

entities and securities, OFHEO has not given preferential treatment to mortgage insurers in the final rule. The final rule also maintains the distinction between triple-A- and double-A-rated counterparties and securities because performance differences between the two are reflected in the data irrespective of the level of stress.

6. Rating Agencies

In NPR2 OFHEO proposed to use rating information from four NRSROs, S&P, Moody's, D&P, and Fitch IBCA, for all counterparties and securities other than seller/servicers. For seller/servicers, NPR2 proposed to use only rating information from S&P and Moody's for seller/servicers providing mortgage credit enhancements. Freddie Mac and Fitch IBCA recommended that the rule use credit ratings by all NRSROs for all counterparties, and OFHEO has adopted this approach in the final rule.

7. Collateralized Securities

Both Fannie Mae and Freddie Mac commented that the stress test should not haircut investments if (1) they are backed by collateral representing obligations of the U.S. Government (e.g., Ginnie Mae securities or FHA-insured loans) or of GSEs; and (2) the collateral is held by a trustee. Fannie Mae also suggested that haircuts for mortgage revenue bonds based on security ratings would be excessive, due to double counting the risk of any collateral guaranteed by the Enterprise.

The final rule continues to treat these investments consistently with other investments because OFHEO believes that NRSROs strive to achieve consistency in the risk assessments represented by their ratings. A rating reflects the rater's overall assessment of the likelihood an investor will receive all contractually required principal and interest. A rating of less than triple-A reflects the rater's perception of an element of risk in some aspect of a security or its structure, such as the legal structure or the role of a third party in the transaction, even when some or all of the collateral represents obligations of the Federal Government or a Government-sponsored Enterprise. Further, OFHEO does not believe the haircutting of MRBs results in material double counting of the credit risk of any Enterprise collateral. Rating agencies treat such collateral as triple-A, so the risk associated with any lower rating on the collateralized security reflects risk factors not related to the collateral.

8. Private Label Security Haircut

NPR2 proposed to apply haircuts to payments due to an Enterprise from private label securities (municipal, corporate and mortgage- or asset-backed) based on the security's credit rating, consistent with the treatment of all securities and counterparties other than interest rate and foreign currency derivative contract counterparties. Thus, the proposal would have subjected unrated securities to a haircut appropriate to a rating of double-B or below. In the final rule, private label securities, like all other securities, will be assigned a 100 percent haircut if they are rated double-B or lower or are unrated.

OFHEO did not adopt Freddie Mac's suggestion that unrated securities should receive haircuts based on the rating of the issuer, because there are circumstances in which the credit rating for an issuer might not be appropriate for an unrated security. For example, for many securities there is no contractual requirement for an issuer to provide credit support. Furthermore, evaluating contractual obligations of individual issuers for specific securities would add complexity to the stress test that would impede its operational workability and would not be justified by any marginal benefit derived.

K. Mortgage Credit Enhancements

NPR2 proposed to offset stress test losses with the credit enhancements used by the Enterprises.¹⁵¹ NPR2 generally distinguished between "percent denominated" enhancements (e.g., primary mortgage insurance), where the coverage is based on a percentage of the loss incurred, and "dollar denominated" enhancements (e.g., pool insurance) where the coverage available is expressed as a specified dollar amount, which is applied to offset credit losses on a pool of loans until the coverage is exhausted.¹⁵² For all credit

¹⁵¹ The Charter Acts prohibit the purchase of conventional single family mortgages with LTV ratios in excess of 80 percent unless: (1) The seller retains a participation interest of 10 percent or more; (2) the seller agrees to repurchase or replace the mortgage upon default; or (3) the amount of the mortgage in excess of 80 percent is insured or guaranteed. For reasons stated in NPR2, the proposed stress test did not, and the final stress test will not, recognize any credit enhancements on any such mortgages that do not meet one of these three conditions. When this statutory requirement is applicable and is met, the stress test will recognize all credit enhancements related to the loan. See 64 FR 18156, April 13, 1999.

¹⁵² Percent-denominated credit enhancements included mortgage insurance and unlimited recourse and unlimited indemnification. Mortgage insurance coverage is a percentage of the gross claim amount and unlimited recourse and

enhancements, the available coverage was reduced by a "haircut" based on the counterparty's public rating.¹⁵³ (See III.J., Other Credit Factors.)

NPR2 proposed to apply credit enhancements at the loan group level.¹⁵⁴ Because pools of loans covered by a particular credit enhancement contract could be distributed among more than one loan group, NPR2 proposed simplifications in the treatment of such contracts. Specifically, for dollar-denominated credit enhancements, NPR2 proposed allocating amounts available under the contract to each affected loan group based on the ratio of the aggregate balance of loans in the loan group covered by the enhancement, to the aggregate balance of all loans covered under the contract. As proposed in NPR2, for each loan group, the proposed stress test aggregated funds available under all dollar-denominated credit enhancements subject to the same credit rating, applied the amounts available to loan group losses each month of the stress period, and tracked the balances of the funds allocated to each loan group throughout the stress period.

When loans are covered by more than one type of credit enhancement, the stress test proposed in NPR2 would apply percent-denominated credit enhancements first and then apply dollar-denominated enhancements to cover any remaining losses. In such cases, to determine "haircuts" for counterparty credit risk, the proposed stress test assigned the credit rating associated with the first level of credit enhancement for a given loan (usually primary mortgage insurance) to all secondary credit enhancements,¹⁵⁵

unlimited indemnification cover 100 percent of the net loss amount. All other types of credit enhancements currently used by the Enterprises were considered dollar-denominated. The final rule distinguishes between loan limit credit enhancements and aggregate limit credit enhancements, which correspond to the NPR2 designations of percent- and dollar-limit credit enhancements, respectively, except that in the final rule, for computational convenience, unlimited recourse and unlimited indemnification are treated as aggregate limit credit enhancements (limited to the aggregate original UPB of the covered loans).

¹⁵³ A "haircut" is a reduction in the credit enhancement coverage available that is based on the public rating of the provider to reflect the risk that the stress of the stress period will cause the provider to default on some of its obligations. See section III.J., Other Credit Factors for a discussion of haircuts.

¹⁵⁴ Loan groups are created by grouping loans of the same type, origination year, original LTV, original coupon, Census Division, and remittance cycle. (See section 3.1, Data, of the Regulation Appendix.)

¹⁵⁵ For example, if 50 percent of a loan group carried primary mortgage insurance with an AAA-rated carrier, haircuts associated with an AAA

which might differ from the haircut appropriate for the contract credit enhancement counterparty.

OFHEO believed this approach to modeling mortgage credit enhancements struck a balance between precision and practical implementation. OFHEO recognized that the approach could overstate the benefits of some and overstate those of other credit enhancement contracts, but believed that the overall impact on stress test results would likely be minimal.

A common theme of the comments on the treatment of mortgage credit enhancements proposed by NPR2 was that mortgage credit enhancements should be modeled at a greater level of detail. Commenters expressed concerns about the impact of modeling simplifications, the failure to model revenue inflows into spread accounts, and the modeling of termination of credit enhancement coverage. In addition, several commenters made suggestions about how OFHEO should treat credit derivatives, including the Mortgage Default Recourse Note (MODERN) transaction that was introduced recently by Freddie Mac. NPR2 did not specify a treatment for credit derivatives, because, with the exception of the MODERN transaction, the Enterprises had not been using them. The cash flows from the MODERN transaction could be modeled like other instruments that are modeled according to their terms and did not present any unique issues. Comments on these issues are discussed below by topic.

1. Modeling Simplifications

a. Contract Detail

(i) Comments

Both Enterprises criticized the simplified treatment of dollar-denominated credit enhancements. Fannie Mae argued that the "underlying parameters" of contractual agreements between an Enterprise and the credit enhancement counterparty should be modeled, because in some cases the approach taken in NPR2 would not be consistent with economic risk. Fannie Mae supported the modeling of all credit enhancement contracts according to their terms. For example, in the case of a contractual agreement that provides for the statutory minimum level of primary mortgage insurance on a particular lender's loans with LTVs in excess of 80 percent and a supplemental dollar-denominated coverage in the form of a pool policy that applies to the

rating would be applied to any subordinate credit enhancement coverage on those loans.

entire pool, Fannie Mae suggested that the stress test should apply the primary coverage only to that lender's loans with LTVs greater than 80 percent and that the supplemental coverage should be applied in accordance with the terms of the contract.

Freddie Mac commented that OFHEO's simplified treatment of dollar-denominated credit enhancements would provide the Enterprises with the benefit of some coverage to which they would not be entitled, and would fail to provide the benefits of some overlapping coverage to which they would be entitled. Freddie Mac also criticized the simplified structure because it did not accommodate credit enhancement contracts with specialized features. Freddie Mac argued that the complexity necessary to model the contractual terms of credit enhancements explicitly is justified by the need to assess accurately the value of the mortgage credit enhancements because more than 30 percent of its portfolio is credit enhanced beyond primary mortgage insurance.

