability to provide quality data, meet all reporting requirements on a timely basis and a proven track record of successful loan workouts	Experienced asset management with ability to provide quality data, meet all reporting requirements on a timely basis and a proven track record with successful loan workouts	Good asset management with ability to provide data, meet most reporting requirements on a timely basis and a satisfactory record with successful loan workouts	Satisfactory asset management (may have limited staff) with occasional lapses on reporting requirements and a satisfactory record with successful loan workouts	Asset management may be inexperienced and have limited staff; lapses in meeting reporting requirements and a spotty record with successful loan workouts	Inexperienced asset management with very limited staff; challenged in meeting reporting requirements and no record with successful loan workouts

	Factor or Sub-factor Weight	Aaa	Aa	A	Baa	Ba	B or Below
		Portfolio contains nearly 100% MBS (where the obligor or guarantor is Aaa)*1					
Portfolio Characteristics	5%	More than 75% of loans carry highest quality mortgage insurance; for single family, low Loan-to-Values (LTVs)	More than 65% of loans carry highest quality mortgage insurance; for single family, low LTVs	More than 50% of loans carry highest quality mortgage insurance; for single family, low LTVs	Less than 50% of loans carry highest quality mortgage insurance; for single family, low LTVs; may contain up to 70% of unenhanced affordable multifamily housing loans	Low quality mortgage insurance; for single family, high LTVs; primarily unenhanced affordable multifamily housing loans	A substantial portion of the portfolio does not have mortgage insurance; for single family, high LTVs
		More than 90% of loan types are fixed-rate, level-payment; for multifamily, stabilized, fully amortizing loans with no construction or lease-up risk	75%-90% of loan types are fixed-rate, level-payment; for multifamily, majority of loans are stabilized and fully amortizing, with less than 10% of unenhanced construction loans or lease-up risk	60%-75% of loan types are fixed-rate, level-payment; for multifamily, majority of loans are stabilized and fully amortizing, with less than 20% of unenhanced construction loans or lease-up risk	50%-60% of loan types are fixed-rate, level-payment; for multifamily, majority of loans are stabilized and fully amortizing, with less than 30% of unenhanced construction loans or lease-up risk	40%-50% of loan types are fixed-rate, level-payment; for multifamily, some loans are not fully amortizing, with up to 40% of unenhanced construction loans or lease-up risk	Less than 40% of loan types are fixed-rate, level-payment; for multifamily, most loans may not be fully amortizing, of which majority are unenhanced construction loans or lease-up risk
		Extremely well-distributed portfolio regarding vintages (single family) and borrowers (multifamily)	Very well-distributed portfolio regarding vintages (single family) and borrowers (multifamily)	Well-distributed portfolio regarding vintages (single family) and borrowers (multifamily)	Slightly concentrated portfolio, regarding vintages (single family) and borrowers (multifamily)	Concentrated portfolio in weaker vintages (single family) and borrowers (multifamily)	Very concentrated portfolio regarding weak vintages (single family) and borrowers (multifamily)
		Portfolio contains nearly 100% MBS (where the obligor or guarantor is Aaa)*1					

	Factor or Sub-factor Weight	Aaa	Aa	A	Baa	Ba	B or Below
Factor: Risk Profile (20%)							
Risk Position	10%	Very conservative risk position. Minimal operational and credit risks that are unlikely to affect an HFA's financial strength, as indicated by an HFA that has none of the risk factors categorized below:	Conservative risk position with limited operational and credit risks which may have nominal effect on an HFA's financial strength as measured by an HFA that has five or less of the specific risk factors and no more than two from the top two broad categories below:	Moderate risk position with several operational and credit risks which could affect an HFA's financial strength as measured by an HFA that has eight or less of the specific risk factors and no more than three from the top two broad categories below:	Satisfactory risk position. Numerous operational and credit risks that may weaken an HFA's financial strength, as indicated by an HFA that has ten or fewer of the specific risk factors and no more than four from the top two broad categories below:	Aggressive risk position. Substantial operational and credit risks that may deteriorate an HFA's financial strength, as indicated by an HFA that has twelve or fewer of the specific risk factors and all five in the top two broad categories below:	Very aggressive risk position. Significant operational and credit risks that are highly likely to deteriorate an HFA's financial strength, as indicated by an HFA that has more than twelve of the specific risk factors and all five in the top two broad categories below:
		1 Highest: Debt supported by self-liquidity or MBS servicing 2 High: Variable-rate debt > 25%, Fannie Mae risk-sharing single family loans, or unenhanced construction loans 3 Medium: Unenhanced multifamily projects, FHA risk-sharing multifamily loans, derivative instruments, geographic concentration, or non-housing loans 4 Moderate: Secondary market activity managed in-house, mortgage warehousing, whole loan self-servicing, or unsecured debt 5 Low: Secondary market activity managed by a third party					
Risk Management Infrastructure	5%	Superior management depth and risk governance structure with abundant talent and robust succession planning	Very good management depth and risk governance structure with strong talent and excellent succession planning	Good management depth and risk governance structure with satisfactory talent and succession planning	Key person risk may be present; although there is limited succession planning, it is expected that key positions could be covered and filled quickly	Key person risk is present with limited succession planning; no risk governance structure	Key person risk is present with no succession planning; no risk governance structure
		Very high awareness of new and existing risk initiatives by both the board and senior management	High awareness of new and existing risk initiatives by both the board and senior management	Solid awareness of new and existing risk initiatives by both the board and senior management	Adequate awareness of new and existing risk initiatives by both the board and senior management	Poor awareness of new and existing risk initiatives by both the board and senior management	No awareness of new and existing risk initiatives by both the board and senior management
		Risk management is a key component of decision-making process	Risk management is a major component of decision-making process	Risk management is an important component of decision-making process	Risk management is part of the decision-making process	Risk management is occasionally considered in the decision-making process	No risk management discussion

