



OFFICE OF FEDERAL HOUSING ENTERPRISE OVERSIGHT

NEWS RELEASE

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OFHEO'S AMENDMENT TO RISK-BASED CAPITAL RULE FINALIZED

WASHINGTON, D.C. - Armando Falcon, Jr., Director of the Office of Federal Housing Enterprise Oversight (OFHEO), safety and soundness regulator of Fannie Mae and Freddie Mac (the Enterprises), announced that an amendment to OFHEO's risk-based capital rule has been finalized and will be sent to the *Federal Register* today. The amendment will be published in the *Federal Register* in early March.

The risk-based capital rule became *effective* when it was published in the *Federal Register* September 13, 2001. The rule and the amendment to the rule will be *enforceable* later this year, beginning September 13, 2002, as mandated by Congress in OFHEO's authorizing statute which called for a one-year implementation period for the Enterprises.

The proposed amendment was published in the *Federal Register* December 18, 2001.

The amendment to the risk-based capital rule has remained essentially the same as the original proposal.

Highlights of the final amendment to the risk-based capital rule include:

Modification to Counterparty Haircuts

-The amendment modifies the calculation of counterparty haircuts -- reductions made in risk calculations to cash flows from a security or agreement -- to take loss severities into account explicitly and would extend the phase-in period for investment grade counterparties from five years to 10 years. These changes tie haircuts more closely to the historical experience of bond issuers during stressful periods and phase them in evenly during the 10-year stress period.

-The amendment reduces the differential in haircuts between AAA- and AA-rated counterparties to more closely reflect historical experience.

Multifamily Loans

-The amendment makes a number of changes to the multifamily default model, loss severity parameters, and prepayment speeds that refine the measurement of risk in multifamily loans. The changes reflect more accurately the differential risks between fixed rate and adjustable rate mortgages as well as the costs and

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recoveries associated with foreclosures. The amendment on prepayment speeds more accurately reflects prepayment penalties.

Funding

-The amendment refines funding rules to provide a more realistic picture of funding costs in a stressful period by altering the target mix of long- and short-term debt to be maintained during the stress period from 50/50 to the Enterprise's actual mix of long- and short-term debt at the start of the stress period. The amendment also adds a 10-basis point premium to the cost of an Enterprise's newly issued debt during the last nine years of the stress period, reflecting the impact of the stress on an Enterprise's cost of funds.

Technical and Clarifying Changes

-The amendment makes a number of other technical and clarifying changes that refine the measurement of risk in complex instruments, such as derivative contracts, foreign currency swaps, and instruments with call options, and eliminates double counting and distortion in calculations.

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Federal Register

**Friday,
March 15, 2002**

Part V

Department of Housing and Urban Development

**Office of Federal Housing Enterprise
Oversight**

**12 CFR Part 1750
Risk-Based Capital; Final Rule**

**DEPARTMENT OF HOUSING AND
URBAN DEVELOPMENT**

**Office of Federal Housing Enterprise
Oversight**

12 CFR Part 1750

RIN 2550-AA23

Risk-Based Capital

AGENCY: Office of Federal Housing Enterprise Oversight, HUD.

ACTION: Final rule.

SUMMARY: The Office of Federal Housing Enterprise Oversight (OFHEO) is amending appendix A to subpart B of 12 CFR part 1750 Risk-Based Capital. These amendments modify provisions relating to counterparty haircuts, multifamily loans, and refunding and make several technical adjustments and corrections. These amendments are intended to refine the stress test model to tie capital more closely to risk.

DATES: April 15, 2002.

FOR FURTHER INFORMATION CONTACT:

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SUPPLEMENTARY INFORMATION:

Background

OFHEO published a final regulation setting forth a risk-based capital stress test (Rule) on September 13, 2001, which formed the basis for determining the risk-based capital requirement for the Federally sponsored housing enterprises—Federal National Mortgage Association (Fannie Mae) and Federal Home Loan Mortgage Corporation (Freddie Mac) (collectively, the Enterprises).¹ The risk-based capital stress test set forth in the Rule simulates the performance of each Enterprise's assets, liabilities, and off-balance-sheet obligations under severe credit and interest rate stress for a period of ten years (stress period). The stress test projects rates of default and prepayment for the mortgages guaranteed by the Enterprises, as well as cash flows from these and other assets, liabilities, and off-balance-sheet obligations. Using these cash flows, the stress test

produces monthly balance sheets for the 120 months of the stress period in order to determine the amount of starting capital that would be necessary to maintain positive capital during the stress period. Thirty percent of the amount of capital so determined is then added to that amount to protect against management and operations risk. By statute, the Rule becomes fully enforceable on September 13, 2002, one year after it was issued.²

On December 18, 2001, OFHEO published a notice proposing to amend certain provisions in the risk-based capital stress test (AmendNPR).³ The proposed amendments related to counterparty haircuts, multifamily loans, and refunding and included several technical adjustments and corrections. The purpose of the proposed changes was to improve the Rule's measurements and formulas to tie capital more closely to risk and to ensure that the Rule supports the safety and soundness regime created by the 1992 Act. OFHEO stated that such a proposal is consistent with OFHEO's intention to review, on an ongoing basis, the operation of the stress test and its various components and to evaluate the need for revisions and improvements. Also, OFHEO committed to act expeditiously to remedy any technical and operational issues that arise during the one-year implementation period during which time the capital requirement under the Rule is not being enforced.

OFHEO received 48 comments on the AmendNPR. Commenters included Freddie Mac; Fannie Mae; housing and financial trade associations; financial services companies, including mortgage insurance companies; housing advocacy groups; State housing authorities; academics; consultants; and other interested parties. Many of the comments discussed aspects of the Rule that were not addressed specifically in the AmendNPR. In other instances, commenters approved of certain changes proposed, but suggested that OFHEO go farther or make additional changes in the same area. Numerous commenters, for instance, applauded OFHEO's changes to the multifamily model, which had the effect of lowering adjustable rate mortgage (ARM) defaults in the stress test, but urged OFHEO to take additional steps to lower ARM loss rates. The amended Rule reflects

OFHEO's consideration of all of these comments. However, the need for OFHEO to establish a firm baseline for the stress test and apply it to the Enterprises prior to the end of the implementation period does not allow OFHEO to consider further changes or enhancements at this time. A description of the comments along with OFHEO's responses to them is set forth below.

A. Changes to Counterparty Haircuts

The Rule gives the Enterprises credit for cash payments that would be received during the stress period from securities and various counterparties, such as mortgage insurance companies and derivative counterparties. However, because Enterprise counterparties are themselves likely to be adversely affected by the economic conditions of the stress period and to default on some or all of their obligations, the stress test discounts the value of cash payments received during the stress period by a specified percentage, based on the public credit rating of the security or counterparty. The amount by which cash payments from a counterparty or security are discounted in each month of the stress period is the haircut. The specified haircut percentages increase as the credit rating declines—the lower that rating, the more severe the haircut. In the previous Rule, the haircuts were phased in over the first five years of the stress period, except for haircuts for below-investment-grade providers and instruments, which are applied fully in the first month of the stress period.

The Rule applies one set of haircuts for non-derivative counterparties and securities, based on analysis of historical bond default rates, and a different set of haircuts for derivative counterparties, reflecting lower expected loss severities associated with the use of strong collateral agreements.⁴ To further refine the previous Rule's treatment of haircuts, OFHEO has improved the consistency between haircuts for derivative counterparties and securities and non-derivative counterparties and securities by specifying default and severity rates separately; extending the phase-in period for the haircuts from five to ten years; providing for netting of exposures to the same derivative counterparty;

⁴ The term "derivative" is used to refer to over-the-counter interest rate and foreign currency derivatives that are used by the Enterprises to hedge interest rate risk and foreign exchange risk. The term should not be read to encompass credit derivatives, which are currently not in use by the Enterprises and would be considered a "new activity" and dealt with under section 3.11 of the Rule, if the Enterprises began to use them.

¹ Risk-based Capital, 66 FR 47730 (September 13, 2001).

² Section 1364 of Title XIII of the Housing and Community Development Act of 1992, Pub. L. 102-550, known as the Federal Housing Enterprises Financial Safety and Soundness Act of 1992 (1992 Act), (12 U.S.C. 4614(d)).

³ Risk-based Capital, Notice of proposed rulemaking 66 FR 65146 (December 18, 2001).

providing for certain technical amendments described herein; and providing for an exception to the BBB haircut for certain unrated multifamily seller/servicers, as described in the AmendNPR.

OFHEO proposed lowering the maximum haircuts for both non-derivative and derivative counterparties and securities. The specified default and severity rates were calculated separately. Their products are the maximum haircuts. Previously, no explicit allowance was made for recoveries after default (severities of less than 100 percent) for non-derivative losses.

Default Rates

The amended Rule adopts the former Rule's non-derivative maximum haircut levels as maximum default rates, except that the percentage for AA-rated firms and securities was lowered from 15 to 12.5. Many commenters argued that using data from the Great Depression as a basis for default rates was inappropriate because of the broad changes in the economy since then and because default rates should be consistent with mortgage losses applied elsewhere in the stress test. Others focused on the relationship between defaults in the AA and AAA categories. Most argued that the ratio embodied in the proposal (2.5:1), which is lower than in the former Rule, was still too high or that there should be no differential between the categories at all. Many suggested that the proposed difference would drive all or most mortgage insurance business to the two AAA-rated firms, lessening competition and creating concentration risk for the Enterprises.

One commenter, however, opposed the change in the ratio, arguing that the average ratio (3:1) over the longest period available, 1920–1999, should be the basis for the Rule. A few commenters argued that maintaining a substantial differential between AAA and AA categories was important in either the maximum default rates used or the phase-in of those rates. In their view, a large differential would promote capital accumulation by mortgage insurers, decreasing the risk of losses to the Enterprises, and reversing the trend toward smaller market shares of mortgage insurance at AAA-rated firms. These commenters also noted that defaults of AAA-rated firms generally have occurred later for any given cohort of mortgage loans than defaults of AA-rated firms. One commenter further pointed out that OFHEO's haircuts differ far less across rating categories than rating agency haircuts on

reinsurance that is provided by lesser-rated insurance providers.

After reviewing the comments, OFHEO has decided to adopt the proposed default rates. No single set of data provides a clear guide to the determination of default rates for the stress test. OFHEO agrees that many changes have occurred since the Great Depression and, therefore, does not view it as the sole relevant period for determining appropriate haircuts during the stress period. Data from the past three decades, however, do not contain any periods of interest rate stress or credit stress on a national basis comparable to that during the stress period.⁵ Furthermore, the implication of data raised by some commenters that AAA-rated firms are as risky or riskier than AA-rated firms is based on a very small number of actual defaults. The characteristics of AAA-rated and AA-rated firms, as described in rating agency analyses, suggest significantly better relative credit performance should be expected for AAA-rated firms in a future stressful environment.

OFHEO has examined the available data from a variety of sources with varying perspectives as described in the preambles to NPR2,⁶ the September 13, 2001 Rule, and the AmendNPR. OFHEO has based its choices on the totality of the data, but also has taken into account treatment of credit supports by rating agencies, although OFHEO recognizes that the agencies' purposes and perspectives differ somewhat from OFHEO's. The Depression-era data are of particular interest because, unlike other data, they reflect a very stressful period. OFHEO notes, however, that cumulative defaults in Moody's data for 1929–31, as discussed in the proposal, are very close to those obtained by using Moody's 1920–1999 data and adding 2½ standard deviations to the average 10-year default rates. Data from Hickman's 1928 cohort and more recent time periods could suggest higher default rates for the AAA category relative to the other categories, but the

⁵ Some commenters argued that OFHEO should use the years, 1983–1984, of the benchmark loss experience. The benchmark loss experience, which is specified by the 1992 Act, includes only loans from a small area of the country and is intended only as a benchmark for credit losses on mortgage loans. It was never intended to be and would be entirely inappropriate as a benchmark for counterparty defaults for many reasons. Even more inappropriate would be use of the national data from those years without applying the requirement that they represent the highest default rates from an area of the country containing at least five percent of the population.

⁶ The second notice of proposed rulemaking issued prior to the initial issuance of a final Rule on September 13, 2001. 64 FR 18084 (April 13, 1999).

relatively later timing of AAA defaults in much of the data is also relevant given that OFHEO has not imposed different phase-in patterns for different rating categories. OFHEO has similarly considered the earlier timing of historical defaults in the A category and especially in the BBB category. OFHEO also considered the fact that the stress test interest rate shocks and mortgage losses as specified in the 1992 Act are heavily front-loaded in comparison to historical periods.

OFHEO recognizes that relative haircut levels for the different rating categories can have competitive implications and, therefore, has focused great attention on differences in haircuts across rating categories, so that they reflect differences in risk to the Enterprises well, without adding undue complexity to the Rule.

Severity Rates

The amended Rule adopts the severity rates from the proposal, a 70 percent severity rate for all non-derivative defaults and a 10 percent rate for derivative defaults. Much of the comment with respect to non-derivative severity rates was positive, but some commenters suggested higher or lower rates. Those favoring lower rates objected to the use of Great Depression data and suggested focusing on severity rates for senior obligations. One commenter also suggested reflecting ultimate recovery rates (1 minus severity rates) in historical data rather than security prices at the time of default. Those favoring higher severity rates stressed the variability of recovery rates, not only across users and industries, but also over time. One of the commenters also recommended using data for recovery rates on financial issues, which tend to be lower. This commenter also noted that Moody's average recovery rate for even senior secured debt was only 31 percent (69 percent severity) during the 1970s. Finally, some commenters suggested special treatment for particular types of counterparties, such as mortgage insurers, or obligations, such as mortgage revenue bonds or other mortgage related securities.

OFHEO decided to adopt the proposed non-derivative severity rates. Severity data from the Great Depression, which show higher severities during stressful periods, are relevant for the same reasons as default data from the same period. As two commenters pointed out, more recent data also show higher severity during recessions. At the same time, however, OFHEO found the average experience of 10-year periods, such as the 1930s or the 1970s more

relevant than subtracting standard deviations of annual data from long-term averages as one commenter suggested. Year-to-year variability does not imply that a string of ten consecutive poor results is a reasonable projection. Also, OFHEO has found data on security prices at default to be more relevant than ultimate recoveries, because prices at default take account the time value of money and uncertainties about actual future payments, which payments may even be lower during a continuing period of stress than otherwise expected.