(ii) OFHEO's Response

In response to Enterprise comments, OFHEO explored a method of modeling dollar-denominated credit enhancements that tracks amounts available under such credit enhancements by contract, rather than by loan group, charging payments to an Enterprise made under any such enhancement against the related contract, regardless of which loan groups are involved. This approach required the creation of a finer aggregation of loans below the loan group level, called Distinct Credit Enhancement Combinations (DCCs). DCCs identify the principal amount of loans in a loan group that have equivalently identical credit enhancement arrangements. The creation of DCCs permits the aggregation across all affected loan groups of deposits into and payments from each individual credit enhancement and the consideration of its specific rating and application priority. OFHEO found, however, that the implementation of this treatment is exceedingly complex and greatly increases the time required to run the stress test. OFHEO will continue to explore how this more precise modeling might be done more efficiently, but found it impracticable to incorporate the method in the stress test at this time.

The final rule adopts a more limited use of DCCs. While it ensures that haircut levels for aggregate limit credit enhancements are consistent with specific counterparty ratings and

application priority, it does not track deposits to and withdrawals from such enhancements at the contract level. Rather, the Enterprises report credit enhancement available balances adjusted for deposits that can reasonably be expected to be made during the stress period. These adjusted balances are prorated among DCCs, based on the ratio of covered loan UPB at the DCC level to the total UPB of loans covered under the credit enhancement contract. For each DCC, the stress test then separately tracks withdrawals from such prorated enhancement amounts under a given contract to offset covered losses.

With regard to Fannie Mae's concern over the treatment of primary mortgage insurance combined with pool insurance, the use of DCCs in the final rule ensures that mortgage insurance coverage is applied only to covered loans and that pool insurance or other aggregate limit credit enhancement is then applied to all loans covered by the contract.

b. Ratings Detail

A number of commenters pointed out that the assignment of the ratings of providers of primary credit enhancements to all supplemental enhancements almost always overestimates the total credit enhancement coverage where the primary layer is triple-A-rated mortgage insurance, and may understate credit enhancement coverage where the primary layer is an unrated seller/servicer. They asserted that this effect creates an incentive to provide a thin primary triple-A layer of credit enhancement, supplemented by an extensive and lower cost credit enhancement from a lower rated institution.

In NPR2, OFHEO recognized that the application of the ratings of the providers of primary credit enhancement to secondary credit enhancements could understate or overstate the creditworthiness of secondary credit enhancements, but thought the impact of this simplification would likely be small. Nevertheless, in considering the comments, OFHEO weighed the additional complexity that would result from taking into account the actual rating of the supplemental provider against the disadvantages and perverse incentives that the commenters pointed out and concluded that the proposed stress test should be modified. Accordingly, the final regulation takes into account the rating of the supplemental credit enhancement rather than assigning the credit rating of the primary credit enhancement provider.

c. Cash Accounts

In NPR2, OFHEO proposed to model mortgage credit enhancements that take the form of cash accounts by aggregating them with all other dollar-denominated credit enhancements, netting applicable haircuts, and offsetting losses dollar for dollar until the amount of coverage is exhausted.

The final rule models cash accounts more explicitly. It does not aggregate them with all other dollar-denominated credit enhancements and does not apply haircuts. However, if the cash is permitted to be invested in securities with maturities longer than one year, the value of the account is discounted by 30 percent to reflect the risk that the value of the investments may be lower than par when they are required to be liquidated to offset losses. When these investments are sold prior to maturity, there is a risk that the price may be significantly less than par because of changes in interest rates or market conditions that occur between the time the investments are marked to market and the time they are liquidated. This treatment is consistent with the practice of rating agencies of requiring overcollateralization or applying a discount factor to achieve sufficient certainty that the market price at least equals the required amount of credit enhancement at any time.

2. Credit Enhancements Receiving a Cash Flow Stream

Some dollar-denominated credit enhancements—primarily spread accounts—are funded by a portion of each loan interest payment. The proposed stress test took into account the amount of cash in the credit enhancement account at the start of the stress test, but did not attempt to model cash flows into the account during the stress period. The Enterprises and others criticized this feature of the stress test.

In response to these comments, the final regulation allows the Enterprises to take account of these cash inflows by adjusting the available balance at the start of the stress test to reflect inflows that might reasonably be expected to occur during the stress period. These adjusted initial balances are then used to offset covered losses during the stress period.

3. Termination Dates

Freddie Mac noted that, although OFHEO stated in NPR2 that the coverage expiration date for credit enhancement contracts is required as an input, OFHEO's cash flow model did not actually take it into account.

This apparent inconsistency resulted from OFHEO's efforts to respond to the enactment of the Homeowner's Protection Act of 1998 (HPA)¹⁵⁶ shortly before NPR2 was published. The HPA, which applies to loans originated after July 1, 1999, provides for the automatic termination of mortgage insurance when the loan balance is scheduled to reach 78 percent of the original value of the property securing the loan,¹⁵⁷ if payments on the loan are current. However, the adjustment of the stress test to reflect this change was not yet accomplished when NPR2 was published on April 13, 1999.

As a result of events that have transpired since 1998, OFHEO has decided to modify the stress test to terminate mortgage insurance on all loans that amortize below 78 percent LTV. The public discourse surrounding the enactment of the HPA and the notification policies of many lenders have raised consumer awareness of the option to cancel, making it increasingly likely that those borrowers will cancel mortgage insurance as soon as it is possible to do so. Accordingly, the final regulation specifies that mortgage insurance is terminated for all loans, whenever originated, when the loan is amortized below 78 percent LTV. For other types of credit enhancements, the stress test takes contract expiration dates into account.

4. Treatment of Credit Derivatives

Credit derivatives are contractual instruments that link payment or receipt of funds to the credit losses (which could include a rating change on a security or a default that affects payments) on an underlying asset or pool of assets. Treatments for credit derivatives were not specified in NPR2. Nor did NPR2 specify counterparty haircuts for credit derivatives.¹⁵⁸ Commenters, therefore, questioned whether the treatment of interest rate derivatives was intended to apply to credit derivatives. If not, these commenters asked precisely how credit derivatives would be modeled and, specifically, what haircuts are appropriate for counterparties to these transactions.

¹⁵⁶ Pub. L. 105-216, 112 Stat. 897-910 (1998) (12 U.S.C. 4901-4910).

¹⁵⁷ FHA loans and "high risk" loans, as defined by the Enterprises, are exempt from this provision.

¹⁵⁸ The proposed rule provided a detailed description of the cash flows that would be modeled for interest rate derivatives and described treatments for foreign currency swaps. NPR2 also specified a schedule of "haircuts" that would be applied to net amounts due to an Enterprise from counterparties in derivative transactions. 64 FR 18157-18159, 18292-18296, April 13, 1999.

A number of commenters addressed the general issue of how credit derivatives should be modeled. Also, several commenters addressed a type of instrument called a Mortgage Default Recourse Note (MODERN), which was used by Freddie Mac as part of a broader transaction to hedge mortgage credit risk. The MODERNS can be considered credit derivatives because the amounts of payments on them are "derived" from the performance of a fixed reference pool of mortgages, but do not flow through from the mortgages and are not secured by the mortgages. The two groups of comments, which raised different issues, are dealt with separately below.

a. Credit Derivatives in General

The use of credit derivatives to hedge credit risk of mortgages is a new practice at the Enterprises, which currently comprises an insignificant volume of transactions. However, OFHEO recognizes that, as happened with interest rate derivatives, this activity could grow significantly in the coming years. Therefore, the stress test must be sufficiently flexible to deal with these instruments appropriately as they arise. Credit derivatives are also far less standardized in type and form than interest rate derivatives. They can be structured to include only a small degree of counterparty risk to the Enterprises, like the MODERN transaction, or to create large exposure to counterparties. Depending upon their structures, these instruments can also create significant modeling complexities.

(i) Comments

The comments reflected two schools of thought on the general subject of credit derivatives. Commenters from the mortgage insurance industry recommended that these instruments be analyzed separately from other types of derivatives and as the subject of a separate rulemaking proceeding. They emphasized that the market for credit derivatives is still relatively small, that documentation is not standardized, and that counterparties do not come from a monoline industry dedicated to insuring mortgage credit losses. These commenters urged that OFHEO should use a cautious approach in assigning haircuts to counterparties in credit derivative transactions until the market for these instruments is better developed and subject to more specific regulations and protections. They also sought clarification that the discussion of the treatment of derivatives in NPR2 was intended to apply only to contracts that transfer interest rate risk.