	Factor or Sub-factor Weight	Aaa	Aa	A	Baa	Ba	B or Below
Factor: Management and Operating Environment (20%)							
Management and Governance	15%	Superior management with substantial financial and personnel resources available to maintain and grow the HFA's financial position	Strong management with significant financial and personnel resources available to maintain the HFA's financial position	Solid management with significant financial and personnel resources to maintain the HFA's financial position	Adequate management with sufficient financial and personnel resources to maintain the HFA's financial position	Poor management or oversight with limited financial or personnel resources	Lack of management or oversight with very limited financial or personnel resources
		Ability and willingness to act swiftly and appropriately to address challenges	Ability and willingness to act promptly and appropriately to address challenges	Ability and willingness to act appropriately and in a timely manner to address challenges	Ability and willingness to act appropriately to address challenges, potentially with delays	Minimal board involvement	Minimum to no board involvement
		Superior governance with highly experienced and involved board members providing oversight	Strong governance with very experienced and involved board members providing oversight	Capable governance with experienced and involved board members providing oversight	Capable governance with experienced and involved board members providing oversight	Weak governance with less experienced board members providing minimal oversight	Very weak governance with inexperienced and uninvolved board members
Operating Environment	5%	Strong relationship with state and federal governments; no potential for a required transfer of funds to the state for other purposes (required transfer) in the near term	Strong relationship with state and local governments; little to no potential for a required transfer in the near term	Good relationship with state and federal governments; some potential for a required transfer in the near term	Cordial relationship with state and federal governments; potential required transfer in sight	Weak relationship with state and federal governments; potential required transfer in sight; minimal future prosperity potential	Very weak relationship with state and federal governments; imminent required transfer in sight
		Very strong presence in the state's housing market	Strong presence in the state's housing market	Good presence in the state's housing market	Satisfactory presence in the state's housing market	Weak presence in the state's housing market	Extremely weak presence in the state's housing market
		Very strong housing fundamentals with projected favorable trends; and home price appreciation or decline of less than 5% (from peak); and less than 5% state multifamily vacancy rates	Strong housing fundamentals with projected favorable trends; may have 5%-10% in home price declines (from peak), or state multifamily vacancy rates 5%-10%	Good housing fundamentals with projected stabilizing trends; may have 10%-15% in home price declines (from peak), or state multifamily vacancy rates 5%-10%	Satisfactory housing fundamentals with projected stabilizing trends; may have 15%-20% in home price declines (from peak) or state multifamily vacancy rates 10%-15%	Weak housing fundamentals with projected negative trends; or 20%-40% in home price declines (from peak) or state multifamily vacancy rates 15%-20%	Very weak housing fundamentals demonstrating extremely negative trends; or over 40% in home price declines (from peak) or state multifamily vacancy rates over 20%
		Employment and other economic indicators support stability in the housing market	Employment and other economic indicators support stability in the housing market	Employment and other economic indicators show some weakness in the housing market	Employment and other economic indicators show weakness about housing market	Employment and other economic indicators are substantially below the national average	Employment and other economic indicators are far below the national average

**1 If the obligor or guarantor were rated lower than Aaa, the score would be the broad alpha or alphanumeric category that corresponds to the rating.*

Source: Moody's Investors Service

Appendix C: Analytical Adjustments to HFA and Their Bond Programs' Financial Statements

This appendix describes our analytical adjustments to the financial statements of HFAs and their bond programs. We adjust reported financial statements to better reflect the underlying financial positions of HFAs and to improve the comparability of financial data.

Our adjustments do not imply that an HFA's financial statements fail to comply with applicable accounting rules. Our goal is to enhance the analytical value of financial data for credit analysis.

In general, we adjust intangible items on the statement of net assets and on the statement of revenues, expenses and changes in net assets. Intangible items may include deferred issuance costs, amortization of the bond discount, custodial funds, certain assets relating to state-sponsored mortgage insurers, and public housing operations. The following sections describe our typical adjustments.[15]

Adjustments to the Statement of Net Assets

We may make adjustments to a specific HFA's statement of net assets to reflect situations that are specific to a particular HFA.