OFHEO recognizes that the characteristics of specific exposures, such as collateral or line of business, may affect severity rates. However, taking account of such characteristics could add undue complexity to the Rule. At this time, OFHEO does not consider such additional complexity to be warranted, but may reevaluate that conclusion in the future, if appropriate.

Comments on the proposed severity of 10 percent for derivative defaults were

mostly favorable. Some commenters recommended consideration of even lower severities, in the range of 1 percent to 2½ percent. They view the proposed severity rate as consistent only with a combination of very unlikely events; sudden failures and large, simultaneous, adverse changes in interest rates. A few commenters, however, voiced disapproval of OFHEO's reasoning, which relies heavily on the existence and implementation of collateral agreements. They argued that haircuts on derivative receipts should be unchanged or raised to the level of non-derivative receipts. They suggested that only actual collateral held by an Enterprise at the start of the stress period should be considered, not promises to provide collateral under certain circumstances. They questioned whether it would be feasible to unwind and replace the very large positions the Enterprises have with individual counterparties in a market that may have experienced a shock of some type.

OFHEO has decided to adopt the proposed severity rate for derivative defaults. OFHEO continues to have a high level of confidence in the successful operation of the Enterprises' collateral agreements, even in difficult times. The majority of the Enterprises' over-the-counter derivatives are simple interest rate swaps, which have been consistently very liquid, even in weak markets. Nonetheless, some caution is appropriate, given the high levels of stress contemplated in the stress test and potentially significant levels of correlation between the unlikely events considered in the proposal. While some derivatives are less liquid and could merit more cautious treatment, OFHEO judges that the added complexity is unwarranted at this time.

Haircuts

Under the amendment, haircuts will be determined by multiplying the default rate for each rating category by the severity rate. The resulting haircuts are set forth in Table 1 below.

TABLE 1—STRESS TEST HAIRCUT BY RATINGS CLASSIFICATION

Ratings Classification	Derivative Contract Counterparties ¹	Non-Derivative Contract Counterparties or Instruments
Cash	0%	0%
AAA	0.5%	3.5%
AA	1.25%	8.75%
A	2%	14%
BBB	4%	28%
Below BBB and Unrated	100%	100%

¹ Does not include interim rates prior to implementation of netting. See Table 2.

Phase-In

Under the former Rule, haircuts were phased in linearly over a 5-year period. OFHEO proposed lengthening the phase-in to the full 10 years of the stress period. Most of the comments supported the change. A few commenters suggested changing the pattern of the phase-in to reflect actual default timing during the 10-year period for the cohort for a specific year or the average of cohorts from a specific time period. This approach would have different phase-in patterns for different rating categories. A few other commenters urged OFHEO not to change the existing 5-year phase-in. They argued that it is particularly appropriate for AA-rated mortgage insurers, which could expect to experience their greatest losses during the middle years of the stress period.

OFHEO decided to adopt the proposed 10-year linear phase-in. Historical data indicate that defaults have not been concentrated in the first 5 years of the 10-year periods. OFHEO recognizes that defaults generally occur increasingly later within 10-year experiences as ratings increase. That is, not only have higher-rated firms (AAA versus AA, for example) shown lower default rates during periods of economic stress, those that have not survived tended to have sufficient capital to withstand the stress longer and, therefore, defaulted later than lower-rated firms. OFHEO considered timing differences across different rating categories in determining maximum default rates for those categories, as discussed above. Determining a special timing pattern of defaults for any

specific type of counterparty, such as mortgage insurers, would be difficult and speculative. Even the timing of claims is uncertain during the stress period because, while the stress test does not incorporate new business of the Enterprises, no similar provision applies to mortgage insurers. In any event, OFHEO can not add the complexity involved with explicit consideration of specific types of counterparties in the time frame required for implementation of the Rule.

Netting of Derivative Counterparty Exposures

OFHEO adopts as proposed the treatment for netting of derivative counterparty exposures. Due to technical limitations, the previous Rule did not model the master netting

agreements associated with derivative counterparty exposures. OFHEO will now recognize the risk mitigation effects of master netting agreements by reducing the haircuts for derivative contract counterparties as set forth in Table 2, under heading of Haircuts for

Derivative Contract Counterparties prior to Implementation of Netting. Upon implementation of modeling of master netting agreements, maximum haircuts for derivative contract counterparties will be readjusted. (See Table 2, under heading of Haircuts for Derivative

Contract Counterparties upon Implementation of Netting). The interim treatment will remain effective only for the period required to complete the technical software modifications necessary to model master netting agreements.

TABLE 2—STRESS TEST HAIRCUTS FOR DERIVATIVE CONTRACT COUNTERPARTIES

Ratings Classification	Haircuts for Derivative Counterparties Prior to Implementation of Netting	Haircuts for Derivative Counterparties Upon Implementation of Netting	Number of Phase-in Months
AAA	0.3%	0.5%	120
AA	0.75%	1.25%	120
A	1.2%	2.0%	120
BBB	2.4%	4.0%	120
Below BBB and Unrated	100%	100%	1

Commenters generally supported OFHEO's proposal to recognize the impact of derivative counterparty netting agreements and urged OFHEO to implement counterparty netting as soon as possible.

OFHEO has adopted the proposed treatments and will continue to work toward implementation of the technical changes required to model netting agreements.

Unrated Seller/Serviceicers

OFHEO adopted the change to the treatment of unrated seller-serviceicers as proposed in the AmendNPR, with the addition of language to clarify that the change applies only to unrated multifamily seller-serviceicers. The previous Rule provided that unrated seller-serviceicers will be treated as if they are BBB-rated counterparties, unlike other unrated counterparties, which are treated as below BBB. Consistent with OFHEO's commitment in the Rule to evaluate alternative approaches to determine risk distinctions among unrated seller-serviceicers, OFHEO is amending the Rule to permit a higher rating than BBB (but not to exceed AA) for certain unrated multifamily seller-serviceicers. These unrated multifamily seller-serviceicers must participate in a delegated underwriting and servicing program that requires a loss-sharing agreement collateralized by a fully funded reserve account pledged to the Enterprise and the reserve account must be in an amount that is equal or greater than an amount determined by OFHEO to be adequate to support the seller-serviceicer's loss-sharing obligation under the program. Each program will be

evaluated on a case-by-case basis by the Director to determine whether the program qualifies the seller-serviceicer for the refined ratings treatment. The amendment only applies to multifamily seller-serviceicers and does not incorporate a similar treatment for single-family seller-serviceicers.

For example, if the loss-sharing obligation of a seller-serviceicer participating in Fannie Mae's Delegated Underwriting and Servicing (DUS) Program (which is a multifamily mortgage program) is collateralized by a fully funded reserve account that is equal to or greater than one percent of the seller-serviceicer's aggregate unpaid principal balance covered by the loss-sharing agreement at the start of the stress test, the rating of the issuer of the instrument backing the reserve account may be used, in lieu of BBB, as the rating of the unrated seller-serviceicer, not to exceed AA. Determinations of the required reserve amount and the rating equivalent permitted will be made on a program-by-program and Enterprise-by-Enterprise basis.

With a few exceptions, commenters generally viewed the proposed amendment to the Rule regarding unrated seller-serviceicers as a positive contribution that would tie capital more closely to risk. Indeed, commenters who supported the amendment largely suggested that OFHEO also consider other factors, such as the value of the servicing stream and the level of capital of unrated seller-serviceicers as support for an improved rating for these seller-serviceicers. Commenters who disagreed with the proposed amendment included some who objected to the use of a BBB

rating for any unrated counterparty, and objected further to allowing a rating higher than BBB for unrated counterparties under any circumstances. One commenter indicated that OFHEO should have empirical data supporting the BBB rating for unrated seller-serviceicers. Others who objected cited the example given of the DUS program, questioning whether a one percent fully funded reserve account would be adequate to support the loss-sharing obligation under the DUS program, and objecting to the competitive advantage that a higher than BBB rating for unrated seller-serviceicers would impart to the Automated Underwriting (AU) systems of the Enterprises, thereby placing other AU systems at a disadvantage. Finally, one commenter recommended that OFHEO clarify its intent to limit this approach to unrated multifamily seller-serviceicers.

OFHEO believes that the amendment ties capital more closely to risk by allowing for an improved rating for specified unrated multifamily seller-serviceicers. OFHEO has relied upon its own specialized expertise in the mortgage business and its detailed understanding of the Enterprises' seller-serviceicer agreements in making its decision to treat unrated seller-serviceicers more favorably than other unrated counterparties of whom OFHEO may lack such specialized understanding. Beyond the BBB rating to which all unrated seller-serviceicers are elevated, the amendment allows a higher rating than BBB to be used for certain multifamily seller-serviceicers. The increased rating is available if OFHEO determines that their ongoing relationships with the

Enterprises and the contractual leverage available to the Enterprises in managing their exposure to counterparty risk from these seller-servicers is further enhanced by a fully funded reserve account—pledged to the Enterprise—of sufficient size to support the loss-sharing obligation adequately. With regard to the consideration of other factors as the basis for ratings above BBB, OFHEO will continue to evaluate alternative approaches for assessing the risk of unrated seller-servicers.

Finally, OFHEO notes that there appeared to be some confusion among commenters who objected to the amendment regarding the extent of the obligations of DUS lenders to share in multifamily credit losses. The one percent fully funded reserve account is not intended to be adequate to support all losses incurred on the covered loans. Rather it is determined to be adequate to support the much smaller loss-sharing obligations of the seller-servicer under the DUS program. In addition, there also appeared to be some confusion among commenters regarding the distinction between the multifamily DUS program and the single-family Automated Underwriting (AU) systems of the Enterprises. There is no connection between the two. The amendment does not apply to single-family programs.

B. Changes to Multifamily Model

OFHEO is adopting as proposed a number of changes to the multifamily default model, multifamily loss severity parameters, and multifamily prepayment speeds specified in the Rule. These changes and the comments regarding them are summarized below:

Underwater Debt Coverage Ratio Flag (UWDCRF)

As amended, the multifamily default model includes an Underwater Debt Coverage Ratio Flag (UWDCRF), which accounts for the additional default risk posed when the projected debt service coverage ratio (DCR)—net operating income (NOI) divided by mortgage payment—falls below 0.98 during the stress test. The stress test projects the DCR in each month of the stress period from the prior month's value by updating NOI, using rent growth rates and rental vacancy rates that reflect the economic conditions of the benchmark region and time period,⁷ and adjusting mortgage payments over time according to the note terms and the stress test

⁷ The terms "benchmark region and time period" refer to the regional credit loss experience identified by OFHEO in compliance with the "Credit Loss" parameters outlined in 12 U.S.C. 4611, as described in additional detail in NPR2.

interest rate scenario. The UWDCRF adds value to the multifamily default model by capturing the additional risk of default when NOI is insufficient to cover mortgage payments.

OFHEO has re-specified the UWDCRF to turn the flag on when the projected DCR is less than 0.98 (that is, when net operating income (NOI) on the collateral property is more than two percentage points below the mortgage payment), altering the previous Rule, which turned the flag on when the projected DCR fell below one. The re-specified multifamily default model results in a slightly lower coefficient on UWDCRF, and the coefficients for the other explanatory variables do not change materially. Simulations using the revised UWDCRF definition result in lower predicted default rates for ARMs in the up-rate scenario and for FRMs with low initial DCR in both interest-rate scenarios, making the revised model less sensitive to the UWDCRF than the prior version. The revised model does not substantially affect the predicted default rates for most FRMs or for ARMs in the down-rate scenario.

All commenters that addressed this change recommended its adoption. These commenters included a number of seller-servicers of the Enterprises, State housing authorities, and both Enterprises. In view of these comments, together with OFHEO's concern, discussed in detail in the AmendNPR, that borrowers often have reasons to carry properties with slightly negative cash flows for a period of time, OFHEO decided to adopt the change as proposed.

ARM Flags

The amended Rule retains the same explanatory variables as the model in the earlier Rule, except that three dummy variables or flags, the New ARM flag (NAF), the New Balloon Loan Flag (NBLF), and the Ratio-Updated Flag (RUF) are removed, and a re-specified flag is introduced that captures both the distinction between ARMs and FRMs and the distinction between ratio-updated and not-ratio-updated loans. Specifically, the new variable OFHEO has adopted in its re-specified default model is a Not-Ratio-updated ARM Flag (NRAF) that is turned on if a loan is both an ARM and not-ratio-updated and is turned off otherwise. However, there were insufficient data on FRMs that were not-ratio-updated to include a flag similar to the NRAF for FRMs.⁸ Instead,

⁸ OFHEO decided against using an FRM counterpart to the NRAF in the multifamily default model, despite the fact that a similar distinction between ratio-updated and not-ratio-updated FRMs

the revised Rule calculates the monthly conditional default rates for not-ratio-updated FRMs by applying a factor of 1.2 to the conditional monthly default rates for otherwise comparable ratio-updated FRMs.

The NRAF variable was introduced because OFHEO observed higher ARM default rates compared with FRM default rates even during historical periods of flat-to-declining interest rates, which should, other things being equal, have favored ARM performance. Additionally, when FRM and ARM data were combined, OFHEO found substantially higher Enterprise default rates for not-ratio-updated versus ratio-updated loans. This result was not surprising given that the ratio-updating process is intended to improve underwriting and the resultant performance of all loans. The factor of 1.2 that is applied to not-ratio-updated FRMs is based upon the multiplicative difference in simulated stress test default probabilities for the typical ratio-updated versus not-ratio-updated ARM loan, holding all other factors constant at their means. Given the definition of ratio-updating, OFHEO determined that it is reasonable to expect proportionate performance differentials for ratio-updated versus not-ratio-updated ARMs and FRMs when other factors are held constant.