The Enterprises and two investment banking firms expressed a different view. They view the market and documentation for any credit derivatives the Enterprises might use as well developed and similar to that for interest rate derivatives. Fannie Mae commented that collateralized credit-linked securities or risk transfers with well-capitalized firms with diversified books of business can reduce overall risk exposure, because derivative contract counterparties may be able to absorb losses better than mortgage insurers.

(ii) OFHEO's Response

OFHEO considered all of these comments. The credit derivatives market is relatively small at present, as reflected in the minimal volume of these instruments at the Enterprises. Accordingly, OFHEO has decided that it would be inappropriate at this time to issue a blanket treatment that would be applicable to all credit derivatives.

OFHEO agrees with the mortgage insurers that, at present, credit derivatives should be analyzed separately from other derivatives. However, OFHEO will not assume that all credit derivatives necessarily raise structural concerns or weaknesses that require haircuts that are more conservative than those applied to counterparties in similar transactions. Nor does OFHEO agree that it is necessary to have an additional rulemaking proceeding to deal with these instruments if and when they arise at the Enterprises. As discussed below, OFHEO's analysis of the MODERN transaction revealed that credit derivatives can be structured in such a way as to offset an Enterprise's credit risk in much the same manner as mortgage pool insurance, and it is consistent with the purpose of the stress test to account for that transaction in much the same manner as pool insurance. Likewise, if counterparty and other risks associated with the instrument appear to be the same as those of an interest rate or foreign currency derivative, it will be treated in a similar manner. However, if those risks are significantly different, OFHEO will impose some other appropriately conservative treatment.

b. MODERN Transaction

The MODERN transaction was a unique form of mortgage credit enhancement, developed by Freddie Mac, that involved the sale of securities to investors. The MODERN transaction may be thought of as a "credit derivative" because payment to investors in the securities, as well as

payments to Freddie Mac, are determined from the credit performance of a fixed pool of mortgages, which serves as a reference asset. The transaction required creation of a trust that is contractually obligated to pay amounts to Freddie Mac based on the amount of credit losses on the reference pool. As consideration, Freddie Mac pays the trust a fee or premium that, together with earnings on the trust principal, is used to make interest payments to purchasers of the bonds that are used to fund the trust, as well as any payments due to Freddie Mac. These securities are issued in several tranches. The principal of each security is reduced (together with future interest payments), according to the priority of its tranche, as amounts are required to cover losses on the reference pool. The bonds, which are issued by a special purpose corporation and are not marketed as Enterprise securities, are all rated single-A and below because they carry a high probability that their entire principal will not be repaid. For Freddie Mac, the MODERN transaction bears some similarity to mortgage pool insurance, because Freddie Mac receives variable payments, based upon the credit losses in a pool of mortgages, and makes fixed payments, analogous to premiums.

(i) Comments

Comments were divided as to the appropriate treatment for the MODERN transaction. Commenters from the mortgage insurance industry took the position that it involves greater counterparty risk than interest rate derivatives or mortgage insurance. Accordingly, those commenters recommended giving no credit or subjecting payments to Freddie Mac under MODERNS to greater haircuts than those applicable to other types of counterparties, such as mortgage insurers. Freddie Mac said that there is no counterparty risk in these transactions, and that the payments to Freddie Mac cannot be reduced from the amounts required under the contract due to financial failure of a counterparty. There is no more risk of nonpayment in the MODERN transaction, argued Freddie Mac, than in a mortgage-backed security or other asset-backed security where a trustee is obligated to make payments when, and in the amounts that are, due.

(ii) OFHEO's Response

After study of the MODERN transaction, OFHEO agrees that it does create some credit risk (i.e., risk of default by a counterparty) to the Enterprises. Although risk of loss may

be low because the transaction is structured to provide significant collateral, OFHEO does not have the data necessary to analyze the adequacy of that collateral. OFHEO finds the transaction most similar, structurally, to mortgage pool insurance and will model it in a similar fashion, applying the haircut that would be appropriate to a mortgage pool insurance contract. However, future MODERN or other credit derivative transactions will be analyzed based upon their specific terms and similar treatments will not necessarily be found appropriate for them.

The final rule does not detail the specific treatment for the MODERN transaction because it presents no new features that cannot be modeled using the more general treatments that are specified. Like other transactions that are modeled according to their terms, cash flows on the MODERN transaction will be projected according to the terms of its instruments and will be haircut based upon the credit rating of the counterparty. Those terms are tied directly to credit losses of a pool of Enterprise mortgage loans, which is modeled like any other pool of loans in the stress test.

L. New Debt and Investments

The proposed stress test projected cash inflows and outflows for each month of the stress period in order to determine the net availability of cash. To the extent cash inflows exceed cash outflows in any month, NPR2 specified how an Enterprise would employ the excess funds. Conversely, to the extent that cash outflows exceed cash inflows in any month, NPR2 specified how an Enterprise would obtain the funds to cover the cash deficit. The net cash position for each of the 120 months of the stress period was calculated at the end of each month. Depending upon whether the cash balance at the end of a month was positive or negative, new debt or investment was added. Excess cash was invested in one month maturity assets at a rate equivalent to the six-month Treasury yield. If a cash deficit existed, new short-term debt was added. NPR2 specified that the Enterprises would issue all new debt as six-month discount notes at the six-month Federal Agency Cost of Funds rate plus 2.5 basis points to cover issuance cost.

Comments are discussed below by topic.

1. Length of Debt Term

a. Comments

The proposal to fund all cash deficits with short-term instruments received a number of comments, only one of which favored the proposal. Most commenters that addressed the issue recommended that OFHEO provide for a mix of long- and short-term debt instruments, to better reflect the rebalancing strategies of the Enterprises. The Enterprises both suggested that the rule be modified to add 80 percent long-term debt in the up-rate scenario and 20 percent long-term debt in the down-rate scenario. One commenter suggested that OFHEO allow the Enterprises to use their internal models to project the appropriate mix of debt, apparently presuming that OFHEO would adopt an internal models approach to setting risk-based capital.

b. OFHEO's Response

After consideration of the comments and further analysis of the issue, OFHEO determined that a more risk-neutral approach to establishing the mix of long- and short-term debt is available and practical and has implemented it in the final rule. That approach sets a 50-50 target mix of long- and short-term debt for an Enterprise's portfolio and projects issuance of debt each month that will move the Enterprise toward that target and maintain that mix once it is reached. The 50-50 mix was selected because an Enterprise cannot know from month to month whether interest rates will go up or down and OFHEO will not try to model Enterprise predictions.

Notwithstanding the contrary views of some commenters, OFHEO has found it neither practical nor desirable to attempt in the stress test to predict the reactions of Enterprise management to interest rate shocks. Both Enterprises adjust the mix of maturities in their debt portfolios frequently, based upon the anticipated duration of their assets. The Enterprises have different policies designed to mitigate interest rate risk by matching the durations of assets and liabilities. They use sophisticated computer models to provide insights into future interest rate patterns and to monitor duration mismatches in their portfolios. These models allow the Enterprises to adjust their issuance of liabilities and their derivatives positions daily to comply with their internal policies. However, as several commenters recognized, attempting to approximate this decision-making process in the stress test is impractical. Further, doing so would cause the stress test to create additional hedges and risks in the Enterprises' books of business,

which, in OFHEO's view, is contrary to the intent of the 1992 Act. For those reasons, OFHEO has adopted an approach that is not biased toward long- or short-term debt in either interest rate scenario.

The practical difficulties associated with attempting to develop a simple rule that approximates the Enterprises' likely new debt issuance is illustrated by an analysis of the refunding rules suggested in their comments. The Enterprises suggest that new debt issuances be weighted heavily to the long-term in the up-rate scenario and to the short-term in the down-rate scenario. They contend that, given the impracticality of predicting funding decisions, this simple methodology would provide a reasonable approximation of their behavior. OFHEO disagrees that this methodology provides such a reasonable approximation. The suggested weightings may or may not reflect the way the Enterprises respond to a future interest rate shock, because they rebalance to achieve certain balances in their portfolios, not in their issuances. Accordingly, whether they issue long- or short-term debt depends as much upon their current debt, asset, and derivative positions as upon interest rate movements.

Another factor in each Enterprise's funding decisions is its expectations for interest rates. These expectations are based, at least in part, upon historical models that, particularly under the extreme conditions of the stress test, might project various outcomes, and would, almost certainly, not project exactly the paths specified in the stress test. In short, the Enterprises would have no way of knowing that interest rates were going to continue moving quickly in the same direction for a year and remain at an elevated or deflated level for another nine years. However, despite this uncertainty, the Enterprises' approach would add mostly long-term debt in the up-rate scenario, increasing vulnerability to interest rate declines without regard to the mix of liabilities in the existing portfolio. This approach would have the effect of locking in relatively lower interest rates early in the stress period and lowering debt costs (and, therefore, capital requirements) significantly. Similarly, adding mostly short-term debt in the down-rate scenario would allow an Enterprise to refinance with lower cost debt regardless of the Enterprise's existing maturity mix, although, as many commenters noted, an assumption that an Enterprise will utilize predominately short-term funding is not realistic. It should be noted, however,

that OFHEO found the impact on capital of short-term funding in the down-rate scenario was small, because rapid prepayment of loans creates little need for new debt.