Bonds Payable

For the amount of bonds payable, we use the par amount of bonds outstanding, eliminating the effect of unamortized discounts or premiums.

Custodial Funds

Many state HFAs have custodial funds, which are funds the HFA administers on behalf of others, including funds held on behalf of project owners to pay property taxes and property and casualty insurance premiums. The HFA holds these custodial funds until they are due to the taxing authority or the insurer. We adjust the HFA's balance sheet by subtracting the amount of custodial funds from the HFA's assets and the corresponding accrued liabilities from the HFA's liabilities.

Depreciation

For HFAs that include depreciation on their statement of net assets and on their statement of revenues, expenses and changes in net assets, we add back accumulated depreciation to calculate total assets and the surplus.

Investments

We adjust an HFA's investments by subtracting unamortized discounts or premiums. In our calculations, we reverse the effect of gains or losses related to Governmental Accounting Standards Board (GASB) Statement 31, which establishes fair value standards for investment reporting for public sector entities. Most investments held by an HFA for its bond programs are typically held until maturity. The annual or cumulative gain or loss in market or fair value, therefore, is not generally realized.

[15] In this appendix, references to an HFA signify both the HFA and its bond programs. We may not make adjustments when items are immaterial.

In our calculations, we may adjust investments (or other items) based on non-public information or our own estimates, for example if the HFA's financial statements or other disclosures do not include information related to the par value of investments.

Loans Receivable

We adjust loans receivable to eliminate the effect of premiums and discounts by using the par amount of the loans. When an HFA purchases mortgage loans at a discount, the amount reported in the statement of net assets is lower than the actual amount of loan principal outstanding, because GASB rules generally require certain assets to be carried at the lower of cost or current value. We use the par amount of loans receivable, which often results in a higher amount of assets than reported by the HFA and which facilitates greater comparability across bond programs.

We also adjust loans receivable to eliminate the effects of any material loan loss set-aside. While some HFAs set aside certain monies they believe are uncollectible, we add back loan loss reserves and, as described in Appendix D, use our loan loss calculator to project the losses to a single-family program and, as described in Appendix E, use a benchmarking approach to project the losses to a multifamily program. These projections incorporate our default and recovery assumptions. By using the par amount of loans rather than the net amount after the loan loss reserve, which reflects the HFA's loss assumptions, we avoid double counting of loan loss assumptions.

Segregation of Certain Funds

In cases where an HFA houses a state-sponsored mortgage insurance program, we exclude the insurance assets and liabilities from the statement of net assets. These assets typically can be used only for insurance claims and are not available to purchase mortgage loans or pay debt service.

We exclude HFA funds and other assets associated with public housing authority (PHA) functions or other governmental activities. If a state HFA is also a PHA, we exclude PHA funds and other assets from the statement of net assets, because federal government subsidies represent the primary source of PHA revenue and are intended for specific public housing purposes rather than for HFA bond-related activities. We also exclude funds and other assets associated with certain state-sponsored activities that the HFA manages on behalf of its parent government, such as grants and pass-through programs, or related funds for which the HFA serves as a custodian.

Derivative Instruments

We exclude from the statement of net assets fair value adjustments for derivative instruments, such as swaps and interest rate caps, classified as effective derivative hedging instruments, pursuant to GASB Statement No. 53.

Adjustments to the Statement of Revenues, Expenses and Changes in Net Assets

We may make adjustments to a specific HFA's statement of revenues, expenses and changes in net assets to reflect situations that are specific to a particular HFA.

General Adjustments

We subtract the effect of annual changes to the following items:

» Depreciation.

» Gains or losses on the reported value of the investments.

» Loan losses.

» Changes in the fair value of derivative instruments.

Operating versus Non-Operating Revenue and Expenses

In some cases, a statement of revenues, expenses and changes in net assets includes certain entries that are not regularly part of the HFA's annual revenue or expenses.

Generally, we consider the following items to be operating revenue:

» Mortgage loan interest.

» Investment interest.

» Loan and program fees.

» Trade premiums on to-be-announced (TBA) mortgage-backed securities.

Generally, we consider the following items to be operating expenses:

» Interest expense.

» Administrative expenses.

» Pool policy fees.

» Cost of terminating TBA hedges.

Essentially all other revenue and expenses are typically classified as non-recurring or non-operating entries and are not considered part of ongoing operations. We include these items in total revenue or total expenses, but as non-operating revenue or a non-operating expense. An example of non-operating revenue is a realized gain on an investment.

Appendix D: Loan Loss Analysis for HFA Single-Family Housing Bond Programs

In this appendix, we discuss the stress case loan loss projections used in our ratio analysis for whole loan single-family housing bond programs. In assessing the balance sheet strength of an HFA's single-family housing bond program, we consider the program's ability to withstand loan losses under a stress scenario to maintain its Risk-adjusted Net Asset Ratio described under the Financial Position factor.

