



FEDERAL HOUSING FINANCE AGENCY

ADVISORY BULLETIN

AB 2018-02

FEDERAL HOME LOAN BANK USE OF MODELS AND METHODOLOGIES FOR INTERNAL ASSESSMENTS OF MORTGAGE ASSET CREDIT RISK

Purpose

This Advisory Bulletin provides Federal Housing Finance Agency (FHFA) guidance for Federal Home Loan Bank (Bank) use of models and methodologies to assess credit risk associated with mortgage assets, including Acquired Member Asset (AMA) mortgage pools, mortgage-backed securities (MBS), and collateralized mortgage obligations (CMOs), as required by FHFA regulations. This guidance supplements more general guidance issued by FHFA on model risk management by describing minimally acceptable criteria in selecting a mortgage asset credit risk model and the associated input of a macroeconomic stress scenario to be used in assessing mortgage asset credit risk.¹

As applied to Bank acquisitions of AMA, the guidance provides criteria that a Bank should consider when selecting a mortgage asset credit risk model to use to document its compliance with the requirement imposed by 12 CFR § 1268.5(f). The AMA rule requires that a Bank shall use an appropriate model and methodology for estimating the amount of credit enhancement for an asset or pool.

As applied to Bank investments in MBS and CMOs, the guidance provides criteria a Bank should consider when selecting and using a mortgage asset credit risk model and stress test to document its determination that the credit risk associated with such assets is consistent with those assets being deemed to be of “investment quality,” as is required by 12 CFR §§ 1267.1 and 1267.3(a)(3).

Effective Date

Effective, January 1, 2019, FHFA will consider a Bank’s use of models and methodology for internal assessments of mortgage asset credit risk to be satisfactory if the Bank’s use of models and methodology meets the criteria described in this Advisory Bulletin.

¹ See FHFA Advisory Bulletin 2013-07, “*Model Risk Management Guidance*”.

Background

AMA Model and Methodology Requirement

In July 2000, the Federal Housing Finance Board (Finance Board) adopted a regulation governing the Banks' mortgage acquisitions – the AMA rule. The rule established that for each AMA product, the Banks shall have a credit risk-sharing (enhancement) structure with the member participating financial institution to enhance the credit quality of the pool of loans to at least that of a Nationally Recognized Statistically Ratings Organization (NRSRO) equivalent of investment grade, *i.e.*, triple-B or better.² The AMA rule also required that Banks determine the amount of the member-provided credit enhancement by using a methodology that is confirmed in writing by an NRSRO to be equivalent to one that an NRSRO would use in rating a comparable pool of assets.³ In December 2016, FHFA amended the AMA rule primarily to remove references to NRSROs.⁴ Consequently, FHFA replaced the requirement that the methodology to determine the credit enhancement be equivalent to that used by an NRSRO with a more general requirement that the Bank use a model and methodology that it determines to be appropriate. The amount of the credit enhancement determined by the Bank's model and methodology, however, must result in the pool or asset being at least "AMA investment grade." 12 CFR § 1268.5(a), (b). For an item to be AMA investment grade, the Bank must have determined, based on a documented analysis, that it has a high degree of confidence "that it will be paid principal and interest in all material respects, even under reasonably likely adverse changes to expected economic conditions." *Id.* at § 1268.1. The regulations further require a Bank, upon request, to provide FHFA information about its model and methodology, and reserved to FHFA the right to direct a Bank to make changes to its model and methodology. *Id.* at § 1268.5(f).

Mortgage-related Securities

Banks are separately authorized to acquire other types of investments, including MBS and CMOs. Until 2014, the regulations had required that such acquisitions have an NRSRO credit rating of investment grade, *i.e.*, triple-B or better. FHFA amended the regulation to remove all references to NRSROs and NRSRO credit ratings, and to require instead that such instruments be of "investment quality." 12 CFR § 1267.3(a)(3). The term "investment quality" refers to a determination by a Bank, based on a documented analysis, that full and timely payment of principal and interest is expected, and that adverse changes in economic and financial conditions during the projected life of the instruments will only cause minimal risk of such payments not occurring. *Id.* at 1267.1. Although the investment regulations do not specifically set any requirements as to the model or methodology a Bank should use to make that determination, FHFA expects that Banks will use their models and methodologies in a similar manner when assessing the credit quality of both AMA and mortgage-related securities.