In sum, OFHEO adopted an approach that did not attempt explicitly to predict or simulate Enterprise responses to the interest rate shocks in the stress test. Instead, recognizing that any new debt will have some effect on interest rate risk, OFHEO chose an approach that reflects no bias toward long- or short-term debt in either interest rate scenario.

2. Specific New Debt and Investment Instruments

a. Investment Instruments

Fannie Mae suggested that specifying an investment instrument with a one-month maturity and a six-month rate is inappropriate, because such instruments do not exist.

The final rule adopts the proposed rule and specifies that all cash surpluses will be invested in one-month maturity assets with a six-month Treasury yield. Recognizing that the instrument specified does not exist in the marketplace, OFHEO chose it as a modeling simplification that simulates the effect of a series of investments made over successive months and ensures that each month there are instruments that mature and are replaced in the portfolio. Using a longer maturity would have resulted in greater fluctuations in cash surpluses from month to month, causing the Enterprises to borrow money in later months to cover instruments purchased with a temporary cash surplus.

However, using a one-month rate for new investments would ignore the fact that an Enterprise's actual return on new short-term investments is based upon a number of different maturities between one day and one year. The six-month rate was chosen as a reasonable approximation of the average rate earned on those maturities.

b. Debt Instruments

Fannie Mae recommended that OFHEO change the proposed short-term debt instrument from a six-month to a one-month maturity, but did not explain any benefits from such a change. Nevertheless, OFHEO analyzed whether, in light of other changes in the new debt approach, the short-term debt instrument should be changed. OFHEO determined not to change the instrument proposed in NPR2, because a six-month rate is more representative of the mix of short-term maturities issued by the Enterprises.

A few commenters recommended that the regulation specify ten-year bullet (no

call) debt as the long-term debt instrument. Fannie Mae suggested that OFHEO specify ten-year bullet debt as the long-term instrument during the up-rate scenario and, in the down-rate scenario, three-year debt callable in one year. OFHEO considered those options, but determined that a five-year bond callable in one year was most appropriate. The Enterprises issue a variety of debt with maturities greater than one year, but with average maturities generally far less than ten years. Also, they increasingly have come to rely upon callable debt to balance the prepayment optionality in their loan portfolios. For these reasons, OFHEO concluded that five-year callable debt was a more representative proxy for long-term Enterprise debt than ten-year bullet or three-year callable debt.

The Enterprises expressed concern that the regulation would not take into consideration the linkage of the short-term debt in their portfolios to interest rate swaps that result in effective long-term rates and maturities. The Enterprises create this long-term "synthetic debt" to take advantage of pricing anomalies in the debt and derivatives markets. The final rule clarifies that in determining the amount of short-term debt on the books of an Enterprise, the notional value of debt-linked fixed-pay swaps is deducted from the total amount of short-term debt and added to the total amount of long-term debt. This procedure effectively converts the affected short-term debt to long-term for purposes of the determining the mix of new debt.

3. Date of Issuance or Purchase

NPR2 specified that new debt is issued and new investments purchased at the end of each month of the stress period based upon the cash position at the end of the month. OFHEO determined that a more correct modeling convention is to issue the debt or purchase the investments at the midpoint of the month to reflect the fact that financial instruments mature throughout a month, not at month end. The final rule changes the issuance date to the 15th day of the month.

M. Cash Flows

1. Mortgage-Related Cash Flows

In NPR2, OFHEO described how the stress test would treat cash flows from mortgage-related instruments during the stress period. Under the proposal, the stress test would produce cash flows for single family and multifamily mortgage loans that are held in portfolio and cash flows for the same types of loans that are pooled into mortgage-backed

securities (MBS) that are guaranteed by the Enterprise. For retained loans, the cash flows to the Enterprises are all the principal and interest payments on the loans, except for a portion of the interest payment retained by the servicer as compensation. For sold loans, these cash flows are guarantee fees received by the Enterprises and float income.¹⁵⁹ Cash flows, net of credit losses, are produced for each month of the stress period for each loan group using loan group characteristics and information on interest rates; default, prepayment, and loss severity rates; and third party credit enhancements.

Only Freddie Mac commented on the mortgage cash flow section of the stress test. Specifically, Freddie Mac recommended that OFHEO specify a different treatment for cash flows produced by adjustable rate mortgages (ARMs) and modify the remittance cycle for MBS. These comments and OFHEO's responses are discussed below.

a. Adjustable Rate Mortgages (ARMs)

In NPR2, OFHEO proposed to model ARM cash flows as if the loans all adjusted annually and as if they all had the same margins and caps. Under the proposal, all ARM loan groups were indexed to either the one- or three-year CMT or the 11th District COFI.

Freddie Mac alleged that the proposed approach failed to capture the impact of a substantial volume of ARM products that adjust monthly or every six months and have different margins and caps. These additional terms may result in extra income to the Enterprises.

Based on its analysis of ARM-related cash flows in light of Freddie Mac's comment, OFHEO has determined that it is appropriate to modify the stress test to model ARM cash flows according to their contract terms as reported in the RBC Report. This change reflects the importance of the full range of ARM products to the Enterprises, particularly in relatively volatile interest rate environments. Although the estimated default and prepayment rates for ARMs are averages for all ARM product types, for reasons described in III.1.1.h., Adjustable Rate Mortgages (ARMs), the stress test does capture the cash flow differences by ARM product type, thereby addressing Freddie Mac's comment. The respecified ARM model

is capable of modeling cash flows from all ARM products whose terms are reported in the RBC Report according to those terms. This reflects the importance of these product types to the Enterprises, particularly in relatively volatile interest rate environments.

b. Remittance Cycles for Mortgage-Backed Securities (MBS)

In NPR2, OFHEO proposed to model only specific categories of MBS by including the float amount for three remittance cycles. Specifically, the stress test included remittance cycles only for Freddie Mac's Standard and Gold Programs and Fannie Mae's Standard Program. The stress test did not model additional programs.

Freddie Mac commented that under NPR2, only two of its three principal remittance cycles are modeled. Freddie Mac stated its general belief that where practicable, OFHEO should model the contractual terms or actual characteristics of an instrument or make reasonable simplifications.

Based on its analysis of MBS-related cash flows and in light of Freddie Mac's comment, OFHEO has determined that it is appropriate to modify the stress test to accommodate a wider range of remittance cycles, rather than limit the modeling to three specific cycles. Specifically, the final rule allows as an input, the number of float days in a remittance cycle, rather than a specified number of remittance cycles. The additional precision resulting from more refined modeling of MBS reflects the significant volume of these products and their importance to the Enterprises.

2. Nonmortgage Instrument Cash Flows

In NPR2, OFHEO specified the proposed treatment of cash flows from nonmortgage instruments during the stress period in two sections of the Regulation Appendix. Section 3.9.3, Debt and Related Cash Flows detailed how the stress test would produce cash flows for instruments such as debt, guaranteed investment contracts (GICs), preferred stock, debt-linked derivative contracts, and mortgage-linked derivative contracts. Similarly, section 3.9.4, Non-Mortgage Investment and Investment-Linked Derivative Contract Cash Flows detailed how the stress test would produce cash flows for instruments such as nonmortgage assets and investment-linked derivative contracts. The cash flows for debt, nonmortgage investments, and preferred stock included interest (or dividends for preferred stock) and principal payments or receipts. The cash flows for debt-linked, investment-linked, and mortgage-linked derivative contracts

¹⁵⁹ Float income is the earnings from the investment of principal and interest payments on sold loans during the remittance cycle for the period of time between the receipt of these payments from the servicer and the remittance of those payments, net of guarantee fees, to security holders. The length of time an Enterprise can invest these payments depends on the length of that period.

would include interest payments and receipts. NPR2 did not attempt to provide detailed descriptions of the cash flow calculations of all nonmortgage instruments that exist or might exist at the Enterprises. The examples that were provided were illustrative.

a. Comments

Only MICA commented on NPR2's proposed treatment of nonmortgage instrument cash flows. Although MICA generally agreed with the proposed method of generating cash flows, it recommended that American-style calls also be modeled. With American-style calls, the exact timing of the exercise of the call option is not always known because the nature of the American-style call allows the issuer to exercise its call at any time between the first call date and the final call date.

b. OFHEO's Response

American-style calls were modeled in NPR2, but, as a simplifying assumption, were treated as Bermudan-style calls, which are evaluated for exercise on each coupon payment date following the start date of the option. OFHEO agrees that it would be desirable to model American calls more precisely and is exploring how they might be precisely, but efficiently, modeled or whether a more appropriate simplifying assumption should be used. For now, the final rule continues to treat American-style calls as Bermudan-style calls.