Our loan loss projections incorporate stress case assumptions about the probability of default and the loss given default of the loans in an HFA's single-family housing loan portfolio. The projected loan loss is the product of the default probability and the loss given default.

Loan Loss Calculation Inputs

For most HFA single-family portfolios, we conduct our loan loss analysis on a portfolio-wide basis; however, for higher-risk programs, we may conduct the analysis on a loan-by-loan basis.

Portfolio-Wide Analysis

In developing stress case loan loss projections on a portfolio-wide basis, we generally use the following information:

» The principal balance of the mortgage loans outstanding.

» The number of mortgage loans outstanding.

» The weighted-average interest rate.

» The percentage of the portfolio covered by each insurance provider.

» The percentage of the portfolio that is uninsured.

» A comparison of the original loan-to-value ratio and the current loan-to-value ratio (i.e., the current loan outstanding/the purchase price of the home), broken down by each mortgage insurer.

For certain portfolios we may consider additional portfolio data for each mortgage loan type (e.g., 30-years of level monthly payments or monthly interest-only payments), or for each vintage (i.e., the year of mortgage origination).

Loan-by-Loan Analysis

In developing stress case loan loss projections for each loan in the loan portfolio, we generally use the following information:

» The mortgage loan type.

» The original mortgage loan amount and the original appraised value to arrive at the loan-to-value ratio.

» The lien position (e.g., first lien or second lien).

» The current mortgage loan balance.

» The interest rate.

» The original underwriting data (e.g., FICO score and the level of documentation).

» The loan status (whether it is current, or the number of days delinquent).

» The location of the property.

Assumptions

Probability of Default

For the purpose of our loan loss calculations, probability of default represents the percentage of loans projected to default over the life of the HFA's bond program (i.e., the cumulative default rate). We establish an annual base case default rate assumption for each bond program after considering the program's historical levels of default and trends in delinquency and foreclosure within the portfolio, as well as delinquency and foreclosure rates for loans within the HFA's state that are insured by the Federal Housing Administration (FHA). [16] The base case cumulative default rate is equal to the roll-forward amount assuming that the annual base case default rate is the same for the subsequent three years. The cumulative base case default rate is capped at 75%.

To arrive at the stress case default probabilities used in the calculator, we then apply multiples to the base case probabilities. The multiples are based on the bond program's expected rating,[17] using the values shown in the table below.

[16] FHA loans are considered in this analysis because HFA borrowers have many of the same characteristics as FHA borrowers.

[17] The initial expected rating is typically the bond program's existing rating or is based on our estimate of the ability of the bond program to sustain a certain percentage of loan losses. Where the resulting scorecard-indicated outcome incorporating stress case loan losses is not consistent with the expected rating used in this lookup, we may employ an iterative approach.