² 65 Fed. Reg. 43969 (July 17, 2000).

³ 12 CFR 955.3(a) (2001).

⁴ 81 Fed. Reg. 91674 (Dec. 19, 2016). FHFA amended the AMA rule to comply with Section 939A of the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010, which requires federal agencies to remove from regulations all references to, or requirements based on, ratings issued by NRSROs.

Due Diligence in Acquiring Mortgage Assets

Beyond those specific regulatory requirements, Banks also should assess the market and credit risks associated with any asset they may acquire, for prudential reasons.⁵ With respect to the credit risk of mortgage assets, including MBS and CMOs, FHFA expects that a Bank would make those assessments based on its own analyses, rather than by relying solely on a credit rating provided by an NRSRO or other third party vendor. The accepted practice within the mortgage industry for making such an assessment of credit risk is to use a mortgage asset credit risk model and any other models that might be necessary to account for credit enhancements, such as those provided through a CMO subordination structure.

Scope

The Advisory Bulletin applies to Banks that acquire AMA loans or any other single-family residential mortgage assets, MBS, or CMOs. Mortgage-related assets that are guaranteed as to the payment of principal and interest by the United States government or by an entity that is operating with capital support or other form of direct assistance from the United States government, currently including Fannie Mae and Freddie Mac, are considered by FHFA to present zero credit risk and, therefore, are excluded from the scope of this Advisory Bulletin. Certain legacy mortgage-related assets for which a Bank can demonstrate a *de minimis* credit risk also are excluded from the scope of this Advisory Bulletin. The criteria for excluding such assets are described below.

Guidance

In order to be reasonably assured that they can accurately assess the credit risk associated with their mortgage-related investments, the Banks should use a mortgage asset credit risk model that is sufficiently robust to produce meaningful loss estimates. Mortgage asset credit models are commonly used to assess credit risk at the loan level. Such models account for a wide variety of risk factors, including both underwriting information and macroeconomic scenarios. The underwriting information generally includes borrower information (*e.g.*, credit score, owner or investor, debt-to-income ratio) and loan specific information (*e.g.*, interest rate, loan-to-value ratio, loan size, loan age). The macroeconomic scenarios generally include house price and interest rate scenarios extending out for the life of the loans. Credit enhancements, such as insurance, recourse structures, or subordination, are typically accounted for through a separate model or exercise applied to the initial estimates of credit loss. FHFA would consider a mortgage asset credit model that meets the criteria described below as able to produce results that could satisfy the regulatory requirements.

Selecting a Mortgage Asset Credit Risk Model

A Bank should select a credit risk model that is capable of producing loan-level estimates of potential credit loss, and that can accept as an input user-defined macroeconomic stress scenarios disaggregated to at least the state level. Such models are made available by third-party vendors and are commonly used by mortgage market participants. Available vendor-supplied credit

⁵ Specifically, like any financial institution, each Bank should assign and provide for sufficient economic capital to ensure solvency of the Bank aside from regulatory capital requirements.

models, however, may differ in model structure and, importantly, in the historical data sets used to estimate the model coefficients, all of which can result in differences in estimates of prepayment speeds and credit loss for an identical pool of loans. Consequently, the Bank should consider, for example, selecting a model constructed using data from loans generally similar to those typically acquired by the Bank, such as conforming loans. Alternatively, a Bank, or consortium of Banks, could develop and administer a similarly capable, credit risk model.⁶

Macroeconomic Scenarios

A Bank should ensure that its model includes appropriate macroeconomic stress scenarios. The scenarios incorporated into a mortgage asset credit risk model should include several key factors that will affect the borrowers' prepayment decisions and their ability to make timely payment of principal and interest, as such factors will affect the probability of default. At a minimum, the key factors should include projected paths of house price levels and interest rates.⁷ The most important factor affecting credit loss estimates is the level of house prices because a change in the value of the property that secures a mortgage loan will not only affect the probability of default, but also, and more importantly, is the principal risk factor affecting estimates of the loss-given-default on mortgage loans.