In addition to the change made in response to the comments, OFHEO restructured the Appendix sections dealing with cash flows produced by nonmortgage instruments by combining the section of NPR2 dealing with debt with the section dealing with nonmortgage investment and investment-linked derivative contracts. OFHEO notes that this restructuring permits OFHEO to use a single modeling instruction for two types of instruments that have identical cash flows. That is, a fixed rate noncallable bond has the same cash flows whether it is modeled as a liability or an asset; the only difference is the party that receives the cash flow. The final rule also deletes instructions for specific types of instruments where more general provisions in the Appendix are sufficient to generate the necessary cash flows according to the terms of the instrument. In some cases, simplifying assumptions are made for certain instrument terms. These modifications serve to streamline the regulation.

While the final rule replaces specific modeling instructions with more

general ones, the general instructions are more detailed in some respects than those proposed in NPR2. For example, the final rule specifies more detailed treatment of the options on nonmortgage instruments and cancellation rules on interest rate swaps.¹⁶⁰ Although NPR2 did not specifically mention call premiums and discounts, the final regulation specifies the manner in which the premiums and discounts for certain instruments are modeled. In addition, because the Enterprises use some interest-rate swaps to reduce the interest-rate risk associated with some callable debt they issue, OFHEO has decided to model put options associated with swaps so that those puttable swaps are cancelled when the associated debt is called. Puts on Enterprise debt and calls on nonmortgage assets are still not modeled, given that would entail modeling the behavior of a third party that can exercise the option rather than the behavior of an Enterprise.

In the final rule, the more detailed general descriptions for noncomplex instruments are sufficient to provide an understanding of how each instrument is modeled. For some complex instruments, as with the description of the noncomplex instruments, industry standard methodology is used. In addition, the computer code that OFHEO plans to release after the rule is published will provide detail on the algorithms used.

N. Accounting, Taxes, and Operating Expenses

In NPR2, OFHEO proposed procedures for creating pro forma balance sheets and income statements, determining short-term debt issuance and short-term investments, calculating operating expenses and taxes, and computing capital distributions. The proposal explained the inputs and outputs for this component of the stress test. Inputs included an Enterprise's balance sheet at the beginning of the stress period, interest rates from the interest rates section, and information from the cash flow section. These inputs were used to produce as the output, the 120 monthly pro forma balance sheets and income statements for an Enterprise.

¹⁶⁰ An interest rate swap is an agreement whereby two parties (counterparties) agree to exchange periodic streams of interest payments on obligations they have issued. The dollar amount of the interest rate payments exchanged is based on a predetermined dollar principal (often the face amount of the underlying instrument), which is called the notional principal amount. The dollar amount each counterparty pays to the other is the agreed-upon periodic interest rate multiplied by the notional principal amount.

MBA, Fannie Mae and Freddie Mac commented on the proposed approaches related to taxes and accounting. Among the specific issues they raised were (1) the effective tax rate, (2) the adherence to generally accepted accounting principles (GAAP), (3) the treatment of non-interest earning assets, and (4) net operating losses. Several commenters, in addition to the Enterprises, commented on the proposed treatment of operating expenses. These comments and OFHEO's analysis of the comments are discussed below.

1. Effective Tax Rate

In NPR2, OFHEO proposed¹⁶¹ to apply an effective Federal income tax rate of 30 percent when calculating the monthly provision for income taxes in the stress test. OFHEO noted that this tax rate is lower than the statutory rate set forth by the Internal Revenue Service. The Enterprises' lower overall tax rates are a result of tax exempt interest, tax deductions for dividends, and equity investments in affordable housing projects. OFHEO further noted that it may change the 30 percent income tax rate if the Enterprises' effective tax rate changes significantly over time or if the statutory income tax rate changes.

Fannie Mae was the only commenter to address the proposal to specify in the regulation a Federal effective income tax rate of 30 percent. Fannie Mae noted that this rate is lower than the current 35 percent corporate statutory rate because of the Enterprises' involvement in tax-advantaged activities, such as investing in tax-exempt mortgage revenue bonds and tax credits for affordable housing projects, but asserted that adopting a fixed tax rate would undermine the stress test's ability to relate the capital requirements dynamically to the evolving nature of the Enterprise's business. Accordingly, Fannie Mae recommended that the rule apply an effective tax rate based on recent experience, i.e., an effective tax rate equal to the average annual rate for each Enterprise over the most recent three calendar years.

OFHEO decided not to adopt Fannie Mae's recommendation. OFHEO has reserved in the regulation the discretion to change the 30 percent income tax rate if there are significant changes in Enterprise experience or changes in the statutory income tax rate. OFHEO believes that this addresses Fannie Mae's concern by allowing OFHEO the flexibility to make any reasonable adjustments to the rule, based on significant changes in circumstances.

¹⁶¹ 64 FR 18297, April 13, 1999.

Fannie Mae's suggested approach would not have resulted in a significant increase in sensitivity to risk, but would have added unnecessary complexity to the stress test. Accordingly, OFHEO has adopted without modification the proposal in NPR2 with respect to the effective income tax rate.

2. Consistency With GAAP

In NPR2, OFHEO proposed to apply Generally Accepted Accounting Principles (GAAP) in the stress test to the extent that they are applicable and feasible.¹⁶²

Only the Enterprises addressed the proposed accounting approach. Although Freddie Mac generally agreed that the stress test should apply GAAP to the extent possible, it mentioned several accounting treatments that it believed should be modified. Fannie Mae stated that the proposed regulation does not adhere to GAAP uniformly in describing the procedures to use to generate projected monthly financial statements. Accordingly, Fannie Mae recommended that OFHEO adopt a more generalized approach toward accounting methods that would establish basic guidelines for projecting stress test performance.

Notwithstanding Fannie Mae's preference for a generalized approach, both Freddie Mac and it specifically requested that the stress test recognize Financial Accounting Standard (FAS) 115¹⁶³ and FAS 133,¹⁶⁴ both of which require a portion of unrealized market value gains or losses on the balance sheet to be recorded in a new stockholder's equity account known as "other comprehensive income" (OCI).

OFHEO agrees with the Enterprises that, to the extent that GAAP is applicable, the risk-based capital regulation should adhere to GAAP. Accordingly, like the proposed rule, the final rule adopts accounting rules that are generally consistent with GAAP, although, in certain situations, complete adherence to GAAP is impractical given the stylized nature of the stress test. In those situations, such as with FAS 115 and FAS 133, the agency has determined that it is necessary to implement simplified procedures to allow the efficient and practical implementation of the stress test. For

instance, it would be impracticable and unreasonably speculative to make market adjustments over the ten-year stress test. Given the difficulties inherent in calculating future market values during the stress test, OFHEO has decided to recognize unrealized gains (losses) resulting from FAS 115 and FAS 133 and related OCI at the outset of the stress test. That is, the stress test does not reflect certain securities at their fair market values later in the stress test, as required by FAS 115 and FAS 133. Instead, these assets are adjusted to an amortized cost basis at the outset of the stress test. Similarly, gains and losses resulting from the termination of derivative instruments during the stress period are amortized on a straight-line basis over the same period used to calculate the gain or loss.

3. Treatment of Non-Interest Earning Assets

In NPR2, OFHEO proposed to convert to cash non-earning assets, such as miscellaneous receivables, real estate owned (REO), and general clearing accounts, by the end of the stress test's first year. NPR2 allowed other non-earning assets, such as investments in low income housing tax credits, to remain constant over the stress period, i.e., be carried over from quarter to quarter and earn no income.¹⁶⁵

Three commenters stated that the treatment of non-interest earning assets in the stress test would penalize investments in affordable housing programs. Fannie Mae stated that investments in affordable housing should be converted to cash over the first six months of the stress period, thereby eliminating what it termed an "artificial burden" to this type of investment. Freddie Mac stated that these assets should be converted to cash when the Enterprises begin to show net losses to reflect the resulting elimination of associated tax benefits.

After reviewing the comments, OFHEO has decided to adopt the proposed rule with one modification. Investments in low income housing tax credits are converted to cash over the first six months of the stress period.

4. Net Operating Losses

In NPR2,¹⁶⁶ OFHEO proposed to have a Net Operating Loss (NOL) carryback period of three years so that an NOL for a current month would be "carried back" to offset taxes in any or all of the preceding three calendar years. OFHEO explained that this offset of the prior years' taxes results in a negative

provision for income taxes for the current month. A period of 15 years was proposed for carry forwards.