EXHIBIT 4

Multiples to Base Case Probabilities Based on Bond Program's Expected Rating

Roll Forward %	C	Ca	Caa3	Caa2	Caa1	B3	B2	B1	Ba3	Ba2	Ba1	Baa3	Baa2	Baa1	A3	A2	A1	Aa3	Aa2	Aa1	Aaa
0.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.23	1.37	1.50	1.67	1.83	2.0	2.2	2.7	3.00	3.30	4.50	5.00	5.50	7.00
0.25%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.22	1.36	1.49	1.66	1.82	1.98	2.19	2.66	2.97	3.29	4.41	4.91	5.47	6.88
0.50%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.21	1.34	1.48	1.64	1.81	1.96	2.18	2.61	2.94	3.29	4.31	4.81	5.44	6.75
0.75%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.20	1.33	1.46	1.63	1.80	1.94	2.16	2.57	2.91	3.28	4.22	4.72	5.41	6.63
1.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.19	1.31	1.45	1.61	1.79	1.93	2.15	2.53	2.88	3.28	4.13	4.63	5.38	6.50
1.25%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.18	1.30	1.44	1.60	1.78	1.91	2.14	2.48	2.84	3.27	4.03	4.53	5.34	6.38
1.50%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.17	1.28	1.43	1.58	1.77	1.89	2.13	2.44	2.81	3.26	3.94	4.44	5.31	6.25
1.75%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.16	1.27	1.41	1.57	1.76	1.87	2.11	2.39	2.78	3.26	3.84	4.34	5.28	6.13
2.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.15	1.25	1.40	1.55	1.75	1.85	2.10	2.35	2.75	3.25	3.75	4.25	5.25	6.00
2.25%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.15	1.25	1.39	1.54	1.74	1.84	2.09	2.34	2.72	3.19	3.69	4.19	5.13	5.88
2.50%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.15	1.25	1.39	1.53	1.73	1.83	2.08	2.33	2.69	3.13	3.63	4.13	5.00	5.75
2.75%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.15	1.25	1.38	1.51	1.71	1.81	2.06	2.31	2.66	3.06	3.56	4.06	4.88	5.63
3.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.15	1.25	1.38	1.50	1.70	1.80	2.05	2.30	2.63	3.00	3.50	4.00	4.75	5.50
3.25%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.15	1.25	1.37	1.49	1.69	1.79	2.04	2.29	2.59	2.94	3.44	3.94	4.63	5.38
3.50%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.15	1.25	1.36	1.48	1.68	1.78	2.03	2.28	2.56	2.88	3.38	3.88	4.50	5.25
3.75%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.15	1.25	1.36	1.46	1.66	1.76	2.01	2.26	2.53	2.81	3.31	3.81	4.38	5.13
4.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.15	1.25	1.35	1.45	1.65	1.75	2.00	2.25	2.50	2.75	3.25	3.75	4.25	5.00
4.25%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.15	1.24	1.35	1.44	1.63	1.73	1.98	2.23	2.47	2.72	3.22	3.72	4.22	4.94
4.50%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.15	1.24	1.34	1.43	1.61	1.71	1.96	2.20	2.44	2.69	3.19	3.69	4.19	4.88
4.75%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.15	1.23	1.33	1.41	1.59	1.69	1.94	2.18	2.41	2.66	3.16	3.66	4.16	4.81
5.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.15	1.23	1.33	1.40	1.58	1.68	1.93	2.15	2.38	2.63	3.13	3.63	4.13	4.75
5.50%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.15	1.21	1.31	1.38	1.54	1.64	1.89	2.10	2.31	2.56	3.06	3.56	4.06	4.63
6.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.15	1.20	1.30	1.35	1.50	1.60	1.85	2.05	2.25	2.50	3.00	3.50	4.00	4.50
6.50%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.15	1.20	1.30	1.35	1.49	1.59	1.84	2.03	2.23	2.47	2.94	3.42	3.90	4.38
7.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.14	1.20	1.30	1.35	1.48	1.58	1.83	2.02	2.21	2.44	2.88	3.33	3.79	4.25
7.50%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.14	1.20	1.30	1.35	1.48	1.58	1.81	2.00	2.19	2.41	2.81	3.25	3.69	4.13
8.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.13	1.20	1.30	1.35	1.47	1.57	1.80	1.98	2.17	2.38	2.75	3.17	3.58	4.00
8.50%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.13	1.20	1.30	1.35	1.46	1.56	1.79	1.97	2.15	2.35	2.69	3.08	3.48	3.88

EXHIBIT 4

Multiples to Base Case Probabilities Based on Bond Program's Expected Rating

Roll Forward %	C	Ca	Caa3	Caa2	Caa1	B3	B2	B1	Ba3	Ba2	Ba1	Baa3	Baa2	Baa1	A3	A2	A1	Aa3	Aa2	Aa1	Aaa
9.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.13	1.20	1.30	1.35	1.45	1.55	1.78	1.95	2.13	2.32	2.63	3.00	3.38	3.75
9.50%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.12	1.20	1.30	1.35	1.44	1.54	1.76	1.93	2.10	2.28	2.56	2.92	3.27	3.63
10.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.12	1.20	1.30	1.35	1.43	1.53	1.75	1.92	2.08	2.25	2.50	2.83	3.17	3.50
11.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.11	1.20	1.30	1.35	1.42	1.52	1.73	1.88	2.04	2.19	2.38	2.67	2.96	3.25
12.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.10	1.20	1.30	1.35	1.40	1.50	1.70	1.85	2.00	2.13	2.25	2.50	2.75	3.00
13.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.10	1.19	1.28	1.33	1.39	1.49	1.68	1.83	1.95	2.10	2.21	2.43	2.65	2.88
14.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.10	1.18	1.25	1.30	1.39	1.48	1.65	1.80	1.90	2.07	2.18	2.35	2.55	2.75
15.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.10	1.16	1.23	1.28	1.38	1.46	1.63	1.78	1.85	2.03	2.14	2.28	2.45	2.63
16.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.10	1.15	1.20	1.25	1.37	1.45	1.60	1.75	1.80	2.00	2.10	2.20	2.35	2.50
17.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.10	1.15	1.20	1.25	1.37	1.44	1.58	1.73	1.78	1.95	2.08	2.16	2.29	2.44
18.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.10	1.15	1.20	1.25	1.36	1.43	1.55	1.70	1.75	1.90	2.05	2.13	2.23	2.38
19.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.10	1.15	1.20	1.25	1.36	1.41	1.53	1.68	1.73	1.85	2.03	2.09	2.20	2.31
20.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.10	1.15	1.20	1.25	1.35	1.40	1.50	1.65	1.70	1.80	2.00	2.05	2.15	2.25
21.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.10	1.15	1.20	1.25	1.34	1.39	1.49	1.63	1.67	1.77	1.97	2.02	2.12	2.21
22.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.10	1.15	1.20	1.25	1.34	1.39	1.47	1.60	1.65	1.74	1.94	1.98	2.08	2.18
22.50%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.10	1.15	1.20	1.25	1.33	1.38	1.47	1.59	1.64	1.73	1.92	1.97	2.06	2.16
23.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.10	1.15	1.20	1.25	1.33	1.38	1.46	1.58	1.63	1.72	1.91	1.95	2.05	2.14
24.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.10	1.15	1.20	1.24	1.33	1.37	1.45	1.57	1.61	1.69	1.88	1.92	2.02	2.11
25.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.10	1.15	1.20	1.24	1.32	1.37	1.44	1.55	1.59	1.67	1.85	1.90	1.99	2.08
26.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.10	1.15	1.20	1.24	1.32	1.36	1.43	1.53	1.58	1.65	1.83	1.87	1.96	2.06
27.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.10	1.15	1.20	1.24	1.31	1.35	1.42	1.52	1.56	1.63	1.81	1.85	1.94	2.03
27.50%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.10	1.15	1.20	1.24	1.31	1.35	1.42	1.51	1.55	1.62	1.80	1.84	1.93	2.02
28.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.10	1.15	1.20	1.24	1.31	1.35	1.41	1.51	1.55	1.61	1.78	1.83	1.92	2.01
29.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.10	1.15	1.20	1.24	1.30	1.34	1.41	1.49	1.53	1.60	1.76	1.81	1.90	1.98
30.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.10	1.15	1.20	1.24	1.30	1.34	1.40	1.48	1.52	1.58	1.74	1.79	1.87	1.96
31.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.10	1.15	1.20	1.24	1.30	1.34	1.39	1.47	1.51	1.57	1.72	1.77	1.85	1.94
32.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.10	1.15	1.20	1.24	1.29	1.33	1.39	1.46	1.50	1.56	1.70	1.75	1.83	1.92
33.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.10	1.15	1.20	1.24	1.29	1.33	1.38	1.45	1.49	1.54	1.68	1.73	1.81	1.89