If a borrower defaults on the loan when the market value of the property that secures it is greater than the remaining amount of the loan (plus transaction costs), then typically the property can be sold to repay the loan at little or no loss to the mortgage holder. Consequently, credit loss (loss-given-default) on a mortgage loan will generally occur only in locations where, subsequent to origination, house price levels have fallen in nominal terms. The model's scenarios also should allow for different house price paths by geographic location because house price appreciation and depreciation can vary, and historically have varied, significantly across geographic regions, including at the state and MSA levels. For example, a defaulted loan in a location where house price levels have fallen may result in significant credit loss while an otherwise identical defaulted loan, at the same moment in time but in a different location where house price levels have been stable, may not generate a loss. So, while a credit model should identify loans that, because of borrower or loan risk factors, are at a high risk of default, whether those defaults would result in credit losses will depend on the movement in house prices.

Macroeconomic scenarios used in credit risk models are typically either baseline or stress scenarios. A baseline scenario can be used when estimating expected losses. Estimates of expected loss are used for purposes of mortgage asset pricing, and for determining the member's risk-sharing obligations, as required in AMA programs.⁸ In generating a baseline scenario,

⁶ As an example, see "FHFA Mortgage Analytics Platform," a white paper released by FHFA on July 10 2014, located at: https://www.fhfa.gov/PolicyProgramsResearch/Research/PaperDocuments/FHFA_MortgageAnalyticsPlatform_Whitpaper.pdf

⁷ Some mortgage asset credit risk models also accommodate including projections of GDP and/or unemployment in the macroeconomic scenario. FHFA research has found that, as long as HPI paths are included, also including projections of GDP and unemployment will add little to the stress loss estimates, and therefore is not necessary.

⁸ AMA participating financial institutions must bear the direct economic consequences of actual credit losses for AMA assets sold to the Banks from the first dollar of loss up to the amount of expected losses, or immediately following expected losses in an amount equal to or exceeding expected losses. See 12 CFR § 1268.5 (c)(1)(i).

common practice is to project house price and interest rate paths that revert to anticipated long-run trend levels and growth rates, and either cycle about or remain at such trends for the duration of the loans. Historical data typically are used to generate such trends. The house price component of the baseline scenario, as represented by a house price index (HPI), should be disaggregated to at least the state level, and not at the national level. The interest rate component can be determined at the national level.

A stress scenario is used when estimating stress losses. A Bank can use stress-loss estimates to determine an appropriate level of economic capital that should accompany any asset purchase.⁹ A Bank should establish an appropriate level of economic capital when determining whether a particular investment is permissible. It also should do so when conducting its due diligence in connection with any asset acquisition. As with the baseline scenario, the HPI component of the stress scenario should be disaggregated to at least the state level, and not at the national level. The interest rate component can be determined at the national level.

Determining a Stress Scenario

Determining the HPI path for a stress scenario is particularly challenging because the scenario should anticipate the degree to which HPI could fall from its current levels, which is not always bounded by historical precedent. For example, as observed during the prior financial crisis, HPI in certain states fell from its peak by a greater percentage than had occurred previously, based on all available HPI data. In seeking to address that possibility, FHFA has developed an approach that demonstrates how economic fundamentals can be used to support a rules-based methodology for determining stress scenarios that dynamically adjust the severity of the HPI shock to current market conditions, and that, as unprecedented current conditions might one day warrant, could result in HPI shocks more severe than any observed historically.

FHFA makes its stress scenarios publicly available on a quarterly basis.¹⁰ The FHFA stress scenarios meet all of the following criteria:

- The methodology to determine the HPI path is rules-based or objectively determined, not discretionary, which ensures that it will be consistently applied across time and region.
- The HPI downward shock is determined on a regional (state or MSA) basis.
- The HPI downward shock is based on economic fundamentals that are reflective of current market conditions relative to long-term trend, such that it results in stress-loss estimates applicable to new acquisitions that are increasing as HPI rises further above its long-term trend, and decreasing as HPI falls to or below its trend.
- The downward path of the HPI shock begins on day one of the scenario and reaches its lowest point in real terms no later than three years beyond day one of the scenario. Such a pattern should ensure that the Bank would know the potential stress losses, or the full amount of economic capital the mortgage asset should ever require, as of the day the Bank acquires it.

⁹ Economic capital is calculated internally by the entity and is the amount of risk capital needed to ensure the survival of the firm in a stress or worst-case scenario. It is meant to be the firm's own view of a realistic measure of risk, and could be greater or less than regulatory risk-based capital requirements.