MBA and Fannie Mae commented that the proposed three-year carry back period and 15-year carry forward periods for NOL tax offsets are no longer consistent with the current tax code. These commenters requested that these periods be changed to reflect the recent legislation which specifies periods of two and twenty years, respectively.

OFHEO has decided to modify the NOL carryback and carryforward periods to two and twenty years, respectively. This will allow the accounting procedures in the stress test to be consistent with the current tax code.

5. Operating Expenses

In NPR2, OFHEO proposed that the stress test calculate operating expenses, including those administrative expenses related to an Enterprise's salaries and benefits, professional services, property, equipment, and offices. Under the proposal, operating expenses would decline in direct proportion to the decline in the volume of each Enterprise's total mortgage portfolio (i.e., the sum of outstanding principal balances of its retained and sold mortgage portfolios). The stress test first projected how an Enterprise's mortgage portfolio would change during the stress period on a monthly basis. It then multiplied the percentage of assets remaining by one-third of the Enterprise's operating expenses in the quarter immediately preceding the start of the stress test to simulate the changed operating expenses in each month of the stress period. The resulting amount would be an Enterprise's operating expense for a given month in the stress period. OFHEO explained that the expense reduction pattern for the up-rate scenario would differ from the down-rate scenario, as would the pattern within each scenario, depending on changes in the characteristics of an Enterprise's total mortgage portfolio.

a. Comments

Commenters provided widely divergent views about the proposed treatment of operating expenses. Among the issues that they addressed were whether the proposed treatment would result in an appropriate capital requirement, whether the stress test should link operating expenses to the size of each Enterprise's mortgage portfolio, whether the stress test should model fixed and variable expenses separately, whether the stress test should exclude expenses associated with new activities, and whether

¹⁶² Section 3.10.3.6 of the NPR2 Regulation Appendix, 64 FR 18298-18299, April 13, 1999.

¹⁶³ Financial Accounting Standards Board Statement of Financial Accounting Standard 115, *Accounting for Certain Investments in Debt and Equity Securities*, May 1993.

¹⁶⁴ Financial Accounting Standards Board Statement of Financial Accounting Standard 113, *Accounting for Derivative Instruments and Hedging Activities*, June 1998.

¹⁶⁵ 64 FR 18298, April 13, 1999.

¹⁶⁶ 64 FR 18297, April 13, 1999.

operating expenses should be tied to the previous quarter's operating expenses.

Commenters disagreed about the extent to which the proposed treatment of operating expenses would result in an appropriate capital requirement. The Enterprises and a Wall Street firm commented that the proposal would result in an excessive capital requirement. Freddie Mac stated that operating expenses constitute a relatively small portion of its total expenses but a disproportionately large component of its capital requirement under the proposal. In contrast, several trade associations and financial organizations stated that it would be more appropriate to model operating expenses in a manner that would result in a higher capital requirement. These differing views, which are discussed below, were reflected in specific recommendations for revising the stress test's modeling of operating expenses.

Commenters, for instance, disagreed about whether the stress test should link operating expenses to the change in the size of an Enterprise's mortgage portfolio during the stress test. The Enterprises stated that the stress test should not incorporate such a linkage, which they believe distorts risks. They were especially concerned that such a modeling approach would result in significantly different treatment for operating expenses depending on the interest rate scenario. Fannie Mae stated that the capital requirement in the up-rate scenario could be as much as \$2 billion higher than the down-rate scenario. In contrast, other financial firms stated that operating expenses should remain constant rather than decline during the stress test. They noted that having operating expenses decline is inconsistent with the experience of a financial institution facing stressful conditions. They argued that such institutions typically experience an increase in operating expenses during stressful periods since more expenses are incurred to manage defaults and repossessed real estate.

Commenters also disagreed about whether fixed and variable expenses should be modeled together or separately. Both Enterprises stated that the stress test should model fixed and variable costs separately and then apply a fixed expense ratio against the projected mortgage portfolio balances. Under their recommended approach, the level of operating expenses would not vary based on the level of such expenses in the quarter preceding the stress test. Other commenters believed that the stress test should not separately model fixed and variable expenses, but

rather should hold these expenses constant during the stress period.

Both Enterprises commented that the stress test should not consider expenses related to new business development, product innovation, and research, given the 1992 Act's "no new business" requirement.¹⁶⁷ Freddie Mac stated that under the no new business requirement, this portion of its operating expenses would drop nearly to zero during the stress period. Similarly, Fannie Mae stated that less than half of each company's current cost structure is devoted to maintenance and support of existing book-of-business balances.

b. OFHEO's Response

As the widely divergent comments indicated, there is no single "correct" way to model operating expenses, particularly in a stylized stress test which by necessity must incorporate simplifying specifications. In general, the Enterprises stated that the proposed treatment would result in unreasonably high capital requirements, whereas other financial institutions stated that the proposed treatment would result in unreasonably low capital requirements. OFHEO believes that the recommendation by both Enterprises to have a fixed expense ratio of between 1.5 and 2.0 basis points of unpaid principal balance (UPB) per year is unreasonably low. As one commenter noted, Enterprise expenses to outstanding MBS and portfolio balances have averaged over 7.0 basis points for the past ten years. Similarly, although there was intuitive appeal to the recommendation by financial institutions to hold the level of expenses constant throughout the stress period given the experience of financial institutions under stress, adopting such an approach here would have resulted in unreasonably high capital requirements relative to operating expenses.

After considering all of the comments, OFHEO has decided to adopt the NPR2 approach to operating expense, with some modification. In the final rule, the baseline operating expense level is the same as in NPR2, and operating expenses continue to decrease as the mortgage portfolios decrease, but the method of determining the amount of the decrease is modified. Rather than a strictly proportional decrease, the amount of the decrease in each month of the stress period is determined by calculating a base amount comprised of

a fixed component and a variable component. The fixed component is equal to one-third of the baseline level and remains fixed throughout the stress period. The variable component at the start of the stress test is equal to two-thirds of baseline and declines in direct proportion to the decline in the UPB of the combined retained and sold mortgage portfolios. This base amount is further reduced by one-third, except that this further reduction is phased in during the first 12 months of the stress test.

In determining its treatment of operating expenses, OFHEO was careful to balance the competing concerns expressed by the commenters. Financial institutions facing extremely stressful conditions generally do experience an increase in operating expenses, and therefore the proportional reduction in all expenses that was contained in NPR2 may understate the expenses that would be expected under the conditions of the stress test. Nevertheless, OFHEO believes that holding all operating expenses constant, as suggested by some commenters, would have overstated operating expenses and that some reduction is appropriate over time, given the cessation of all new business in the stress test.

On balance, OFHEO believes that the formula in the final rule provides an overall expense experience that is consistent with the stress period. The gradual phase-in during the first 12 months of the stress period of the adjustment to the base amount reflects the fact that operating expenses would not be likely to change dramatically in the first few months of the stress period. At any given time, the Enterprises have numerous commitments and obligations that affect operating expenses, including those related to personnel and technological innovation. Upon entering a stressful period, it would take some time for an Enterprise to implement modifications associated with these commitments and obligations. OFHEO has determined that it would be inappropriate to adopt the Enterprises' recommendations to exclude expenses related to new business development, product innovation, and research. As discussed in NPR2,¹⁶⁸ OFHEO determined that it would be inconsistent with the 1992 Act and the overall purpose of the stress test for the model to attempt to reflect decisions that would be made by an Enterprise that was intentionally winding down its operations. Nevertheless, the one-third reduction in expenses incorporated in the final rule reflects that the

¹⁶⁷ 12 U.S.C. 4611(a)(3)(A) states that "No other purchases of mortgages shall be assumed" under the current rule, except for contractual commitments.

¹⁶⁸ 64 FR 18168-69, April 13, 1999.

elimination of new business would result in some permanent reduction in operating expenses.

O. Dividends and Share Repurchases

The proposed stress test specifies in each quarter of the stress period whether the Enterprise pays preferred and common stock dividends, and, if so, how much. For preferred and common stock, dividends are paid as long as an Enterprise meets the minimum capital requirement before and after the payment of these dividends. For preferred stock, the payments are based on the coupon rates of the issues outstanding. For common stock, dividends are paid in the first year of the stress period. The payments are based on the trend in earnings. If earnings are increasing, the dividend payout rate is equal to the average of the percentage payout of the preceding four quarters. If earnings are not increasing, then the amount of dividends paid is based on the preceding quarter's dollar amount of dividends per share. If a full dividend would cause the Enterprise to fall below its estimated minimum capital level, then a partial dividend is paid. The proposed stress test did not recognize other capital distributions such as repurchases of common stock or redemptions of preferred stock.

Fannie Mae and Freddie Mac were the only commenters on the proposed treatment of dividends.