EXHIBIT 4

Multiples to Base Case Probabilities Based on Bond Program's Expected Rating

Roll Forward %	C	Ca	Caa3	Caa2	Caa1	B3	B2	B1	Ba3	Ba2	Ba1	Baa3	Baa2	Baa1	A3	A2	A1	Aa3	Aa2	Aa1	Aaa
34.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.10	1.15	1.20	1.24	1.29	1.33	1.38	1.44	1.48	1.53	1.66	1.71	1.79	1.87
35.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.10	1.15	1.20	1.24	1.29	1.32	1.37	1.44	1.47	1.52	1.64	1.69	1.77	1.85
36.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.10	1.15	1.20	1.24	1.28	1.32	1.37	1.43	1.46	1.51	1.63	1.67	1.75	1.83
37.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.10	1.15	1.20	1.23	1.28	1.32	1.36	1.42	1.45	1.50	1.61	1.65	1.73	1.81
38.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.10	1.15	1.20	1.23	1.28	1.31	1.36	1.41	1.45	1.49	1.59	1.63	1.71	1.79
39.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.10	1.15	1.20	1.23	1.28	1.31	1.35	1.41	1.44	1.48	1.57	1.61	1.69	1.77
40.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.10	1.15	1.20	1.23	1.28	1.31	1.35	1.40	1.43	1.48	1.56	1.59	1.67	1.75
41.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.10	1.15	1.20	1.23	1.27	1.31	1.35	1.39	1.43	1.47	1.54	1.58	1.66	1.73
42.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.10	1.15	1.20	1.23	1.27	1.30	1.34	1.39	1.42	1.46	1.52	1.56	1.64	1.71
43.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.10	1.15	1.20	1.23	1.27	1.30	1.34	1.38	1.41	1.45	1.51	1.55	1.62	1.70
44.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.10	1.15	1.20	1.23	1.27	1.30	1.34	1.38	1.41	1.45	1.49	1.53	1.60	1.68
45.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.10	1.15	1.20	1.23	1.27	1.30	1.33	1.37	1.40	1.44	1.48	1.51	1.59	1.66
46.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.10	1.15	1.20	1.23	1.27	1.30	1.33	1.37	1.40	1.43	1.47	1.50	1.57	1.65
47.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.10	1.15	1.20	1.23	1.26	1.29	1.33	1.36	1.39	1.43	1.46	1.50	1.56	1.63
48.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.10	1.15	1.20	1.23	1.26	1.29	1.33	1.36	1.39	1.42	1.45	1.49	1.55	1.62
49.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.10	1.15	1.20	1.23	1.26	1.29	1.32	1.35	1.38	1.42	1.45	1.48	1.53	1.60
50.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.10	1.15	1.20	1.23	1.26	1.29	1.32	1.35	1.38	1.41	1.44	1.47	1.52	1.59
51.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.10	1.15	1.20	1.22	1.25	1.28	1.31	1.34	1.37	1.40	1.43	1.46	1.51	1.58
52.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.10	1.14	1.19	1.22	1.25	1.28	1.31	1.34	1.37	1.40	1.43	1.46	1.50	1.57
53.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.09	1.14	1.19	1.22	1.24	1.27	1.30	1.33	1.36	1.39	1.42	1.45	1.49	1.55
54.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.09	1.14	1.18	1.21	1.24	1.27	1.30	1.33	1.36	1.39	1.41	1.44	1.48	1.54
55.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.09	1.13	1.18	1.21	1.23	1.26	1.29	1.32	1.35	1.38	1.41	1.44	1.48	1.53
56.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.09	1.13	1.17	1.20	1.23	1.26	1.29	1.32	1.35	1.38	1.40	1.43	1.47	1.52
57.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.09	1.13	1.17	1.20	1.22	1.25	1.28	1.31	1.34	1.37	1.40	1.42	1.46	1.51
58.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.08	1.13	1.17	1.19	1.22	1.25	1.28	1.31	1.34	1.37	1.39	1.42	1.45	1.50
59.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.08	1.12	1.16	1.19	1.22	1.24	1.27	1.30	1.33	1.36	1.39	1.41	1.45	1.49
60.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.08	1.12	1.16	1.19	1.21	1.24	1.27	1.30	1.33	1.36	1.38	1.41	1.44	1.48
61.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.08	1.12	1.16	1.18	1.21	1.23	1.26	1.30	1.33	1.35	1.38	1.40	1.43	1.47