All commenters to address this issue favored the elimination of the NAF, NBLF, and RUF variables and the introduction of the NRAF flag. However, several comments, including those of Fannie Mae, suggested that the 1.2 factor applied to FRMs should be eliminated, because it lacked statistical or factual basis. Some of those commenters may have confused the ratio-updating process with the Enterprises' receipt or lack of receipt of annual operating statement data and rent rolls on certain loans.⁹

OFHEO disagrees with the suggestion that the 1.2 factor be dropped and notes that, although there are insufficient data

was consistent with the data. The introduction of a flag to capture non-ratio-updated FRMs substantially altered the size of other variable coefficients and the significance of other model variables. Further examination of Enterprise data indicated that this result likely occurred because of insufficient data on not-ratio-updated FRMs, particularly in recent years. Therefore, OFHEO rejected the inclusion of a not-ratio-updated flag in the re-specified default model.

⁹ As described in the AmendNPR, ratio-updating refers to New Book loans for which the LTV and DCR have been calculated by the Enterprise or its delatee at loan origination or for which the LTV and DCR have been recalculated by an Enterprise or its delatee upon acquisition according to current underwriting standards. New Book loans for which origination and/or acquisition LTV and DCR are unknown cannot be considered to be ratio-updated.

to incorporate an FRM counterpart to the NRAF into the multifamily default model, the decision to include a similar and proportionate adjustment to the default rates of not-ratio-updated FRMs was predicated on statistical analysis. Statistical evidence suggests that the ratio-update process, whereby loans originated using underwriting standards that may differ from those of the Enterprises are re-underwritten using the Enterprises' standards at the time of acquisition, reduces stress test default rates for a typical ARM by about 17 percent. Furthermore, Enterprise data confirm lower historical default rates of ratio-updated versus not-ratio-updated loans without regard to product type. At this time, OFHEO has no evidence that the ratio-update process should operate in a different fashion for one product than for another. Therefore, OFHEO believes the use of a multiplicative factor of 1.2 applied to the conditional monthly default rates of not-ratio-updated FRMs is a reasonable approach reflecting sound judgment based in fact and statistical evidence. If sufficient data become available to convince OFHEO that the use of the multiplicative factor of 1.2 is no longer appropriate, OFHEO will consider a change to the Rule.

One commenter questioned how the definition of the NRAF would be affected by any future changes in the underwriting standards of the Enterprises. For example, if as a result of ongoing experience, the standards of an Enterprise were to become tighter or looser, or simply emphasize different financial ratios, the commenter asked whether the entire current ARM portfolios of the two companies would be subject to this variable. In response to this comment, OFHEO notes that if an Enterprise were to stop updating the ratios of loans at acquisition, for example, the entire Enterprise multifamily portfolio would eventually be subject to the NRAF variable (or its FRM counterpart) as older ratio-updated loans terminated. As to the other part of the commenter's question, OFHEO continually examines the Enterprises' underwriting standards and processes and may modify variables or introduce new ones where the data indicates it is appropriate to do so.

Initial Vacancy Rate

OFHEO modified the Rule so that the change in vacancy rates between the period immediately prior to the stress test and month one of the stress test is based on the change in the benchmark region vacancy rate from the month prior to the benchmark period to the first month of the benchmark period.

OFHEO views this change as a technical correction. The change sets the initial vacancy rate at ten percent, which is the estimated West South Central (WSC) Census division vacancy rate in 1983. Thus, the vacancy rate change in the initial month of the stress test will be increased from ten percent to 13.6 percent. All comments to discuss this change were favorable, although some suggested that OFHEO's technical correction should have reflected a higher initial vacancy rate. OFHEO did not find any convincing arguments from those who suggested the initial rate should have been higher and, therefore, OFHEO will adopt the rate as proposed.

Loss Severity

OFHEO has modified the multifamily severity parameters to take into consideration the performance of Fannie Mae multifamily REO¹⁰ in the 1980s and both Enterprises' more recent multifamily REO. Loss severity parameters in the previous Rule were based upon the experience of 705 Freddie Mac multifamily REO properties from the 1980s. The multifamily loss severity calculations that use the severity parameters in the Rule have not changed. Specifically, OFHEO has decided to reduce net REO holding costs to seven percent from 13.33 percent and to increase REO sales proceeds from 58.88 percent to 63 percent of the unpaid principal balance as of the default date. Additionally, OFHEO is reducing the time from default to foreclosure completion from 18 to 9 months, while increasing the time from REO acquisition to REO disposition from 13 to 15 months. Changing these severity parameters yields a 44 percent "baseline" severity rate, as compared to the 55 percent "baseline" produced by the model in the Rule. "Baseline" severity is a simple way to compare one set of severity parameters with another.¹¹

All comments received regarding this change were favorable.

Prepayment Penalties

OFHEO has modified the Rule to provide for no prepayments in the down-rate scenario inside prepayment penalty or yield maintenance periods. This approach is more consistent with OFHEO's preference to model contractual instruments according to their terms, but recognizes that modeling these penalties according to

their terms would be immensely complicated, because those terms vary greatly from loan to loan. The change implicitly assumes that the prepayment penalty provisions either prevent prepayments or provide compensating economic benefit to the Enterprises.

All comments regarding this change were supportive.

Other Comments

Numerous comments were received suggesting that OFHEO should make further refinements to the multifamily model in the stress test. Many commenters stated that although the proposed changes had gone a long way to address what they viewed as inappropriately high loss rates associated with ARMs, the changes had not gone far enough and that the Rule might cause such loans to be disfavored by the Enterprises. OFHEO will consider these comments as it studies the impact of the current modifications to the Rule and will propose additional changes to the Rule when sufficient data indicates a need for them.

Among the refinements suggested by commenters was that OFHEO take into consideration the effects that low-income-housing tax credits (LIHTCs) have in reducing the likelihood of default on loans collateralized by properties with these credits. OFHEO agrees with experts in the housing finance industry that such loans are less likely to default than otherwise identical non-LIHTC loans. OFHEO has responded to this comment by clarifying the Risk-Based-Capital Report Instructions to provide that potential income from the holders of the tax credits is included in the calculation of current debt-service-coverage ratios on these loans. A rule change was unnecessary, because the existing Rule is sufficient to provide for consideration of the tax benefits to the equity investor from the tax credit.

Both Enterprises argued that the multifamily model should consider seasoning of loans that lack annual operating statements by accounting for the likely improvement in NOI and DCR prior to the stress period. OFHEO agreed. However, this comment also did not require a change to the Rule, which does not prohibit consideration of such improvements. To provide clarity to the Enterprises about how to report current NOI and DCR, OFHEO has added language to the Risk-Based Capital Report Instructions.

One Enterprise's comments suggest that the multifamily model does not account for rate caps and payment caps. In fact, the model does account explicitly for these features. However,

¹⁰ REO is real estate owned as a result of loan default.

¹¹ The "baseline" consists of a simple adding up of the cost components of the rate, without considering discounting, credit enhancements, or passthrough interest on sold loans.

the Risk-Based Capital Report Instructions have been clarified to include specifically third party rate caps or swaps that may be required by loan documents and used to cap a multifamily loan.

C. Changes to Yields on Enterprise Debt

This amended Rule modifies the previous Rule by adding 10 basis points to the cost of debt for an Enterprise in the stress test vis-a-vis other borrowers in the debt markets. This amendment serves to reflect the reaction of the debt markets to the financial stress imposed upon the Enterprise.

Only five commenters addressed the issue of the cost of new Enterprise debt. Those commenters voiced significant disagreement among themselves about whether OFHEO should add a debt premium to the Enterprises' cost of debt compared to other lenders. Several commenters, including FM Watch, the Consumer Mortgage Coalition (CMC), and an individual investment advisor, stated that not only was a debt premium appropriate but that the debt premium should be significantly larger than proposed. They argued that 10 basis points might not realistically reflect changes in the Enterprises' debt financing costs. CMC stated that, in times of stress, GSE debt spreads could increase significantly and that a 50 basis point or greater spread increase is not unlikely. CMC continued that Agency spreads to Treasuries have varied by about 70 basis points since 1998 and that a small spread adjustment in effect allows the GSEs to assume that they have essentially unlimited access to capital markets at preferred rates even in periods of distress. They cited the experience of the Farm Credit System in the 1980s as historical evidence of the need for a debt premium when a government sponsored enterprise faces adverse credit and interest rate stress.

Another commenter noted that if the capital markets perceived the Enterprises to be in trouble, liquidity premiums and default premiums would both increase. That commenter noted that after both the Asian currency devaluations of 1997 and the Long Term Capital Management/Russian debt crisis of 1998, spreads between LIBOR and AA rated instruments increased five to 10 basis points. He concluded that an economic event that directly impacted the GSEs would likely cause the spread between their debt and LIBOR/COFI to increase by more than 10 basis points, especially as their perceived special status might be brought into question by poor performance.

Only Freddie Mac¹² and Fannie Mae opposed including a debt premium. The Enterprises claimed that there was no factual basis for the agency's decision and that it fails to tie capital to risk. Freddie Mac's consultants opined that historical evidence might instead support reducing Enterprise spreads relative to other issuers. Freddie Mac concluded that OFHEO added what it termed a costly premium on Enterprise debt yields based on a mere possibility, unsupported by evidence. Accordingly, the Enterprises recommended that OFHEO retain the methodology under the previous Rule, which projects yields on Enterprise debt based on historical spreads to Treasury, without a debt premium.

OFHEO has decided to adopt the proposed debt premium in which 10 basis points is added after the first year of the stress period. After one year of stress conditions, the Enterprises might appear strong based on accounting measures of earnings and net worth. However, market values of the Enterprises' assets, liabilities, and derivatives contracts would fully reflect the effects of the interest rate shock and some credit quality deterioration of the stress test. Investors would be aware of these changes in market value and adjust their evaluations of the Enterprises' financial health accordingly.

Notwithstanding the Enterprises' critique, historical evidence does exist to support OFHEO's decision to include a debt premium. The historical experiences of Fannie Mae in the early 1980s and the Farm Credit System in the mid-1980s were periods during which government sponsored enterprises faced financial stress, which indicated that borrowing costs would include some risk premium during economic conditions such as those in the stress test. In fact, in drafting the 1992 Act, legislators referenced the Farm Credit System bailout to support having the Enterprises subject to a rigorous risk-based capital test.¹³ This historical experience is further illustrated by data reported in the

¹² Freddie Mac commissioned two consultants to file comments in support of its arguments.

¹³ "Because of their Federal ties, GSEs emerged as a major public policy issue in the wake of the \$4 billion Federal bailout of the Farm Credit System in 1987 * * *" H.R. Rep. No. 102-282 (1991) at 109; *see also* S. Rep. No. 102-282 (1992) at 10 ("While both GSEs are currently very prosperous, HUD estimated in a 1986 report to Congress, that Fannie Mae was insolvent on a marked-to-market basis at year-end 1978 and did not return to solvency until 1985. Its negative net worth reached a peak of more than (sic) \$20 billion in 1981, which was roughly 20 percent of its outstanding liabilities.")

General Accounting Office's 1990 report on government sponsored enterprises in which Fannie Mae's short-term borrowing costs during 1980 through 1982 were generally about 80 basis points in excess of yields of comparable maturity Treasury debt, and rising at one point to 200 basis points above Treasury yields. Spreads receded after sharp declines in interest rates greatly improved Fannie Mae's condition to a more normal range centered roughly at 20 basis points. Spreads were high again in the late 1980s for both Fannie Mae and the Farm Credit System, ranging from 40 to 100 basis points over a two-year period during the Farm Credit System's time of greatest difficulty.¹⁴

These episodes could support a stress test projection that spreads of Enterprise debt yields to Treasury yields widen by 50 to 60 basis points. However, the stressful circumstances likely would also cause yield spreads of other debt to widen. OFHEO has chosen not to project how each yield series in the stress period might be affected by the stresses incorporated in the test, but wider spreads for some indexes generally would benefit an Enterprise with more fixed-pay than floating-pay swaps or swaptions. Because, in recent years, both Enterprises generally have relied much more heavily on fixed-pay instruments, that benefit could easily offset more than half of the cost of wider spreads on the Enterprises' own debt issues. However, based on recent Enterprise asset-liability structures, a substantial portion of new debt that would be issued by each Enterprise in stress tests would not be matched by fixed-pay swaps. Also, the nature of the stresses (sharp changes in long-term yields and high mortgage credit losses) is designed to affect the Enterprises specifically, and short-term yield indexes typically used in swap contracts might be affected less than Enterprise yields. In view of these considerations, OFHEO has decided that an appropriate adjustment to Enterprise yields (in the absence of any adjustment to other yield indexes) should be significantly less than the sustained 50 to 60 basis point spread widenings of the 1980s, low enough to avoid potentially inappropriate adverse affects on the Enterprises, but high enough to be meaningful, pending further consideration.

The Enterprises suggest that the only rational stress test is one that presumes that spreads of Enterprise debt to

¹⁴ U.S. General Accounting Office (1990), *Government Sponsored Enterprises: The Government's Exposure to Risk*. Washington, DC: U.S. General Accounting Office. (GAO/GGD-90-97) 87-88.

Treasuries widen no more than spreads on any other non-Treasury rate. Far from being irrational to presume a wider yield spread on the debt of a stressed Enterprise, OFHEO determined that it was the most prudent and responsible course from a regulatory perspective. To assume, as the failed risk-management strategies at Long Term Capital Management did, that yield spreads would never fall far outside recent experience, is to ignore the reasonable implications of out-of-sample events such as the interest rate and credit stresses that are imposed during the stress period.

D. Changes to New Debt Mix

The previous Rule provided for the funding of all cash deficits by the issuance of new long- or short-term debt, whichever was in shorter supply, until a 50/50 balance of short-to-long-term debt was reached in each Enterprise's portfolio. Thereafter, long- and short-term debt were to be issued in whatever ratio would best contribute to maintaining that balance. OFHEO chose this approach because it did not want to include an assumption about any particular behavioral preference by the Enterprises during the stress test. The previous Rule specified that the new short-term debt being issued as six-month discount notes with a discount rate at the six-month Enterprise Cost of Funds, and the new-long term debt being issued as callable five-year bonds not callable for the first year. The previous Rule also provided a 50 basis point call premium, which required that callable debt would be called when it was 50 basis points out-of-the-money. The Rule further specified an issuance cost of 2.5 basis points on new short-term debt and an issuance cost of 20 basis points on new long-term debt.