1. Preferred Stock

With regard to preferred stock, Freddie Mac agreed with the proposal, stating that it appropriately differentiates between preferred and common stock and appropriately captures distinctions in the effects of different preferred stock structures on the extent to which such equity capital is available to absorb losses. Fannie Mae disagreed with the proposed treatment of preferred stock dividends, stating that

it would be inappropriate to assume that the Enterprises would continue to pay preferred dividends and deplete capital reserves throughout the stress period when they might be classified as "undercapitalized."¹⁶⁹ That Enterprise recommended that the stress test terminate all capital distributions at the end of the first year of the stress period.

The final rule adopts the NPR2 treatment of preferred dividends without change. After reviewing the comments on the payment of preferred stock dividends during the stress period, OFHEO has determined that it is appropriate for the stress test to distinguish between the two types of equity and allow the payment of preferred stock dividends in some circumstances in which common stock dividends are not paid. Such a distinction reflects the higher level of commitment that a corporation makes to investors when issuing preferred stock versus common stock, since preferred stockholders have a first claim on capital distributions.

2. Common Stock

With regard to common stock, both Enterprises agreed with the proposal to cease paying dividends after the first year of the stress test. They stated that such a treatment is appropriate and aligns dividends with the capital classifications and real economic incentives. Both Enterprises, however, offered recommendations to modify the proposed dividend rate for common stock. Freddie Mac recommended using a long-term industry average dividend rate specified in the regulation that would be approximately 25 percent of earnings rather than a rate based on dividend payments in recent quarters. That Enterprise believed that such an approach would simplify the regulation's operation by substituting a single fixed value for a process that

would require collecting data on four prior quarters of dividend payments and earnings, calculating the payout ratio for each quarter, and averaging those ratios. Fannie Mae stated that it is inappropriate to rely on a one-year time frame in which payments could be overly volatile, especially if there were a one-time distribution. Fannie Mae recommended basing the payout rates on the most recent three-year period, claiming such a change would reduce unnecessary volatility in the capital requirement.

After analyzing the comments, OFHEO has determined that it is appropriate to adopt the payout rates as proposed in NPR2. OFHEO notes that between 1990 and 1999 Fannie Mae's dividend payout ratio ranged from a low of 16 percent in 1990 to a high of 35 percent in 1995; whereas, Freddie Mac's dividend payout ratio ranged from a low of 20 percent in 1994 to a high of 23 percent in 1990.

Given such wide ranges in dividend payouts by one of the Enterprises, it would be inappropriate to adopt Freddie Mac's recommendation to set by regulation a dividend payout ratio of 25 percent. OFHEO has also decided not to adopt Fannie Mae's recommendation to extend the time period used to determine the payout rate from one year to three years. While Fannie Mae is correct that its recommended approach would reduce volatility in the capital requirements, such an extended time period under the recommendation would make it more difficult for the stress test to identify quickly changing Enterprise dividend policy that might deplete an Enterprise's capital. Tripling the time period on which the dividend rate is based would be inconsistent with the need for the stress test to provide a timely early warning of potential capital deficiencies.

TABLE 7.—DIVIDEND PAYOUT RATIO FOR FANNIE MAE AND FREDDIE MAC

Fannie Mae	1999	1998	1997	1996	1995	1994	1993	1992	1991	1990
Common Stock Dividend	1.08	0.96	0.84	0.76	0.68	0.60	0.46	0.34	0.26	0.18
Diluted EPS	3.72	3.23	2.83	2.48	1.95	1.94	1.71	1.48	1.25	1.12
Div. Payout Ratio	29%	30%	30%	31%	35%	31%	27%	23%	21%	16%
Freddie Mac	1999	1998	1997	1996	1995	1994	1993	1992	1991	1990
Common Stock Dividend	0.60	0.48	0.40	0.35	0.30	0.26	0.22	0.19	0.17	0.13
Diluted EPS	2.96	2.31	1.88	1.63	1.42	1.27	1.02	0.82	0.77	0.57
Div. Payout Ratio	20%	21%	21%	21%	21%	20%	22%	23%	22%	23%

¹⁶⁹ Under the 1992 Act an Enterprise is undercapitalized if it does not meet its risk-based

capital requirement but meets the minimum requirement, 12 U.S.C. 4614(a).

3. Share Repurchases

In the only comment that addressed other types of capital distributions, Freddie Mac recommended that the stress test count share repurchases as common stock dividends because an Enterprise could follow a strategy of making capital distributions either by dividends or share repurchases. It stated that without this modification, an Enterprise would have to hold more future capital if it made a capital distribution solely by way of dividend payments than if it made an identical distribution by way of share repurchases. Freddie Mac, while acknowledging that reducing dividends is more difficult than ceasing share repurchases, argued that such differential treatment is not warranted by small differences in risk presented by these two forms of capital distributions.

OFHEO has decided to include rules in the stress test addressing share repurchases during the stress period. OFHEO agrees that share repurchases are potentially significant capital distributions that should be reflected in the stress test. However, unlike common stock dividends that are paid for the first four quarters of the stress period, the stress test provides for share repurchases only during the first two quarters. OFHEO believes that this shorter period more closely reflects what would likely occur as the Enterprise begins to experience the adverse economic conditions of the stress test.

4. Oversight Responsibility

OFHEO emphasizes that there are significant differences between establishing a modeling decision for dividend payments and share repurchases in the risk-based capital regulation and acting on a dividend approval request from an Enterprise that is no longer adequately capitalized. Accordingly, provisions in the stress test that provide for the payment of dividends by an undercapitalized Enterprise in some circumstances and not others should not be interpreted as an indication of how OFHEO will act on any specific dividend approval request. Should the situation arise, OFHEO will evaluate any request for approval of a dividend payment on the basis of a case-by-case analysis of all the relevant facts and circumstances.

P. Capital Calculation

1. Background

In NPR2, OFHEO proposed procedures to calculate the amount of capital that an Enterprise would need just to maintain positive capital during

the stress test. Under the proposal, once the stress test projects an Enterprise's capital at the end of every month in the ten-year stress period, the capital calculation process discounts the monthly capital balances back to the start date of the stress period. The Enterprise's starting capital is then adjusted by subtracting the lowest of the discounted capital balances to account for the smallest capital excess or largest deficit (i.e., subtracting a negative number in the case of a deficit). The factor used to discount a monthly capital balance is based on after-tax borrowing or investing yields as appropriate for that month and all previous months during the stress period. After the stress test ascertains the amount of capital necessary to maintain positive capital during the stress period it then multiplies the amount by an additional 30 percent to arrive at the risk-based capital requirement. The additional 30 percent is mandated by section 1361(c) of the 1992 Act to capture the management and operations risk of an Enterprise.

OFHEO stated in NPR2 that it was necessary to use a present-value approach to recognize that a dollar today is worth significantly more than a dollar ten years in the future, that is, a dollar of capital at the beginning of the stress period can be invested to return more in a later year. NPR2 employed selected discount rates that approximate an "iterative approach" also discussed in NPR2. An iterative approach would use a series of iterative simulations as it adjusted the Enterprise's balance sheet until it determined a starting level of capital necessary for an Enterprise just to maintain positive capital, but no more, throughout the stress period. Both approaches take into account the two different interest rate scenarios by applying different interest rates in the capital calculation for each scenario. Both approaches were designed to ensure that an Enterprise would have enough capital to survive the stress test regardless of when losses associated with management and operations risk might occur, even if that were the first day of the stress period. However, OFHEO proposed the present value approach because it is much simpler to design and replicate.

2. Comments

Fannie Mae and Freddie Mac were the only commenters to address the proposed method to calculate the risk-based capital requirement. Each Enterprise objected to the use of a present value approach. Instead, they each recommended that the stress test should base the amount of required risk-

based capital solely on the maximum amount of total capital consumed during the stress period, i.e., subtracting the lowest stress-period capital level without discounting from the starting position total capital. Fannie Mae criticized the present value approach, claiming that it is contrary to the 1992 Act's "directive" to follow Generally Accepted Accounting Principles (GAAP), results in inappropriate incentives, and is contrary to standard industry practice. Freddie Mac stated that the present value approach distorts the assessment of capital and risk and raises timing issues, based on the assumption that management and operations risk is proportional to the interest rate risk and credit risk. That Enterprise stated that the proposed discounting method assumes that losses associated with management and operations risk occur at the very beginning of the stress test.

3. OFHEO's Response

The final regulation generally adopts the approach to calculating risk-based capital proposed in NPR2.¹⁷⁰ After reviewing the proposed method of calculating risk-based capital in light of the comments, OFHEO found the present value approach preferable to the approach suggested by the Enterprises. By discounting, the present value approach allows the capital calculation process to account for the time value of money. The time value of money is important because the stress period extends for ten years during which funds would be invested constantly and during which management and operations losses could occur at any time, including the beginning of the stress period.