EXHIBIT 4

Multiples to Base Case Probabilities Based on Bond Program's Expected Rating

Roll Forward %	C	Ca	Caa3	Caa2	Caa1	B3	B2	B1	Ba3	Ba2	Ba1	Baa3	Baa2	Baa1	A3	A2	A1	Aa3	Aa2	Aa1	Aaa
62.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.08	1.12	1.15	1.18	1.20	1.23	1.26	1.29	1.32	1.35	1.37	1.40	1.43	1.47
63.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.08	1.11	1.15	1.18	1.20	1.23	1.26	1.29	1.32	1.34	1.37	1.39	1.42	1.46
64.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.07	1.11	1.15	1.17	1.20	1.22	1.25	1.28	1.31	1.34	1.36	1.39	1.42	1.45
65.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.07	1.11	1.14	1.17	1.19	1.22	1.25	1.28	1.31	1.34	1.36	1.38	1.41	1.44
66.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.07	1.11	1.14	1.17	1.19	1.21	1.25	1.28	1.31	1.33	1.36	1.38	1.40	1.43
67.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.07	1.10	1.14	1.16	1.19	1.21	1.24	1.27	1.30	1.33	1.35	1.38	1.40	1.43
68.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.07	1.10	1.14	1.16	1.18	1.21	1.24	1.27	1.30	1.32	1.35	1.37	1.39	1.42
69.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.07	1.10	1.13	1.16	1.18	1.20	1.24	1.27	1.30	1.32	1.34	1.37	1.39	1.41
70.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.07	1.10	1.13	1.15	1.18	1.20	1.23	1.26	1.29	1.32	1.34	1.36	1.38	1.41
71.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.06	1.10	1.13	1.15	1.18	1.20	1.23	1.26	1.29	1.31	1.34	1.36	1.38	1.40
72.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.06	1.10	1.13	1.15	1.17	1.20	1.23	1.26	1.29	1.31	1.33	1.36	1.37	1.39
73.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.06	1.09	1.12	1.15	1.17	1.19	1.22	1.25	1.29	1.31	1.33	1.35	1.37	1.37
74.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.06	1.09	1.12	1.14	1.17	1.19	1.22	1.25	1.28	1.31	1.33	1.35	1.35	1.35
75.00%	-0.99	0.35	0.65	0.80	0.90	0.95	1.00	1.06	1.09	1.12	1.14	1.16	1.19	1.22	1.25	1.28	1.30	1.32	1.33	1.33	1.33

Source: Moody's Investors Service

The stress case default probability used in the loan loss calculation is also subject to a minimum probability of default based on the expected rating of the bond program (please see Exhibit 5). The higher the expected rating of the bond program, the higher the minimum stress case probability of default we apply to the bond program.

EXHIBIT 5

Minimum Probabilities of Default Based on Expected Rating of the Bond Program

Program Rating	PD Minimum
Aaa	25%
Aa1	20%
Aa2	20%
Aa3	20%
A1	15%
A2	15%
A3	15%
Baa1	10%
Baa2	10%
Baa3	10%
Ba1	5%

Source: Moody's Investors Service

Loss Given Default

For the purpose of our loan loss calculations, loss given default is the magnitude of the loss on defaulted loans. We estimate this loss as the principal balance at default plus interest and costs between default and final recovery, less recovered funds from the foreclosure sale and any mortgage insurance. For the percentage of loans that are assumed to default in the stress scenario, we estimate loss on foreclosure based on the level of home price change of single-family homes within the state from peak to trough within the housing real estate cycle. For the level of home price change, we use the most recent state-specific house price index from the Federal Housing Finance Agency.