OFHEO has decided to adopt its proposal to change the target balance embodied in the previous Rule's approach. Specifically, the 50/50 debt mix has been replaced with the actual ratio of an Enterprise's debt obligations (as adjusted by interest rate swaps) at the start of the stress period. In addition, OFHEO has decided to modify the call rule for long-term debt so that no calls will be executed on new long-term debt in the up-rate scenario.

Fannie Mae, Freddie Mac, the Mortgage Bankers Association (MBA) and JP Morgan each commented on the new debt mix. All these comments favored the proposed approach over the 50/50 mix adopted in the Rule.

These commenters provided additional recommendations for OFHEO to further refine the new debt mix in the stress test. MBA suggested that OFHEO

meet with professional portfolio risk management experts to devise additional funding rules for each interest rate scenario. MBA also stated, without elaboration, that the capital requirements resulting from this funding rule would cause the agencies to curtail their activities in the housing market at unpredictable times.

The Enterprises provided detailed comments on this issue. Freddie Mac expressed concern that, under the Rule, callable debt issued in the up-rate stress test after month 12 would always be called at the first opportunity, even though interest rates remain constant during the last nine years of the stress period and the Enterprises would incur issuance fees as a result of calling the debt. Freddie Mac requested that the cost of callable debt reflect the degree of prepayment risk in the mortgages being funded. Freddie Mac argued that the issuance fees were inappropriate because there would be no reason for the Enterprise, without more, to call the debt. Freddie Mac requested that the Rule include detailed refunding provisions, including that callable debt match the callability of the mortgages being funded and that the 50 basis point call premium for long term debt be reduced significantly. Specifically, Freddie Mac believed the call premium for 5-year callable debt should be reduced from an initial cost of 50 basis points to 5 basis points over the first 12 months of the up-rate scenario and from an initial cost of 50 basis points to minus 45 basis points over the first 12 months of the down-rate scenario.

Like Freddie Mac, Fannie Mae was particularly concerned about repeatedly calling new long-term debt at the end of one year and incurring the 20 basis point issuance fee for an identically yielding long-term debt instrument. Fannie Mae also supported Freddie Mac's recommendation for lower call premiums on new callable debt. In addition, Fannie Mae suggested that new long-term debt should be a mix of 5-year callable debt and seven year noncallable debt and that calls on newly issued callable debt should reflect the month-end cash position.

As noted above, OFHEO has decided to adopt the proposed change to the new debt mix to reflect an Enterprise's actual short-term/long-term proportions of corporate debt outstanding at the start of the stress test. As the commenters stated, this new approach provides a more typical debt structure than the 50/50 mix set forth in the Rule. In addition, OFHEO has decided to modify the specification for calling long-term debt so that the call option for new long-term debt will never be executed in the up-

rate scenario. OFHEO determined that this modification is appropriate because the earlier requirement would have resulted in new long-term debt being called even though there would be cost but little benefit to an Enterprise in calling it.

OFHEO read with interest the more detailed alternative debt funding strategies suggested by the commenters. However, OFHEO has decided not to adopt any of the more detailed alternative recommendations, but will continue to analyze the issue. In addition, OFHEO is aware that the proposed treatment may place excessive significance on the quantity of an Enterprise's debt maturing early in the second year of the stress test. Such debt will contribute to the long-term (greater than one year) portion of its initial debt ratios, but will count as short-term debt in early months of the stress test when calculating whether new debt is issued as short-term or long-term debt. OFHEO will monitor the amounts of debt with these maturities closely and could decide to reclassify some debt if the amounts do not appear consistent with normal business practice.

E. Miscellaneous Technical Changes

Operating Expenses

OFHEO has decided to modify the stress test treatment of operating expenses by converting 75 percent of starting-position fixed-asset balances to cash over the ten-year stress period. The amended Rule retains 25 percent of the fixed assets on an Enterprise's books throughout the stress period to reflect the acquisition of some new fixed assets, such as computer equipment, which is likely even in a "wind-down" scenario. The effect of this change is to reduce the Enterprises' need for debt to carry nonearning fixed assets.

Only Fannie Mae and Freddie Mac commented on this aspect of the proposal. Each Enterprise stated that the proposal was superior to the treatment of operating expenses in the Rule, because the proposal provides a "more realistic" treatment of fixed assets. Nevertheless, each Enterprise stated that the stress test should use an accelerated rate of amortization of fixed assets, which they believed would be more economically realistic.

This amendment to the treatment of operating expenses adopts the approach proposed in the AmendNPR, without modification. OFHEO believes that the adopted change provides a straightforward and reasonable approach to the treatment of fixed assets.

Float Income

The Rule provides for the modeling of float income associated with passthrough payments on securities issued by the Enterprises. Float income can be positive or negative depending upon whether the Enterprise holds the funds for a period of time before remitting them to security holders or remits funds to security holders before they are actually received. When an Enterprise owns its own passthrough securities, the timing of payment to itself is not relevant. However, the previous Rule included these securities in the calculation of float income, resulting in an overstatement of float income. OFHEO corrected this overstatement by reducing the float income on passthrough securities issued by the reporting Enterprise by the percentage of the Enterprise's ownership interest.

Fannie Mae and Freddie Mac commented favorably about the proposed treatment of float income, provided that the stress test accurately accounts for such income. Freddie Mac provided an alternative equation which it believed more completely implements the proposal.

After reviewing this suggested alternative, OFHEO determined that the alternative, with slight further modification, is correct. Accordingly, OFHEO has adopted its proposal with the appropriate adjustment.

Currency Swaps

Regarding the treatment of Foreign Exchange Risk specified in the previous Rule, OFHEO stated that it would not apply haircuts to foreign currency swaps. However, in furtherance of its commitment to continue to refine the ability of the stress test to tie capital to risk more accurately, OFHEO indicated that it would continue to seek a suitable methodology for applying an appropriate haircut to foreign currency swaps. After additional analysis, including evaluation of the technical enhancements required for implementation, OFHEO has eliminated the simplifying assumption applied in the previous Rule and applied a haircut to foreign currency swap counterparties. Because the stress test does not project foreign currency values, the haircut is applied by adjusting the pay (dollar-denominated) side of the swap upward by the amount of the haircut percentage rather than haircutting the foreign-currency receive side of the swap.

Commenters agreed with OFHEO that the stress test should recognize the capital impact of foreign currency swaps, however, they criticized

OFHEO's methodology. One commenter characterized OFHEO's approach as imprecise and conservative, suggesting that the amendment would result in the imposition of an excessive capital charge for foreign currency swaps. Another commenter opined that OFHEO's treatment would result in excessive capital charges for currency swaps and suggested establishing haircuts based on the net amount owed on the swap. Both Enterprises recommended that OFHEO reduce the haircuts applied to foreign currency swaps by 50 percent. They argued that the proposed approach, which bases the haircut on the amount paid by an Enterprise, rather than the net amount received, implicitly assumes that the U.S. dollar would depreciate by 100 percent. Historical data on dollar exchange rates with major currencies over the past three decades show that the largest sustained decline (average decline over a 10-year period, relative to the start of the 10-year period) in the dollar was slightly less than 50 percent—half the decline implicitly assumed in the proposed approach.

Although OFHEO has declined to project currency exchange rates during the stress period, the amended Rule produces the same result as an assumption that during the stress period the dollar will have depreciated 50 percent relative to the forward exchange values of all foreign currencies embodied in the currency swaps. (A 100 percent dollar depreciation would imply that the dollar value of net swap receipts would be infinite, as would any percentage haircut.) OFHEO agrees that the worst sustained dollar depreciation against a major currency in recent times was nearly 50 percent, which is consistent with the implied assumption about currency rates during the stress period. Accordingly, OFHEO has decided to adopt the proposed change to the Rule.

American Call Options

With respect to the modeling of nonmortgage instrument cash flows, the previous Rule did not attempt to provide a comprehensive explanation of the cash flows of all nonmortgage instruments utilized by the Enterprises. Consistent with this approach, OFHEO used a simplifying assumption in the previous Rule to model American call options. In the previous Rule, an American call option, which allows an issuer to exercise the call option at any time after a lockout period, was treated as a Bermudan call option. Bermudan options allow the owner to exercise the option only on certain specified dates before maturity, usually on coupon

payment days. However, in the preamble to the previous Rule, OFHEO stated that it would be preferable to consider how options might be modeled more precisely.

Upon further evaluation, OFHEO has modified the stress test to evaluate American calls on the first option date in the exercise schedule and on subsequent monthly anniversaries of an instrument's first coupon date. This methodology will allow the stress test to model American call options according to their terms, resulting in a refinement that more closely ties capital to risk.

The comments supported OFHEO's proposed modifications to address American call options. Both Enterprises suggested additional improvements to the stress test could be achieved by incorporating changes designed specifically to model European call options.

Changes to the stress test treatment of European options may be appropriate. OFHEO will consider the desirability of implementing European call related recommendations in the future.

House Price Growth Factor Clarification

The Rule requires the use of OFHEO's most recent House Price Index as of the reporting date to determine the house price growth factor used to calculate current loan-to-value ratios. OFHEO has decided to expand the instructions in Section 3.6 to clarify, consistent with Section 3.7, that when a loan was originated since the publication of that report, a cumulative house price growth factor of one is used. No comments critical of this clarification were received.

Preferred Stock

In the Final Rule, OFHEO decided to include rules in the stress test to address share repurchases during the stress period. Although the Rule's effect was to treat the calling of preferred stock as a share repurchase, this result would not be clear to some readers. Accordingly, OFHEO is making a technical amendment to state in section 3.8.1[a]3 that "no preferred stock issued by the Enterprise will be called."

Technical Correction

OFHEO added a Prepayment Penalty Flag as an additional classification variable for multifamily loan groups. The Flag distinguishes loans with active prepayment penalties or yield maintenance provisions from those without in the calculation of prepayment penalty duration for loan groups.

F. Process Issues

Publication of Capital Numbers

Several commenters opined that OFHEO should have published results of model runs to demonstrate the impact of the proposed change on the Enterprises' capital requirements. One commenter stated that OFHEO should publish the capital requirements for the Enterprises under the previous version of the Rule and the modified Rule, so that the public can understand the impact of the changes.

In OFHEO's view, the comments received in response to the proposed changes demonstrate that the AmendNPR provided sufficient information for a full and informed discussion of the relevant issues. OFHEO considered each of the proposed changes on its own merits and those that were adopted were approved on the basis of sound theory, research and, where appropriate, statistical estimation, rather than simply the impact they might have on the capital of an Enterprise in a particular historical quarter. To the extent that OFHEO did runs to test the developmental computer code it had created for these changes, OFHEO did not rely upon those results as the rationale for its choices. Those runs were designed primarily to check for errors in the code or the algorithms on which the code was based. For these reasons, OFHEO has found the argument that results of runs are necessary to understand or evaluate the impact of the proposed changes to be unfounded.

OFHEO published a final Rule on September 13, 2001, which provided detailed specifications and working copies of the code to the Enterprises and other members of the public. As expected, when outside parties were able to examine the specifications in detail and begin to run portions of the code, OFHEO received numerous comments and requests for changes. Some of these changes OFHEO considered to be sufficiently significant that it was desirable to publish them for comment quickly in order to allow any of them found to be necessary to be finalized without delaying the implementation of the Rule and the September 2002 date when the Rule becomes enforceable. OFHEO expects that with the changes approved in this document, the Rule will better tie capital to risk. Accordingly, the risk-based capital numbers for the first quarter of 2002 will accurately portray the adequacy of the Enterprises' capital under the Rule that will be enforced. Earlier results would be based upon data that are now too old to indicate any

useful information about the Enterprises' current condition.

Another important reason why OFHEO has delayed publishing risk-based capital numbers is that, in OFHEO's view, the 1992 Act intends that the Enterprises have a year to adjust their operations to the requirements of the Rule. These adjustments take a number of forms. First, the Enterprises have needed time to adjust their computer systems and data production systems to support the stress test. This has been a time-consuming and expensive process for them and for OFHEO, but is an essential part of making the entire capital scheme in the 1992 Act operational. Second, the one-year implementation period in the 1992 Act allows the Enterprises to adjust their businesses, including their lending and hedging strategies, to the stress test. Third, the implementation period allows the Enterprises to raise any additional capital that might be required by the Rule. Given the fact that the Enterprises are publicly traded companies, the economic condition of which could be affected greatly by premature disclosure of capital requirements, OFHEO will not disclose capital numbers until the Enterprises have had a reasonable opportunity to make at least a large portion of these adjustments and present to the public their plans to maintain capital compliance.

Use of Code by Parties Other Than OFHEO

Two commenters discussed the difficulties they have encountered in running the computer code released by OFHEO. They both expressed the view that OFHEO should not amend the Rule until they have had time to run the code and analyze the results or until OFHEO has published data regarding the capital impact of any proposed amendments. Instead they would have OFHEO enforce the previous Rule and continue to allow commenters to study the proposed changes. OFHEO disagrees with this approach. The changes that OFHEO adopted are each supportable on its own merits. OFHEO's goal is to have the best rule possible when the Rule becomes enforceable in September 2002. That goal would not be achieved if the changes were delayed until after that date. As a general matter, if OFHEO were to hold up any changes to the Rule until any parties who wished to run the model and test the impact of the changes were able to do so, the Rule would lose the flexibility it must have in order to be dynamic and meaningful. Although the good faith of these commenters in attempting to run the

code is not questioned, their ability to do so, or the ability of any other interested party to do so, will not determine whether OFHEO proceeds with needed changes to the Rule.

Notwithstanding that OFHEO will not delay changes to the Rule to allow other parties (including the Enterprises) to be able to run the underlying computer code, OFHEO appreciates the extensive time and resources certain commenters have put into studying the code and attempting to run it. It is beneficial to OFHEO and to the regulatory process to obtain the well-informed and differing views that have resulted. OFHEO also appreciates the importance of the capital rules to parties other than the Enterprises and takes their views and the factual information they supply into consideration in determining the specifications for the stress test. As time and resources allow, OFHEO will continue to work with these parties to help them understand and run the models that underlie the stress test.