¹⁰ The scenarios and working papers that describe the economic-based methodology used to derive the scenarios are available at: <https://www.fhfa.gov/DataTools/Downloads/Pages/Countercyclical-Stress-Paths.aspx>

- The depth of the HPI shock shall extend to a proportion below long-run trend that at least equals the lowest such proportion observed for that geographic region during the prior 40 years.
- The interest rate shock reflects Federal Reserve Board policy as applied during the prior financial crisis, and applied at the national level. In effect, rates decline over a short period to very low levels and then remain at the lower level for a number of years.

For purposes of determining an appropriate amount of economic capital, and to adhere to Advisory Bulletin 2013-07, a Bank may elect to use the FHFA methodology or stress scenarios in assessing the credit risk associated with its mortgage-related assets. Alternatively, a Bank may develop its own methodology and stress scenarios. If a Bank does so, however, FHFA expects the Bank's methodology to be consistent with that described herein, and that the shocks used would be no less severe at the state level than under the FHFA scenarios. A Bank that develops its own methodology also should be able to demonstrate that the loss estimates for its current book of mortgage-related assets produced by the Bank's own stress tests are at least as severe on a state-by-state basis as those produced using the FHFA stress scenarios.

Credit Enhancements

Mortgage assets of all types can be credit-enhanced through a variety of means, including insurance, recourse arrangements, and subordination as it may be structured in a CMO. Such credit enhancements serve to reduce the Bank's exposure to credit risk. Consequently, a Bank should subtract from its estimates of expected and stress credit losses any amounts that the Bank can reasonably expect to receive as compensation for such credit losses from its various credit enhancement arrangements. In assessing what amounts of credit enhancements a Bank may reasonably expect to receive, the Bank should take into consideration the creditworthiness of any counterparty providing the credit enhancement, the extent to which the credit enhancement may be secured, and the waterfall of payment priorities embedded in the credit enhancement arrangement, such as in a subordination structure.

Exclusion of Certain Legacy Private Label MBS

Certain of the Banks continue to own small portfolios of privately issued mortgage-backed securities (Private Label MBS), most of which were acquired prior to 2008. For those Banks, the costs associated with modeling those assets in accordance with this Advisory Bulletin may outweigh the benefits likely to result from doing so. For that reason, this Advisory Bulletin allows a Bank to exclude its Private Label MBS from the scope of this guidance if the Bank can demonstrate that the stress loss estimates for the portfolio would be *de minimis*. FHFA will regard stress loss estimates as *de minimis* by reference to either of two thresholds. First, the stress loss estimates for a Bank's Private Label MBS portfolio may be *de minimis* if the current unpaid principal balance of that portfolio is less than 10 percent of the Bank's current permanent capital. Second, the stress loss estimates may be *de minimis* if the Bank, using the methodology described in this bulletin, has estimated that the stress losses associated with the Private Label MBS portfolio are less than two percent of the Bank's current permanent capital. A Bank that can demonstrate either measure is below the corresponding threshold may reasonably assume a zero credit risk exposure, and thus a zero economic capital charge for that portfolio. For

purposes of this paragraph, the term Private Label MBS includes only those instruments owned by a Bank as of the date of this Advisory Bulletin.

Determining Estimated Losses for Securities that Cannot Be Modeled

If a Bank owns a mortgage-related security for which the underlying loan-level data needed to model the stress losses in accordance with this Advisory Bulletin is either insufficient or unavailable, the Bank may use a proxy to estimate the credit losses associated with that security. One approach to estimating those losses would be to determine whether the mortgage loans underlying the security and the structure of the security are similar to any other mortgage-related securities that the Bank owns and for which sufficient loan-level data is available to model. In that case, a Bank could model the estimated loss percentage (of unpaid principal balance at origination) for each of those other similar securities and then use an average of those estimated loss percentages as a proxy for the security for which sufficient data is lacking, even if doing so resulted in an estimate of zero credit losses for the security. If, however, a Bank does not own any mortgage-related securities with loan pools and security structures that are similar to the data-deficient security, it could use any other mortgage-related securities that it owns and for which sufficient loan-level data is available to develop an alternative proxy. In that case, a Bank could calculate the average of all of the non-zero estimated credit loss percentages for those other securities and use that average as a reasonable estimate of the credit loss percentage associated with the data-deficient security.

Advisory bulletins communicate guidance to FHFA supervision staff and the regulated entities on specific supervisory matters pertaining to the Federal Home Loan Banks. Questions may be directed to SupervisionPolicy@fhfa.gov.