We add lost interest as well as legal fees and other costs of maintaining the property prior to sale. These additional costs are based on the timeline from default to foreclosure to disposition of the real estate owned (REO) experienced by the program, as well as the published data for the state where the HFA is located. We reduce the loss by assumed recovery from mortgage insurance (including both primary insurance and pool insurance) based on the level of coverage provided by the insurance. We give credit to the mortgage insurance, based on the terms of the contract regarding depth of coverage for the HFA's loan losses as well as the insurer's rating. The percentage of credit given is based on the Insurance Financial Strength Rating of the insurance provider.[18] We may also incorporate rates of rejection, rescission, curtailments and denial of claims based on the performance of individual programs or issuers.

Some programs also benefit from pool insurance, which is additional insurance coverage on one or more pools of loans in the bond program. Pool insurance, which is typically written by PMI providers, generally pays losses after recovery on the PMI and foreclosure of the loan, as specified in the pool contract. We subject pool coverage to the same haircuts we apply to PMI.

[18] Please see Appendix F. In the case of a US government insurance program, e.g., FHA insurance, the percentage of credit given is based on the rating of the US government. For a description of the Insurance Financial Strength Rating, please see *Rating Symbols and Definitions*. A link can be found in the "Moody's Related Publications" section.

Appendix E: Multifamily Mortgage Loans — Benchmarking Analysis

This appendix provides information about our approach to assessing the value of an HFA's multifamily mortgage loan pool use a benchmarking analysis. We calculate or estimate the potential loss on each mortgage loan by comparing sector-wide debt service coverage ratio (DSCR) benchmarks established by specific loan type and rating level to the DSCR of the multifamily loans in the HFA's portfolio. Based on the results, we arrive at a capital charge for the multifamily loan portfolio.

Benchmarking Analysis

In our benchmarking analysis, we start by calculating the DSCR for each property. The ratio's numerator is the property's total annual revenue (primarily rental revenue) less operating expenses (including capital maintenance expenditures). The denominator is the annual mortgage loan debt service.[19]

We then compare the DSCR for each property to a benchmark DSCR developed from time to time based on the sector, peer comparisons, the loan type and the issuer rating level. For properties in the portfolio with a DSCR at or above the benchmark, we use the full value of the loan (i.e., the adjusted loan balance equals the outstanding loan balance). For properties in the portfolio that have a DSCR below the benchmark, we use the adjusted loan balance, which is less than the full value of the loan.

The numerator of the loan valuation ratio is the DSCR of the multifamily loan, and the denominator is benchmark DSCR for that loan.

We then multiply the loan valuation ratio by the outstanding loan principal balance to arrive at an adjusted loan principal balance, which is no higher than the outstanding loan balance. The difference between the adjusted loan principal balance and the outstanding loan principal balance for each of the properties is summed for the entire portfolio. This total is then applied as a capital charge in calculating the Risk-adjusted Net Asset Ratio in the Balance Sheet Strength scorecard sub-factor.

We also apply the following additional criteria:

» For loans that are insured or guaranteed, we assign an adjusted loan principal balance value that depends on the type and level of insurance, the rating of the insurer and the rating of the HFA. For example, a loan that is fully guaranteed by Ginnie Mae would typically be assigned a full value regardless of the difference between the loan's DSCR and the benchmark. As another example, a loan that is insured standard FHA insurance is typically assigned a value of 99% based on the parameters of the insurance.

» In cases where there is no current DSCR for the loan because the property is in the construction or lease-up phase, we assign an adjusted value that reflects those risks, usually a 25% discount to the outstanding loan balance (i.e., a loan valuation ratio of 0.75).

» Loans for which there is no current DSCR because it is unavailable to the issuer are typically assigned a DSCR that is just below 1x in cases where the project is current on its payments, or lower where there is a history of delayed payments. The valuation ratio is calculated based on this assigned DSCR.

19 For non-fully amortizing loans (e.g., bullet or balloon loans), we typically benchmark the loans at zero in cases where they are approaching the maturity date and refinancing has not been arranged.

Appendix F: Claims-Payment Assumptions for US Mortgage Insurance, by Insurer Rating

The table below lists the claims-payment assumptions for US mortgage insurance that we use in our loan loss calculations (please see Appendix D).

EXHIBIT 6

US Mortgage Insurer Financial Strength Rating	Claims-Payment Assumption
Aaa	100%
Aa1	70%
Aa2	60%
Aa3	50%
A1	40%
A2	35%
A3	30%
Baa1	25%
Baa2	20%
Baa3	17.5%
Ba1	15%
Ba2	12.5%
Ba3	10%
B1	9%
B2	8%
B3	7%
< B3	0%

Source: Moody's Investors Service

Moody's Related Publications

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

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

For further information, please refer to *Rating Symbols and Definitions*, which is available here.

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