In order to assist interested parties with their continued efforts to replicate the model, and to maintain appropriate regulatory transparency, OFHEO intends to make the computer code associated with the Rule available to the public. The code will be available upon request after the Rule is published. OFHEO anticipates that the code will continue to evolve over time as additional efficiencies and technical adjustments are incorporated to enhance the functionality of the code. Consistent with OFHEO's need to address technical requirements or other contingencies that arise out of the operation of the code, the agency will continue to make code changes, without opportunity for public comment, as long as such changes are not inconsistent with the Rule. Any such changes to the code will be made available to the public.

Determination That the Amendments to the Rule Are Not "Economically Significant"

One commenter took issue with the determination by the Office of Information and Regulatory Affairs (OIRA) of the Office of Management and Budget (OMB) that the amendments to the Rule were not "economically significant" within the meaning of Executive Order 12866. OFHEO notes that this determination is entirely consistent with similar determinations made with regard to the capital rules of other federal financial regulatory agencies. As a practical matter, it is impossible to prove what economic impact a change in the Rule will have on the economy. However, OFHEO anticipates the effects on the Enterprises

and the economy as a whole will be small.

Cost/Benefit Analysis

The same commenter suggested that OFHEO should have undertaken a more extensive cost/benefit analysis than was included in the AmendNPR. OFHEO disagrees for much the same reasons that it disagreed that these amendments should be considered an economically significant rule in the previous paragraph.

A detailed cost/benefit analysis such as that suggested by the commenter would begin with an analysis of the marginal capital impact of each change on each of the Enterprises. It would then require judgments to be made about whether and to what extent these marginal impacts would alter the behavior of the Enterprises in the marketplace and the financial impact of those changes on other market participants. With risk-based capital rules, these types of predictions of future behavior are speculative, at best, and analysis is most useful after the change is implemented and its actual impact can be studied. That is why risk-based capital rules tend to be changed relatively frequently and incrementally, as additional information comes to light and the behavior of the regulated entities and the markets in which they operate can be studied.

Comment Period Extension

In the AmendNPR, OFHEO proposed a comment period of thirty days. Two commenters each requested that the comment period be extended to give the public more time to analyze and provide meaningful comment about the proposal.

OFHEO contacted the commenters before the close of the comment period and explained that it decided to deny any request to extend the comment period because, as discussed above, OFHEO has determined that the comment period provided sufficient time for a full and informed discussion of relevant issues. Another reason that the extension was denied is the tight statutory timeframe within which Congress intended that the Rule should become fully enforceable. Specifically, the 1992 Act provides that the Rule becomes fully enforceable one year after the Rule is initially issued. It would be impracticable for OFHEO to meet this statutory timeframe if it were to extend the comment period any further.

To meet the one-year timetable, OFHEO needs to establish a firm baseline set of specifications for the Rule, which can be applied to first quarter, 2002, data from the Enterprises.

Any delay in the effective date of these amendments could have caused a one quarter delay in applying that set of specifications. Applying the new specifications to new data from the Enterprises before the risk-based capital rule becomes fully enforceable in September 2002 will allow the Enterprises to adjust to the revised Rule and for OFHEO to study its effects.

Regulatory Impact

Executive Order 12866, Regulatory Planning and Review

Today's final Rule amends OFHEO's risk-based capital rule, which was designated as a major rule by OMB. The amendment refines various aspects of that Rule to tie the capital more closely to risk. Although the impact of these refinements is not economically significant, OMB has reviewed the amendment to determine whether the changes may raise novel policy issues. OFHEO is not required to provide the type of regulatory impact analysis that is required for an economically significant rule. Nevertheless, in accordance with OMB's guidance that all regulatory actions should be consistent with the principles of E.O. 12866, OFHEO has determined, after review by agency economists, financial analysts, and attorneys, that the benefits of the changes to the Rule substantially outweigh any economic costs.

It is impossible to estimate precisely the particular benefits and costs associated with the risk-based capital requirement. Although OFHEO believes this group of enhancements and refinements to the stress test will not generally increase or decrease the amount of required capital for an Enterprise to any substantial degree, the effect in any particular quarter depends upon how well that Enterprise is hedged against the risks and conditions specified in the stress test. OFHEO cannot know whether or not hedges in place at an Enterprise at the beginning of any quarter would have been in place in the absence of specific provisions of the risk-based capital rule or were put in place because of the test. Speculating as to what the Enterprises would do in the absence of specific provisions in future quarters is even more difficult. Therefore, a detailed economic cost/benefit analysis is not practical.

Rather than trying to assess the costs and benefits of every change to the stress test, OFHEO looks to whether or not the changes make the Rule better reflect the risks faced by the Enterprises. Improving the Rule in this manner should reduce the potential for Enterprise insolvency by protecting

better against interest rate, credit, and management and operations risk. By helping to ensure the safety and soundness of the Enterprises, the regulation allows them to continue to carry out their public purposes, which include providing stability in the secondary market for residential mortgages and providing access to mortgage credit in central cities, rural areas, and underserved areas.¹⁵ In addition, the regulation helps ensure that the Enterprises will continue to provide benefits to the primary mortgage market, such as standardizing business practices.¹⁶

The amended Rule results in a capital requirement that corresponds more closely to capital levels that the marketplace would demand in the absence of the benefits afforded by the Government sponsorship of the Enterprises, leading to gains in overall economic efficiency. By improving the Rule's ability to reflect actual risks at the Enterprises, the amendment also may enhance investor confidence in the ability of the stress test to forewarn investors and regulators of financial weaknesses. This result would be consistent with a study by Standard & Poor's (S&P) that provided risk-to-the-government credit ratings for the Enterprises.¹⁷ Although S&P had rated Fannie Mae A- and Freddie Mac A+ in 1991, the 1997 report upgraded the ratings of both Enterprises to AA-. S&P cited increased governmental oversight by OFHEO as an important factor in these higher ratings. It further noted that "OFHEO's regulatory oversight [of Freddie Mac] also gives comfort that appropriate interest rate risk mitigation steps would be taken as needed."¹⁸

OFHEO can identify no significant additional costs associated with implementing the amendments. No new reports are required, and net effects on required future capital likely will be very small. As explained above in response to comments, it is not practical to measure all the indirect impacts that each of these amendments might have on various sectors of the economy. OFHEO is convinced, however, that the amendments do improve, incrementally, the capital requirements applied to the Enterprises, as described in detail above and in the AmendNPR. In sum, the benefits to the public, including the Enterprises and other private-sector

¹⁵ 1992 Act, section 1302(2) (12 U.S.C. 4501(2)).

¹⁶ "Managing Risk in Housing Finance Markets: Perspectives from the Experiences of the United States of America and Mexico," *Mortgage Bankers Association of America* (June 11, 1998).

¹⁷ *Report to OFHEO, Standard & Poor's, Contract No. HE09602C* (February 3, 1997).

¹⁸ Report to OFHEO, at 10.

concerns, of improving the sensitivity of the stress test to risk far outweigh the already expended costs of implementing these improvements.

Paperwork Reduction Act

This regulation does not contain any information collection requirements that require the approval of the Office of Management and Budget under the Paperwork Reduction Act (44 U.S.C. 3501 *et seq.*).

Regulatory Flexibility Act

The Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*) requires that a regulation that has a significant economic impact on a substantial number of small entities, small businesses, or small organizations must include an initial regulatory flexibility analysis describing the regulation's impact on small entities. Such an analysis need not be undertaken if the agency has certified that the regulation will not have a significant economic impact on a substantial number of small entities. 5 U.S.C. 605(b). OFHEO has considered the impact of the regulation under the Regulatory Flexibility Act. The General Counsel of OFHEO certifies that the regulation is not likely to have a significant economic impact on a substantial number of small business entities because the regulation is applicable only to the Enterprises, which are not small entities for purposes of the Regulatory Flexibility Act.

List of Subjects in 12 CFR Part 1750

Capital classification, Mortgages, Risk-based capital.

Accordingly, for the reasons stated in the preamble, OFHEO is amending 12 CFR part 1750 as follows:

PART 1750—RISK-BASED CAPITAL

1. The authority citation for part 1750 continues to read as follows:

Authority: 12 U.S.C. 4513, 4514, 4611, 4612, 4614, 4618.

2. Amend Appendix A to subpart B of part 1750 as follows:

- a. Revise Table 3–1 in paragraph 3.1.1;
- b. Revise Tables 3–2 through 3–4 in paragraph 3.1.2.1;
- c. Revise Table 3–18 in paragraph 3.1.3.1 [c];
- d. Revise paragraph 3.3.1 [b];
- e. Revise paragraph 3.3.3 [a] 3.c.;
- f. Revise Table 3–28 in paragraph 3.4.2;
- g. Add new paragraph 3.5.3 [a] 2.d.;
- h. Revise paragraph 3.5.3 [a] 3. and Table 3–31;
- i. In sentence six of paragraph 3.6.1 [e], remove the comma after the words “Credit Losses”, add the word “and” in its place; and remove the words “and the Float Income” after the words “Guarantee Fee”;
- j. Revise paragraph 3.6.3.4.3.1 [a] 2.a.;
- k. Revise paragraph 3.6.3.4.3.1 [a] 3.a.;
- l. Revise paragraph 3.6.3.5.1 [b];
- m. Revise Table 3–38 in paragraph 3.6.3.5.2.;
- n. Revise paragraph 3.6.3.5.3.1 [a] 2.;
- o. In paragraph 3.6.3.5.3.1 [a] 4, remove the first equation: “ $UWDCRF_m = 1$ if $DCR_m < 1$ in month m ” and add the equation “ $UWDCRF_m = 1$ if $DCR_m < 0.98$ in month m ” in its place;
- p. Revise paragraph 3.6.3.5.3.2 [a] 1. and Table 3–39;
- q. Revise paragraph 3.6.3.5.3.2 [a] 2.b.;
- r. Revise paragraph 3.6.3.5.3.2 [a] 3.;
- s. Revise Table 3–44 in paragraph 3.6.3.6.3.2.;
- t. In section 3.6.3.6.4.3, revise the four paragraphs: [a] 1., [a] 3.b., [a] 4.b. and [a] 5.;
- u. Revise paragraph 3.6.3.7.3 [a] 9.b.;
- v. Revise paragraph 3.7.3.1 [g] 1.;
- w. In paragraphs 3.7.3.2 [a] 5. and 3.7.3.3 [a] 3., add the words “, as appropriate” at the end of the sentence in each paragraph;

- x. In paragraph 3.7.4 [a] remove reference to “Table 3–55” and add “Table 3–61” in its place;
 - y. Redesignate Tables 3–65 through 3–70 as Tables 3–66 through 3–71;
 - z. After Table 3–64, add new paragraph 3.8.1 [f], new footnote 5, and new Table 3–65;
 - aa. In paragraphs 3.8.2 [a] and [b] remove references to “Table 3–65” and add “Table 3–66” in their place;
 - bb. Revise paragraphs 3.8.3.1 [a] 3.a. and 3.8.3.1 [a] 3.d.;
 - cc. Add new paragraph 3.8.3.1 [a] 3.e.;
 - dd. In paragraph 3.8.3.4 remove reference to “Table 3–66” and add “Table 3–67” in its place;
 - ee. In paragraphs 3.8.3.6.1 [e] 1. and [e] 2. remove both references to “Table 3–67” and add “Table 3–68” in their place;
 - ff. In paragraph 3.8.3.9, in redesignated Table 3–69 remove both references to “Table 3–65” and add “Table 3–66” in their place;
 - gg. Revise paragraphs 3.8.3.10 [a], [b] and [c];
 - hh. In paragraph 3.9.2 remove reference to “Table 3–69” and add “Table 3–70” in its place;
 - ii. In paragraph 3.10.2 [a] remove reference to “Table 3–70” and add “Table 3–71” in its place;
 - jj. Revise paragraphs 3.10.3.1 [b] 2. and [b] 3.;
 - kk. Revise paragraph 3.10.3.6.2 [a] 5.; and
 - ll. Revise the definition of *Enterprise Cost of Funds* in paragraph 4.0 Glossary.
- The revisions and additions read as follows:

Appendix A to Subpart B of Part 1750—Risk-Based Capital Text Methodology and Specifications

* * * * *
3.1.1 * * *

TABLE 3–1—SOURCES OF STRESS TEST INPUT DATA

Section of this Appendix	Table	Data Source(s) R = RBC Report P = Public Data F = Fixed Values		
		R	P	F
3.1.3, Public Data	3–19, Stress Test Single Family Quarterly House Price Growth Rates			F
	3–20, Multifamily Monthly Rent Growth and Vacancy Rates			F
3.2.2, Commitments Inputs	Characteristics of securitized single family loans originated and delivered within 6 months prior to the Start of the Stress Test	R		
3.2.3, Commitments Procedures	3–25, Monthly Deliveries as a Percentage of Commitments Outstanding (MDP)			F

Intermediate Outputs	
3.3.4, Interest Rates Outputs	

TABLE 3-1—SOURCES OF STRESS TEST INPUT DATA—Continued

Section of this Appendix	Table	Data Source(s) R = RBC Report P = Public Data F = Fixed Values		
		R	P	F
3.3.2, Interest Rates Inputs	3-18, Interest Rate and Index Inputs		P	
3.3.3, Interest Rates Procedures	3-26, CMT Ratios to the Ten-Year CMT			F
3.4.2, Property Valuation Inputs	3-28, Property Valuation Inputs			3.1.3, Public Data 3.3.4, Interest Rates Outputs
3.5.3, Counterparty Defaults Procedures	3-30, Rating Agencies Mappings to OFHEO Ratings Categories		P	
	3-31, Stress Test Maximum Haircut by Ratings Classification			F
3.6.3.3.2, Mortgage Amortization Schedule Inputs	3-32, Loan Group Inputs for Mortgage Amortization Calculation			3.3.4, Interest Rates Outputs
3.6.3.4.2, Single Family Default and Prepayment Inputs	3-34, Single Family Default and Prepayment Inputs	R		F 3.6.3.3.4, Mortgage Amortization Schedule Outputs
3.6.3.4.3.3, Prepayment and Default Rates and Performance Fractions	3-35, Coefficients for Single Family Default and Prepayment Explanatory Variables			F
3.6.3.5.2, Multifamily Default and Prepayment Inputs	3-38, Loan Group Inputs for Multifamily Default and Prepayment Calculations	R		F
3.6.3.5.3.3, Default and Prepayment Rates and Performance Fractions	3-39, Explanatory Variable Coefficients for Multifamily Default			F 3.6.3.3.4, Mortgage Amortization Schedule Outputs
3.6.3.6.2.6, Single Family Gross Loss Severity Inputs	3-42, Loan Group inputs for Gross Loss Severity			F 3.3.4, Interest Rates Outputs 3.6.3.3.4, Mortgage Amortization Schedule Outputs 3.6.3.4.4, Single Family Default and Prepayment Outputs
3.6.3.6.3.6, Multifamily Gross Loss Severity Inputs	3-44, Loan Group Inputs for Multifamily Gross Loss Severity			F 3.3.4, Interest Rates Outputs 3.6.3.3.4, Mortgage Amortization Schedule Outputs
3.6.3.6.4.8, Mortgage Credit Enhancement Inputs	3-46, CE Inputs for each Loan Group	R		3.6.3.3.4, Mortgage Amortization Schedule Outputs 3.6.3.4.4, Single Family Default and Prepayment Outputs 3.6.3.5.4, Multifamily Default and Prepayment Outputs 3.6.3.6.2.3, Single Family Gross Loss Severity Outputs 3.6.3.6.3.3, Multifamily Gross Loss Severity Outputs
	3-47, Inputs for each Distinct CE Combination (DCC)	R		
3.6.3.7.2, Stress Test Whole Loan Cash Flow Inputs	3-51, Inputs for Final Calculation of Stress Test Whole Loan Cash Flows	R		3.3.4, Interest Rates Outputs 3.6.3.3.4, Mortgage Amortization Schedule Outputs 3.6.3.4.4, Single Family Default and Prepayment Outputs 3.6.3.5.4, Multifamily Default and Prepayment Outputs 3.6.3.6.5.6, Single Family and Multifamily Net Loss Severity Outputs
3.6.3.8.2, Whole Loan Accounting Flows Inputs	3-54, Inputs for Whole Loan Accounting Flows	R		3.6.3.7.4, Stress Test Whole Loan Cash Flow Outputs
3.7.2, Mortgage-Related Securities Inputs	3-56, RBC Report Inputs for Single Class MBS Cash Flows	R		
	3-57, RBC Report Inputs for Multi-Class and Derivative MBS Cash Flows	R		
	3-58, RBC Report Inputs for MRBs and Derivative MBS Cash Flows	R		
3.8.2, Nonmortgage Instrument Inputs	3-66, Input Variables for Nonmortgage Instrument Cash flows	R		
3.9.2, Alternative Modeling Treatments Inputs	3-70, Alternative Modeling Treatment Inputs	R		

TABLE 3-1—SOURCES OF STRESS TEST INPUT DATA—Continued

Section of this Appendix	Table	Data Source(s)			Intermediate Outputs
		R	P	F	
3.10.2, Operations, Taxes, and Accounting Inputs	3-71, Operations, Taxes, and Accounting Inputs	R			3.3.4, Interest Rates Outputs 3.6.3.7.4, Stress Test Whole Loan Cash Flow Outputs 3.7.4, Mortgage-Related Securities Outputs 3.8.4, Nonmortgage Instrument Outputs
3.12.2, Risk-Based Capital Requirement Inputs		R			3.3.4, Interest Rates Outputs 3.9.4, Alternative Modeling Treatments Outputs 3.10.4, Operations, Taxes, and Accounting Outputs

* * * * *

3.1.2.1 * * *

TABLE 3-2—WHOLE LOAN CLASSIFICATION VARIABLES

Variable	Description	Range
Reporting Date	The last day of the quarter for the loan group activity that is being reported to OFHEO	YYYY0331 YYYY0630 YYYY0930 YYYY1231
Enterprise	Enterprise submitting the loan group data	Fannie Mae Freddie Mac
Business Type	Single family or multifamily	Single family Multifamily
Portfolio Type	Retained portfolio or Sold portfolio	Retained Portfolio Sold Portfolio
Government Flag	Conventional or Government insured loan	Conventional Government
Original LTV	Assigned LTV classes based on the ratio, in percent, between the original loan amount and the lesser of the purchase price or appraised value	LTV<=60 60 <LTV<=70 70 <LTV<=75 75 <LTV<=80 80 <LTV<=90 90 <LTV<=95 95 <LTV<=100 100 <LTV
Current Mortgage Interest Rate	Assigned classes for the current mortgage interest rate	0.0<=Rate<4.0 4.0<=Rate<5.0 5.0<=Rate<6.0 6.0<=Rate<7.0 7.0<=Rate<8.0 8.0<=Rate<9.0 9.0<=Rate<10.0 10.0<=Rate<11.0 11.0<=Rate<12.0 12.0<=Rate<13.0 13.0<=Rate<14.0 14.0<=Rate<15.0 15.0<=Rate<16.0 Rate=>16.0
Original Mortgage Interest Rate	Assigned classes for the original mortgage interest rate	0.0<=Rate<4.0 4.0<=Rate<5.0 5.0<=Rate<6.0 6.0<=Rate<7.0 7.0<=Rate<8.0 8.0<=Rate<9.0 9.0<=Rate<10.0 10.0<=Rate<11.0 11.0<=Rate<12.0 12.0<=Rate<13.0 13.0<=Rate<14.0 14.0<=Rate<15.0 15.0<=Rate<16.0 Rate=>16.0

TABLE 3-2—WHOLE LOAN CLASSIFICATION VARIABLES—Continued

Variable	Description	Range
Mortgage Age	Assigned classes for the age of the loan	0<=Age<=12 12<Age<=24 24<Age<=36 36<Age<=48 48<Age<=60 60<Age<=72 72<Age<=84 84<Age<=96 96<Age<=108 108<Age<=120 120<Age<=132 132<Age<=144 144<Age<=156 156<Age<=168 168<Age<=180 Age>180
Rate Reset Period	Assigned classes for the number of months between rate adjustments	Period =1 1< Period <=4 4< Period <=9 9< Period <=15 15< Period <=60 60< Period <999 Period = 999 (not applicable)
Payment Reset Period	Assigned classes for the number of months between payment adjustments after the duration of the teaser rate	Period <=9 9< Period <=15 15< Period <999 Period = 999 (not applicable)
ARM Index	Specifies the type of index used to determine the interest rate at each adjustment	FHLB 11th District Cost of Funds. 1 Month Federal Agency Cost of Funds. 3 Month Federal Agency Cost of Funds. 6 Month Federal Agency Cost of Funds. 12 Month Federal Agency Cost of Funds. 24 Month Federal Agency Cost of Funds. 36 Month Federal Agency Cost of Funds. 60 Month Federal Agency Cost of Funds. 120 Month Federal Agency Cost of Funds. 360 Month Federal Agency Cost of Funds. Overnight Federal Funds (Effective). 1 Week Federal Funds 6 Month Federal Funds 1 Month LIBOR 3 Month LIBOR 6 Month LIBOR 12 Month LIBOR Conventional Mortgage Rate. 15 Year Fixed Mortgage Rate. 7 Year Balloon Mortgage Rate. Prime Rate 1 Month Treasury Bill 3 Month CMT 6 Month CMT 12 Month CMT 24 Month CMT 36 Month CMT 60 Month CMT 120 Month CMT 240 Month CMT 360 Month CMT
Cap Type Flag	Indicates if a loan group is rate-capped, payment-capped or uncapped	Payment Capped Rate Capped No periodic rate cap
OFHEO Ledger Code	OFHEO-specific General Ledger account number used in the Stress Test	Appropriate OFHEO Ledger Code based on the chart of accounts.

TABLE 3-3—ADDITIONAL SINGLE FAMILY LOAN CLASSIFICATION VARIABLES

Variable	Description	Range
Single Family Product Code	Identifies the mortgage product types for single family loans	Fixed Rate 30YR Fixed Rate 20YR Fixed Rate 15YR 5 Year Fixed Rate Balloon 7 Year Fixed Rate Balloon 10 Year Fixed Rate Balloon 15 Year Fixed Rate Balloon

TABLE 3-3—ADDITIONAL SINGLE FAMILY LOAN CLASSIFICATION VARIABLES—Continued

Variable	Description	Range
		Adjustable Rate Step Rate ARMs Second Lien Other
Census Division	The Census Division in which the property resides. This variable is populated based on the property's state code	East North Central East South Central Middle Atlantic Mountain New England Pacific South Atlantic West North Central West South Central
Relative Loan Size	Assigned classes for the loan amount at origination divided by the simple average of the loan amount for the origination year and for the State in which the property is located. Average loan size for the appropriate quarter is provided by OFHEO based upon data from both Enterprises. It is expressed as a decimal	0<=Size<=.4 .4<Size<=.6 .6<Size<=.75 .75<Size<=1.0 1.0<Size<=1.25 1.25<Size<=1.5 Size>1.5

TABLE 3-4—ADDITIONAL MULTIFAMILY LOAN CLASSIFICATION VARIABLES

Variable	Description	Range
Multifamily Product Code	Identifies the mortgage product types for multifamily loans	Fixed Rate Fully Amortizing Adjustable Rate Fully Amortizing 5 Year Fixed Rate Balloon 7 Year Fixed Rate Balloon 10 Year Fixed Rate Balloon 15 Year Fixed Rate Balloon Balloon ARM Other
New Book Flag	"New Book" is applied to Fannie Mae loans acquired beginning in 1988 and Freddie Mac loans acquired beginning in 1993, except for loans that were refinanced to avoid a default on a loan originated or acquired earlier	New Book Old Book
Ratio Update Flag	Indicates if the LTV and DCR were updated at origination or at Enterprise acquisition	Yes No
Interest Only Flag	Indicates if the loan is currently paying interest only. Loans that started as I/Os and are currently amortizing should be flagged as "N"	Yes No
Current DCR	Assigned classes for the Debt Service Coverage Ratio based on the most recent annual operating statement	DCR < 1.00 1.00 <=DCR<1.10 1.10 <=DCR<1.20 1.20 <=DCR<1.30 1.30 <=DCR<1.40 1.40 <=DCR<1.50 1.50 <=DCR<1.60 1.60 <=DCR<1.70 1.70 <=DCR<1.80 1.80 <=DCR<1.90 1.90 <=DCR<2.00 2.00 <=DCR<2.50 2.50 <=DCR<4.00 DCR >= 4.00
Prepayment Penalty Flag	Indicates if prepayment of the loan is subject to active prepayment penalties or yield maintenance provisions	Yes No

3.1.3.1 * * *
[c] * * *

TABLE 3-18—INTEREST RATE AND INDEX INPUTS

Interest Rate Index	Description	Source
1 MO Treasury Bill	One-month Treasury bill yield, monthly simple average of daily rate, quoted as actual/360	Bloomberg Generic 1 Month U.S. Treasury bill Ticker: GB1M (index)

TABLE 3-18—INTEREST RATE AND INDEX INPUTS—Continued

Interest Rate Index	Description	Source
3 MO CMT	Three-month constant maturity Treasury yield, monthly simple average of daily rate, quoted as bond equivalent yield	Federal Reserve H.15 Release
6 MO CMT	Six-month constant maturity Treasury yield, monthly simple average of daily rate, quoted as bond equivalent yield	Federal Reserve H.15 Release
1 YR CMT	One-year constant maturity Treasury yield, monthly simple average of daily rate, quoted as bond equivalent yield	Federal Reserve H.15 Release
2 YR CMT	Two-year constant maturity Treasury yield, monthly simple average of daily rate, quoted as bond equivalent yield	Federal Reserve H.15 Release
3 YR CMT	Three-year constant maturity Treasury yield, monthly simple average of daily rate, quoted as bond equivalent yield	Federal Reserve H.15 Release
5 YR CMT	Five-year constant maturity Treasury yield, monthly simple average of daily rate, quoted as bond equivalent yield	Federal Reserve H.15 Release
10 YR CMT	Ten-year constant maturity Treasury yield, monthly simple average of daily rate, quoted as bond equivalent yield	Federal Reserve H.15 Release
20 YR CMT	Twenty-year constant maturity Treasury yield, monthly simple average of daily rate, quoted as bond equivalent yield	Federal Reserve H.15 Release
30 YR CMT	Thirty-year constant maturity Treasury yield, monthly simple average of daily rate, quoted as bond equivalent yield	Federal Reserve H.15 Release
Overnight Fed Funds (Effective)	Overnight effective Federal Funds rate, monthly simple average of daily rate	Federal Reserve H.15 Release
1 Week Federal Funds	1 week Federal Funds rate, monthly simple average of daily rates	Bloomberg Term Fed Funds U.S. Domestic Ticker: GFED01W (index)
6 Month Fed Funds	6 month Federal Funds rate, monthly simple average of daily rates	Bloomberg Term Fed Funds U.S. Domestic Ticker: GFED06M (index)
Conventional Mortgage Rate	FHLMC (Freddie Mac) contract interest rates for 30 YR fixed-rate mortgage commitments, monthly average of weekly rates	Federal Reserve H.15 Release
FHBL 11th District COF	11th District (San Francisco) weighted average cost of funds for savings and loans, monthly	Bloomberg Cost of Funds for the 11th District Ticker: COF11 (index)
1 MO LIBOR	One-month London Interbank Offered Rate, average of bid and asked, monthly simple average of daily rates, quoted as actual/360	British Bankers Association Bloomberg Ticker: US0001M (index)
3 MO LIBOR	Three-month London Interbank Offered Rate, average of bid and asked, monthly simple average of daily rates, quoted as actual/360	British Bankers Association, Bloomberg Ticker: US0003M (index)
6 MO LIBOR	Six-month London Interbank Offered Rate, average of bid and asked, monthly simple average of daily rates, quoted as actual/360	British Bankers Association, Bloomberg Ticker: US0006M (index)
12 MO LIBOR	One-year London Interbank Offered Rate, average of bid and asked, monthly simple average of daily rates, quoted as actual/360	British Bankers Association, Bloomberg Ticker: US0012M (index)
Prime Rate	Prevailing rate as quoted, monthly average of daily rates	Federal Reserve H.15 Release
1 MO Federal Agency COF	One-month Federal Agency Cost of Funds, monthly simple average of daily rates, quoted as actual/360	Bloomberg Generic 1 Month Agency Discount Note Yield, Ticker: AGDN030Y (index)
3 MO Federal Agency COF	Three-month Federal Agency Cost of Funds, monthly simple average of daily rates, quoted as actual/360	Bloomberg Generic 3 Month Agency Discount Note Yield, Ticker: AGDN090Y (index)
6 MO Federal Agency COF	Six-month Federal Agency Cost of Funds, monthly simple average of daily rates, quoted as actual/360	Bloomberg Generic 6 Month Agency Discount Note Yield, Ticker: AGDN180Y (index)
1 YR Federal Agency COF	One-year Federal Agency Cost of Funds, monthly simple average of daily rates, quoted as actual/360	Bloomberg Generic 12 Month Agency Discount Note Yield, Ticker: AGDN360Y (index)
2 YR Federal Agency COF	Two-year Federal Agency Fair Market Yield, monthly simple average of daily rates	Bloomberg Generic 2 Year Agency Fair Market Yield, Ticker: AGAC02 (index)
3 YR Federal Agency COF	Three-year Federal Agency Fair Market Yield, monthly simple average of daily rates	Bloomberg Generic 3 Year Agency Fair Market Yield, Ticker: AGAC03 (index)
5 YR Federal Agency COF	Five-year Federal Agency Fair Market Yield, monthly simple average of daily rates	Bloomberg Generic 5 Year Agency Fair Market Yield, Ticker: AGAC05 (index)
10 YR Federal Agency COF	Ten-year Federal Agency Fair Market Yield, monthly simple average of daily rates	Bloomberg Generic 10 Year Agency Fair Market Yield, Ticker: AGAC10 (index)
30 YR Federal Agency COF	Thirty-year Federal Agency Fair Market Yield, monthly simple average of daily rates	Bloomberg Generic 30 Year Agency Fair Market Yield, Ticker: AGAC30 (index)

TABLE 3-18—INTEREST RATE AND INDEX INPUTS—Continued

Interest Rate Index	Description	Source
15 YR fixed-rate mortgage	FHLMC (Freddie Mac) contract interest rates for 15 YR fixed-rate mortgage commitments, monthly average of FHLMC (Freddie Mac) contract interest rates for 15 YR	Bloomberg FHLMC 15 YR, 10 day commitment rate Ticker: FHCR1510 (index)
7-year balloon mortgage rate	Seven-year balloon mortgage, equal to the Conventional Mortgage Rate less 50 basis points	Computed

* * * * *

3.3.1 * * *

[b] The process for determining interest rates is as follows: first, identify values for the necessary Interest Rates at time zero; second, project the ten-year CMT for each month of the Stress Period as specified in the 1992 Act; third, project the 1-month Treasury yield, the 3-month, 6-month, 1-, 2-, 3-, 5-, 20- and 30-year CMTs; fourth, project non-Treasury Interest Rates, including the Federal

Agency Cost of Funds Index; and fifth, project the Enterprises Cost of Funds Index, which provides borrowing rates for the Enterprises during the Stress Period, by increasing the Agency Cost of Funds Index by 10 basis points for the last 108 months of the Stress Test.

* * * * *

3.3.3 * * *

[a] * * *

3. * * *

c. *Enterprise Borrowing Rates.* In the Stress Test, the Federal Agency Cost of Funds Index is the same as the Enterprise Cost of Funds Index during the Stress Period, except that the Stress Test adds a 10 basis-point credit spread to the Federal Agency Cost of Funds rates to project Enterprise Cost of Funds rates for the last 108 months of the Stress Period.

* * * * *

3.4.2 * * *

TABLE 3-28—PROPERTY VALUATION INPUTS

Variable	Description	Source
CMT10 _m	10-year CMT yield for months m = 1...120 of the Stress Test	section 3.3, Interest Rates
ACMT _o	Unweighted nine-month average of the ten-year CMT yield for the nine months immediately preceding the Stress Test. (Monthly rates are unweighted monthly averages of daily rates, bond equivalent yield)	section 3.3, Interest Rates
HHPGR _q ^{HSP}	Quarterly single family historical house price growth rates computed from the HPI series for the Benchmark region and time period, unadjusted for inflation. The specific series is the West South Central Census Division for the years 1984-1993, as reported in OFHEO's Third Quarter, 1996 HPI Report	Table 3-19 of section 3.1.3, Public Data
RG _m ^{HSP}	Multifamily Rent Growth Rates for months m = 1...120 of the Benchmark region and time period, unadjusted for inflation	Table 3-20 of section 3.1.3, Public Data
RVR _m ^{HSP}	Multifamily Rental Vacancy Rates for months m = 1...120 of the Benchmark region and time period	Table 3-20 of section 3.1.3, Public Data

* * * * *

3.5.3 * * *

[a] * * *

2. * * *

d. The Stress Test will permit a higher rating to be used for an unrated seller-servicer who participates in a multifamily delegated underwriting and servicing program that requires a loss-sharing agreement when: (1) The loss sharing agreement is collateralized by a fully funded reserve account pledged to the Enterprise; and (2) the reserve account is in an amount that is equal to or exceeds the amount that OFHEO has determined to be adequate to support the seller-servicer's loss-sharing obligation under the program. Determinations of the reserve requirement and of the rating that will be permitted will be made on a program-by-program and Enterprise-by-Enterprise basis by the Director.

3. *Determine Maximum Haircuts.* The Stress Test specifies the Maximum Haircut (i.e., the maximum reduction applied to cash flows during the Stress Test to reflect the risk of loss due to counterparty (including security) default) by rating category and counterparty type as shown in Table 3-31.

a. The Maximum Haircut for a rating category is the product of its default rate and its loss severity rate. For all counterparties, the default rates are 5 percent for AAA, 12.5 percent for AA, 20 percent for A, 40 percent for BBB and 100 percent for Below BBB and Unrated. For non-derivative counterparties, the loss severity rate is 70 percent; for derivative counterparties, it is 10 percent. For all Below BBB and Unrated counterparties, the loss severity rate is 100 percent.

b. For periods prior to the implementation of netting, a separate set of Maximum Haircuts (set forth in Table 3-31) will be applied to derivative contract cash flows to approximate the impact of the net exposures to derivative contract counterparties (see section 3.8.3, Nonmortgage Instrument Procedures). After the implementation of netting, exposures will be netted as described in section 3.8.3 before the haircut is applied.

c. With the exception of haircuts for the Below BBB and Unrated category, haircuts for all counterparty categories are phased-in linearly over the 120 months of the Stress Period. The Maximum Haircut is applied in month 120 of the Stress Period. Haircuts for the Below BBB and Unrated category are applied fully starting in the first month of the Stress Test.

TABLE 3-31—STRESS TEST MAXIMUM HAIRCUT BY RATINGS CLASSIFICATION

Ratings Classification	Derivative Contract Counterparties prior to Implementation of Netting	Derivative Contract Counterparties after Implementation of Netting	Non-Derivative Contract Counterparties or Instruments	Number of Phase-in Months
Cash	0%	0%	0%	N/A
AAA	0.3%	0.5%	3.5%	120
AA	0.75%	1.25%	8.75%	120

TABLE 3-31—STRESS TEST MAXIMUM HAIRCUT BY RATINGS CLASSIFICATION—Continued

Ratings Classification	Derivative Contract Counterparties prior to Implementation of Netting	Derivative Contract Counterparties after Implementation of Netting	Non-Derivative Contract Counterparties or Instruments	Number of Phase-in Months
A	1.2%	2%	14%	120
BBB	2.4%	4%	28%	120
Below BBB and Unrated	100%	100%	100%	1

* * * * *

3.6.3.4.3.1 * * *

[a] * * *

2. Calculate PNEQ_q, the Probability of Negative Equity in quarter q:

$$PNEQ_q = N\left(\frac{\ln LTV_q}{\sigma_q}\right),$$

where:

N designates the cumulative normal distribution function.

a. LTV_q is evaluated for a quarter q as:

$$LTV_{ORIG} \times \frac{\left(\begin{matrix} \text{Ratio of current} \\ \text{Loan Group UPB} \\ \text{to Original UPB} \end{matrix}\right) \left(\begin{matrix} \text{Ratio of current property} \\ \text{value (based on HPI in} \\ \text{quarter q) to original} \\ \text{property value (based on} \\ \text{HPI at Origination)} \end{matrix}\right)}$$

The HPI at Origination is updated to the beginning of the Stress Test using actual historical experience as measured by the OFHEO HPI; and then updated within the Stress Test using House Price Growth Factors from the Benchmark region and time period:

$$LTV_q = LTV_{ORIG} \times \left(\frac{UPB_{m=3q-3}}{UPB_{ORIG}}\right) \left[CHPGF_0^{LG} \times \exp\left(\sum_{k=1}^q HPGR_k\right)\right]$$

Where:

UPB_{m=3q-3} = UPB for the month at the end of the quarter prior to quarter q
 CHPGF₀^{LG} = 1.0 if the loan was originated in the same quarter as or after the most recently available HPI as of the reporting date

* * * * *

3. * * *

a. Compare mortgage rates for each quarter of the Stress Test and for the eight

quarters prior to the start of the stress test (q = -7, -6, ... 0, 1, ... 40):

* * * * *

3.6.3.5.1 * * *

[b] *Explanatory Variables for Default Rates.* Eight explanatory variables are used as specified in the equations in section 3.6.3.5.3.1, of this Appendix, to determine Default rates for multifamily loans: Mortgage Age, Mortgage Age Squared, New Book indicator, Not Ratio-updated ARM indicator, current Debt-Service Coverage Ratio, Underwater Current Debt-Service Coverage indicator, Loan-To-Value Ratio at origination/acquisition, and a Balloon Maturity indicator. Regression coefficients (weights) are associated with each variable. All of this information is used to compute conditional annual Default rates throughout the Stress Test. The annualized Default rates are converted to monthly conditional Default rates and are used together with monthly conditional Prepayment rates to calculate Stress Test Whole Loan Cash Flows. (See section 3.6.3.7, Stress Test Whole Loan Cash Flows, of this appendix).

* * * * *

3.6.3.5.2 * * *

TABLE 3-38—LOAN GROUP INPUTS FOR MULTIFAMILY DEFAULT AND PREPAYMENT CALCULATIONS

Variable	Description	Source
	Mortgage Product Type	RBC Report
A ₀	Age immediately prior to start of Stress Test, in months (weighted average for Loan Group)	RBC Report
NBF	New Book Flag	RBC Report
RUF	Ratio Update Flag	RBC Report
LTV _{ORIG}	Loan-to-Value ratio at loan Origination	RBC Report
DCR ₀	Debt Service Coverage Ratio at the start of the Stress Test	RBC Report
PMT ₀	Amount of the mortgage Payment (principal and interest) prior to the start of the Stress Test, or first Payment for new loans (aggregate for Loan Group)	RBC Report
PPEM	Prepayment Penalty End Month number in the Stress Test (weighted average for Loan Group)	RBC Report
RM	Remaining term to Maturity in months (i.e., number of contractual payments due between the start of the Stress Test and the contractual maturity date of the loan) (weighted average for Loan Group)	RBC Report
RGR _m	Benchmark Rent Growth for months m = 1...120 of the Stress Test	section 3.4.4, Property Valuation Outputs
RVR _m	Benchmark Vacancy Rates for months m = 1...120 of the Stress Test	section 3.4.4, Property Valuation Outputs
PMT _m	Scheduled Payment for months m = 1... RM	section 3.6.3.3.4, Mortgage Amortization Schedule Outputs
OE	Operating expenses as a share of gross potential rents (0.472)	fixed decimal from Benchmark region and time period
RVR ₀	Initial rental vacancy rate	0.10

* * * * *

3.6.3.5.3.1 * * *
[a] * * *

2. Assign product and ratio update flags (NBF, NRAF). *Note:* these values do not change over time for a given Loan Group.
a. New Book Flag (NBF):
NBF = 1 for Fannie Mae loans acquired after 1987 and Freddie Mac loans acquired after 1992, *except* for loans that were refinanced to avoid a Default on a loan originated or acquired earlier.
NBF = 0 otherwise.
b. Not Ratio-updated Arm Flag (NRAF):
NRAF = 1 if both ARMF = 1 and RUF = 0, NRAF = 0 otherwise.
Where:

ARMF = 1 for ARMs (including Balloon ARMs)
ARMF = 0 otherwise, and
RUF = 1 if the LTV and DCR were calculated or delegated to have been calculated at origination or recalculated or delegated to have been recalculated at Enterprise acquisition according to current Enterprise standards.
RUF = 0 otherwise

* * * * *

3.6.3.5.3.2 * * *
[a] * * *

1. Compute the logits for multifamily Default using inputs from Table 3-38 and coefficients from Table 3-39. For indexing purposes, the Default rate for a period *m* is the likelihood of missing the *m*th payment; calculate its corresponding logit ($X\delta_m$) based on Loan Group

characteristics as of the period *prior* to *m*, i.e. *prior* to making the *m*th payment.

$$X\delta_m = \delta_{AY}AY_{m-1} + \delta_{AY^2}AY_{m-1}^2 + \delta_{NBF}NBF + \delta_{NRAF}NRAF + \delta_{DCR}ln(DCR_{m-1}) + \delta_{UWDCRF}UWDCRF_{m-1} + \delta_{LTV}ln(LTV_{ORIG}) + \delta_{BMF}BMF_{m-1} + \delta_0$$

TABLE 3-39—EXPLANATORY VARIABLE COEFFICIENTS FOR MULTIFAMILY DEFAULT

Explanatory Variable (V)	Default Weight (δ_v)
AY	0.5256
AY ²	0.0284
NBF	-1.219
NRAF	0.4193
DCR	-2.368
UWDCRF	1.220
LTV	0.8165
BMF	1.518
Intercept (δ_0)	-4.553

* * * * *

2. * * *

b. For the down-rate scenario, $APR_m = 0$ percent during the Prepayment penalty period (i.e., when $m \leq PPEM$)

$APR_m = 25$ percent after the Prepayment penalty period (i.e., when $m > PPEM$)

* * * * *

3. Convert annual Prepayment and Default rates to monthly rates (MPR and MDR) using the following formulas for simultaneous processes:

$$MPR_m = \frac{APR_m}{ADR_m + APR_m} \times \left[1 - (1 - ADR_m - APR_m)^{\frac{1}{12}} \right]$$

If both ARMF = 0 and RUF = 0, then

$$MDR_m = \left[\frac{ADR_m}{ADR_m + APR_m} \times \left[1 - (1 - ADR_m - APR_m)^{\frac{1}{12}} \right] \right] \times 1.2$$

otherwise,

$$MDR_m = \frac{ADR_m}{ADR_m + APR_m} \times \left[1 - (1 - ADR_m - APR_m)^{\frac{1}{12}} \right]$$

* * * * *

3.6.3.6.3.2 * * *

TABLE 3-44—LOAN GROUP INPUTS FOR MULTIFAMILY GROSS LOSS SEVERITY

Variable	Description	Value or Source
	Government Flag	RBC Report
DR _m	Discount Rate in month <i>m</i> (decimal per annum)	6-month Enterprise Cost of Funds from Section 3.3, Interest Rates
MQ	Time during which delinquent loan interest is passed-through to MBS holders	4 for sold loans 0 otherwise
PTR _m	Pass Through Rate applicable to payment due in month <i>m</i> (decimal per annum)	section 3.6.3.3.4, Mortgage Amortization Schedule Outputs
NYR _m	Net Yield Rate applicable to payment due in month <i>m</i> (decimal per annum)	section 3.6.3.3.4, Mortgage Amortization Schedule Outputs
RHC	Net REO holding costs as a decimal fraction of Defaulted UPB	0.07
MF	Time from Default to completion of foreclosure (REO acquisition)	9 months
MR	Months from REO acquisition to REO disposition	15 months
RP	REO proceeds as a decimal fraction of Defaulted UPB	0.63

* * * * *

3.6.3.6.4.3 * * *
[a] * * *

1. Determine Mortgage Insurance Payment (MI_m) for single family loans in the DCC, or Loss Sharing Payment (LSA_m) for multifamily loans in the DCC, as a percentage of Defaulted UPB, applying appropriate counterparty Haircuts from section 3.5., of this Appendix:

$$MI_m^{DCC} = (1 - MIExp_m^{LG}) \times C^{MI,DCC} \times CLM_m^{MI, LG} \times \left[1 - \frac{m'}{120} \times \text{MaxHct} (R^{MI,DCC}) \right]$$

$$LSA_m^{DCC} = C^{LSA,DCC} \times CLM_m^{LSA, LG} \times \left[1 - \frac{m'}{120} \times \text{MaxHct} (R^{LSA,DCC}) \right]$$

Where:

$m' = m$, except for counterparties rated below BBB, where $m' = 120$

$$MIExp_m^{LG} = 1 \text{ if } \left(LTV_{ORIG} \times \frac{UPB_m^{LG}}{UPB_{ORIG}^{LG}} \right) < 0.78$$

$$MIExp_m^{LG} = 0 \text{ otherwise}$$

0.78 (78%) = the LTV at which MI is cancelled if payments are current

* * * * *

3. * * *

b. Determine CE Payment in Dollars after application of Haircuts:

$$PD_m^{DCC,C1,H} = PD_m^{DCC,C1} \times \left[1 - \frac{m'}{120} \times \text{MaxHct} \left(R^{DCC,C1} \right) \right]$$

Where:

$m' = m$, except for counterparties rated below BBB, where $m' = 120$

* * * * *

4. * * *

b. Determine CE Payment in Dollars after application of Haircuts:

$$PD_m^{DCC,C2,H} = PD_m^{DCC,C2} \times \left[1 - \frac{m'}{120} \times \text{MaxHct} \left(R^{DCC,C2} \right) \right]$$

Where:

$m' = m$, except for counterparties rated below BBB, where $m' = 120$

* * * * *

5. Convert Aggregate Limit First and Second Priority Contract receipts in Dollars for each DCC in month m to a percentage of DCC Defaulted UPB:

$$ALPD_m^{DCC} = \frac{\left(PD_m^{DCC,C1,H} \times ELPI^{DCC,C1} \right) + \left(PD_m^{DCC,C2,H} \times ELPI^{DCC,C2} \right)}{DEF_m \times UPB_{m-1}^{LG} \times P^{DCC}}$$

Where:

$ELPI^{DCC,C} = 0$ if $ELPF^{DCC,C} = Y$ (Yes, indicating that Contract C is an Enterprise Loss Position)

$ELPI^{DCC,C} = 1$ otherwise

* * * * *

3.6.3.7.3. * * *

[a] * * *

9. * * *

b. Float Income (FI) received in month m

$$FI_m = \left(\left[\left(\left[\left(\left(SPR_m + NIR_m - GF_m \right) \times \frac{FDS}{365} \right] + \left[PPR_m \times \frac{FDP}{365} \right] \right) \times FER_m \right] - PIS_m \right) \times (1 - FREP) \right)$$

where: Prepayment Interest Shortfall (PIS) in month m is:

$$PIS_m = UPB_{m-1} \times PRE_m \times \frac{PTR_m}{12}$$

if $FDP \geq 30$

$$PIS_m = UPB_{m-1} \times PRE_m \times \frac{PTR_m}{24}$$

if $15 \leq FDP < 30$

* * * * *

3.7.3.1 * * *

[g] * * *

1. Compute:

$$\text{HctFac}_m = \frac{m'}{120} \times \text{MaxHct} (R)$$

Where:

$m' = m$, except for MBS credit rating below

BBB where $m' = 120$

$R =$ MBS credit rating

* * * * *

3.8.1 * * *

[f] In a currency swap, the Enterprise receives payments that are denominated in a foreign currency and it makes payments in U.S. dollars. The main difference between currency swaps and the type of swaps discussed above is that in a currency swap principal amounts are actually exchanged between the two counterparties. Currency swaps are divided into two classes, as shown in Table 3-65.⁵

⁵ *Ibid.*

TABLE 3-65—CURRENCY SWAP CONTRACT CLASSIFICATION

Classification	Description of Contract
Fixed-for-Fixed Currency Swap	Enterprise receives fixed interest payments denominated in a foreign currency and makes fixed, US dollar-denominated payments
Fixed-for Floating Currency Swap	Enterprise receives fixed interest payments denominated in a foreign currency and makes payments in US dollar based on a floating interest rate

* * * * *

3.8.3.1 * * *

[a] * * *

3. When applying the option exercise rule:

- a. For zero coupon and discount securities, instruments with European options, and zero coupon swaps, evaluate option exercise only on dates listed in the instrument's option exercise schedule. For Bermudan options, evaluate option exercise on the first option date in the instrument's option exercise schedule and subsequent coupon dates (coupon dates on the fixed-rate leg for swaps). For American options, evaluate option exercise on the first option date in the instrument's option exercise schedule and subsequent monthly anniversaries of the instrument's first coupon date.

* * * * *

- d. If the remaining maturity is greater than 360 months, use the equivalent-maturity Enterprise Cost of Funds as if the remaining maturity is 360 months.
- e. In the Stress Test, no preferred stock issued by the Enterprise will be called.

* * * * *

3.8.3.10 * * *

[a] Finally, the interest and principal cash flows received by the Enterprises for non-mortgage instruments other than swaps and foreign currency-related instruments are Haircut (i.e., reduced) by a percentage to account for the risk of counterparty insolvency, if a counterparty obligation exists. The amount of the Haircut is calculated based on the public rating of the counterparty and time during the stress period in which the cash flow occurs, as specified in section 3.5, Counterparty Defaults, of this Appendix.

[b] An Enterprise may issue debt denominated in, or indexed to, foreign currencies, and eliminate the resulting foreign currency exposure by entering into currency swap agreements. The combination of the debt and the swap creates synthetic debt with principal and interest payments denominated in U.S. dollars. The Haircuts for currency swaps are applied to the pay (dollar-denominated) side of the currency swaps, or to the cash outflows of the synthetic debt instrument. Therefore, the payments made by the Enterprise on a foreign currency contract are increased by the haircut amount. The Haircuts and the Phase-in periods for currency swaps are detailed in Table 3-31, under Derivative Contracts.

[c] Haircuts for swaps that are not foreign currency related are applied to the Monthly Interest Accruals (as calculated in section 3.8.3.8, of this Appendix) on the receive leg minus the Monthly Interest Accruals on the pay leg when this difference is positive. Use the maximum haircut from Table 3-31 for

periods before and after the implementation of netting, as appropriate. After the implementation of netting, net the swap proceeds for each counterparty before applying the haircuts. The following example applies to an Enterprise having two swaps with the same counterparty. On the first swap, the Enterprise pays fixed and receives floating and on the second swap it pays floating and receives fixed. If the counterparty is a net payer to the Enterprise, the haircuts will be applied to the sum of the two receive legs net of the sum of the two pay legs.

* * * * *

3.10.3.1 * * *

[b] * * *

2. In any month in which the cash position is negative at the end of the month, the Stress Test issues a mix of new short-term and long-term debt on the 15th day of that month. New short-term debt issued is six-month discount notes with a discount rate at the six-month Enterprise Cost of Funds as specified in section 3.3, Interest Rates, of this Appendix, with interest accruing on a 30/360 basis. New long-term debt issued is five-year bonds not callable for the first year ("five-year-no call-one") with an American call at par after the end of the first year, semiannual coupons on a 30/360 basis with principal paid at maturity or call, and a coupon rate set at the five year Enterprise Cost of Funds as specified in section 3.3, Interest Rates, of this Appendix, plus a 50 basis point premium for the call option. During the Stress Test, the call option for new long-term debt issued is not executed in the up-rate scenario and in the down-rate scenario follows the same call exercise rule as other debt. An issuance cost of 2.5 basis points is assessed on new short-term debt at issue and an issuance cost of 20 basis points is assessed on new long-term debt at issue. New long-term debt is issued to target a total debt mix of short- to long-term debt that is the same as the short- to long-term debt mix at the beginning of the Stress Test. Issuance fees for new debt are amortized on a straight line basis to the maturity of the appropriate instrument.

3. Given the Net Cash Deficit (NCD_m) in month m, use the following constants and method to calculate the amount of short-term and long-term debt to issue in month m:

- a. Set the Issuance Cost on new short-term debt at issue (ISCOST):
ISCOST = 0.00025
- b. Set the Issuance Cost on new long-term debt at issue (ILCOST):
ILCOST = 0.002

c. Calculate Net Short-term Debt Outstanding (NSDO₀) and Total Debt Outstanding (TDO₀) at the start of the Stress Test (m = 0) using the following methodology:

- 1) For each month m and each debt and swap instrument i (each swap leg is considered a separate instrument), determine the Month of Next Repricing (MNR_m) defined as the first month greater than m in which the instrument matures or repricing can occur whether or not the coupon rate actually changes. Set the Principal Balance (PB_m) to be:
- a) The principal (or notional principal) outstanding if the instrument cash flows are paid by the Enterprise,
- b) Minus the principal (or notional principal) outstanding if the instrument cash flows are received by the Enterprise.
- c) Zero if m is less than or equal to the issue month or the month in which an option exercised during the stress test would begin accruing cash flows to or from the Enterprise.
- d) Zero if m is greater than or equal to the maturity month or the month in which an option exercised during the stress test would cease further cash flows to or from the Enterprise.
- 2) Calculate NSDO_m by summing PB_{m,i} for all instruments where MNR_{m,i} is less than or equal to m plus 12.
- 3) Calculate TDO_m by summing PB_{m,i} for instruments where MNR_{m,i} is greater than m.
- d. Set the Maximum Proportion of Total Debt (MPD):

$$MPD = \frac{TDO_0 - NSDO_0}{TDO_0}$$

e. Calculate Discount Rate Factor (DRF_m):

$$DRF_m = \left(1 + \frac{CF_m}{12}\right)^6$$

Where: CF_m = six month Enterprise Cost of Funds for month m

f. Calculate the Adjustment Factor for Short-Term Debt Issuance Fees (AFSIF_m):

$$AFSIF_m = \frac{DRF_m}{1 - ISCOST \times DRF_m}$$

g. Calculate the Adjustment Factor for Long-Term Debt Issuance Fees (AFLIF_m):

$$AFLIF_m = \frac{1}{1 - ILCOST}$$

h. Calculate the Maximum Long-Term Issuance (MLTI_m):

$$MLTI_m = NCD_m \times AFLIF_m$$

i. Calculate Net Short-Term Debt Outstanding (NSDO_m) and Total Debt Outstanding (TDO_m) for month m using

the methodology described in paragraph 3.10.3.1.[b]3.c. of this appendix. *Note:* This calculation must reflect all new issuances, option exercises, and

maturities between the beginning of the Stress Test and month m.
j. Calculate Interim Face Amount of Long-Term Debt to be issued this month (IFALD_m):

$$IFALD_m = \frac{((MPD - 1) \times TDO_m) + NSDO_m + (MPD \times AFSIF_m \times NCD_m)}{1 - MPD + \left(AFSIF_m \times \frac{MPD}{AFLIF_m} \right)}$$

k. Calculate Face Amount of Long-Term Debt to be issued (FALD_m):

$$FALD_m = \min(MLTI_m, \max(0, IFALD_m))$$

l. Calculate Face Amount of Short-Term Debt to be issued (FASD_m):

$$FASD_m = AFSIF_m \times \max\left(0, NCD_m - \frac{FALD_m}{AFLIF_m}\right)$$

* * * * *

3.10.3.6.2 * * *

[a] * * *

5. *Fixed Assets.* 25 percent of fixed assets (net of accumulated depreciation) as of the beginning of the Stress Test remain constant over the Stress Test. The remaining 75 percent is converted to cash on a straight line basis over the ten-year Stress Period. Depreciation is included in the base on

which operating expenses are calculated for each month during the Stress Period.

* * * * *

4.0 * * *

Enterprise Cost of Funds: Cost of funds used in computing the cost of new debt for the Enterprises during the Stress Test, as specified in section 3.3.3.[a]3.c., of this Appendix.

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Dated: February 20, 2002.

Armando Falcon, Jr.,

Director, Office of Federal Housing Enterprise Oversight.

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