OFHEO disagrees with each of the commenters' criticisms of its use of a present value approach. Specifically, OFHEO disagrees with the Enterprises' claim that basing the amount of capital required for the stress test on a capital consumption approach is more consistent with the statute or more appropriate from a risk management perspective than the discounting approach used by OFHEO. First, the approaches recommended by the Enterprises would not ensure that the Enterprises hold capital sufficient to survive the stress test if management and operations losses occurred at the beginning of the ten-year stress period; they would only provide such assurances if these losses occurred near

¹⁷⁰ As discussed in the Regulation Appendix, certain additional amounts relating to off-balance-sheet items addressed in section 3.9, Alternative Modeling Treatments, are included in the calculation of risk-based capital.

the end of that period. Second, OFHEO believes that a present value approach is appropriate because it requires an Enterprise to maintain a capital cushion for other risks when credit risk and interest rate risk are relatively low. Thus, an Enterprise is more likely to survive subsequent, more stressful periods. Third, OFHEO finds no merit to the claim that a present value approach is contrary to standard industry practices; clearly, present value theory is well established in finance and economics, both in academia and in industry. Fourth, in response to Freddie Mac's comment, the present value approach requires an Enterprise to have positive capital at any time during the ten-year stress period, even if a loss attributable to management and operations risk occurs at the beginning of the ten-year stress period.

IV. Regulatory Impact

A. Executive Order 12866—Economic Analysis

1. Introduction

This rule implements the statutory direction to OFHEO in the 1992 Act to set forth in a regulation a risk-based capital test that applies prescribed credit and interest rate stresses to the Enterprises' businesses. Recognizing the novelty of this type of regulation, OFHEO issued a series of notices soliciting public comment. First, the ANPR sought public comment on a number of issues relating to the development of the regulation. These comments were considered in the development of the two subsequent NPRs addressing different components of the risk-based capital regulation. NPR1 related to the methodology for identifying the benchmark loss experience and the use of OFHEO's House Price Index in the stress test. NPR2 set forth the remaining specifications of the stress test. In addition, OFHEO published a Notice soliciting reply comments to provide interested parties an opportunity to respond to other commenters. Throughout the preambles of the NPRs and in OFHEO's responses to comment on the NPRs, OFHEO has provided justification for all of the choices that have been made and has explained the effects of those choices in the rulemaking. All plausible models and assumptions that were suggested by commenters or otherwise identified by OFHEO have been discussed in the rulemaking documents.

This regulation has been reviewed by the Office of Management and Budget (OMB) in accordance with Executive Order 12866, Regulatory Planning and

Review (E.O. 12866). OMB has determined that this is an economically significant rule. OFHEO has conducted an economic analysis of the final rule in accordance with the E.O. 12866 and has concluded that there is adequate information indicating the need for the risk-based capital regulation and that the potential benefits to the Enterprises, the housing market, homeowners, and taxpayers, far exceed any potential costs that may result from compliance with this rule.

In making this determination, OFHEO took into account that the rule relies on performance objectives to the maximum extent possible in helping to ensure the adequate capitalization of the Enterprises. In addition, the economic analysis reveals that the decisions contained in this rule were based upon the best reasonably obtainable technical, economic, and other information germane to the subject matter of the rule. OFHEO considered a reasonable number of alternatives for each of these decisions and chose the most cost-effective alternative that achieves the purposes of the 1992 Act. All plausible models and assumptions that were suggested by commenters or otherwise identified by OFHEO have been discussed in the rulemaking documents.

In conducting its analysis, OFHEO has been guided by the principles of fair disclosure and transparency. In addition, the rule is implemented in a manner that, to the extent possible, provides transparency of the capital calculation process used by OFHEO, which will benefit the Enterprises and other interested parties. OFHEO has solicited comments on all aspects of the rule through the ANPR and two NPRs described above. To assist commenters in evaluating the rule, OFHEO provided technical information on its website, in addition to the extensive material included with the notices.

2. Statement of Need for Proposed Action

The specificity of the statutory requirement to set forth a capital stress test in a regulation reflects a Congressional determination that there is a need for this regulation and that the benefits to be derived exceed any potential costs involved. The 1992 Act specifies key elements of that stress test, which is to be designed to identify the amount of capital that an Enterprise must hold at any given time in order to maintain positive capital for a ten-year period of economic stress. OFHEO concurs with the Congressional judgment that such a regulation is necessary in order to ensure that the Enterprises can continue to fulfill their

important public purposes and to reduce the potential risk of the serious disruptions that could occur if one or both of the Enterprises experienced economic difficulties.

The Enterprises perform an important role in the nation's housing finance system. Issuances of debt and guaranteed mortgage-backed securities by the Enterprises have grown enormously in the past decade, providing more than half of the conventional financing of housing in the United States. The Enterprises are the largest sources of secondary mortgage market credit throughout the United States and fill a particularly important role in providing assistance in the areas of low- and moderate-income housing. Financial failure of an Enterprise could result not only in losses to investors in its securities, but also decreased public confidence in the securities of the other Enterprise and of the Federal Home Loan Banks, which are also Federal Government sponsored enterprises that provide a source of financing for housing. Such a failure also could cause decreased availability and increased cost of financing for persons seeking to purchase or refinance housing in the United States. For these reasons, public confidence in the financial health of the Enterprises will help to promote overall stability in the housing market, benefiting all homeowners and other participants in that market.

Although the current risk of an Enterprise failure is small, the continued financial stability of the Enterprises cannot be taken for granted. Over the past two decades, failures of financial institutions have been commonplace, including more than 2900 banks and thrifts and a number of securities firms. The risks associated with Fannie Mae and Freddie Mac differ in some important ways from those associated with banks, thrifts, and securities firms. However, Government sponsored enterprises are not immune to failure. Fannie Mae encountered serious financial difficulty in the early 1980s, recovering in large part because of a fortuitous decline in interest rates, and the Farm Credit System experienced serious problems later in the decade. Because of the Enterprises' key role and important public mission, Congress created OFHEO to ensure their safe and sound operation. The current combined debt and guarantee obligations of the Enterprises amount to nearly \$2.5 trillion, and, unlike banks, thrifts, and securities firms, no Enterprise obligations are backed by an insurance fund that could contribute toward meeting creditor claims.

The risk-based capital rule (in conjunction with OFHEO's other regulatory tools) is intended to reduce the risk of financial failure of an Enterprise. The rule can contribute to that goal by requiring the Enterprises to hold more capital or take less risk than they otherwise would in some or most circumstances, particularly those circumstances in which the danger of failure is greatest. In circumstances in which some capital or risk adjustment is necessary, the rule gives an Enterprise the flexibility to choose whether more capital, less risk, or a combination of the two best suits its business needs.

Capital reduces the risk of insolvency by absorbing losses. For most firms, debt markets provide strong capital discipline, penalizing a firm that is excessively leveraged with higher borrowing costs. That discipline is largely lacking for the Enterprises because of their status as Government sponsored enterprises. This lack of normal market discipline is the type of significant "market failure" that is described in the Office of Management and Budget (OMB) "best practices" document (OMB Best Practices Guide).¹⁷¹ It makes capital requirements particularly important for the Enterprises.

The statutory requirement to promulgate a risk-based capital regulation reflects a Congressional judgment that the market failure should be addressed through Government-mandated regulation. Enterprise debt securities receive favorable pricing in the market, due in part to the Enterprises' statutory Federal charters and advantages conferred thereby and the perception that the Federal Government would act to prevent an Enterprise's default. This perception, as well as the Enterprises' dominant position in the secondary market for conventional residential mortgage loans, lessens the market discipline that would apply if the Enterprises were not Government-sponsored enterprises. OFHEO views the Congressional direction to develop a risk-based capital regulation as intended, in part, to compensate for this lack of market discipline.

The market failure is significant, even though the Enterprises currently are well managed and profitable, because, if the Enterprises were to experience financial difficulties, disruptions could

occur, with significant adverse effects on the housing and financial markets. Further, the market failure is significant because of the important public purposes served by the Enterprises and the need to avoid the expense to the taxpayer if intervention by the Federal Government were found to be necessary.

In summary, OFHEO is confident that the risk-based capital rule will perform effectively the role intended for it by the 1992 Act. It will promote the Enterprises' safety and soundness, thereby enhancing their ability to continue to carry out their public purposes.¹⁷² These purposes include providing stability in the secondary market for residential mortgages and providing access to mortgage credit in central cities, rural areas, and underserved areas.

3. Examination of Alternative Approaches

a. Limitations Imposed by Statute

In developing the regulation, the Director of OFHEO (Director) has discretion with respect to a number of issues related to the stress test. However, the specificity of the 1992 Act provisions related to the risk-based capital stress test defines a general level of stringency and limits the alternative approaches available to OFHEO. OFHEO is directed to: (1) Identify default and loss severity rates that satisfy a specific statutory standard for credit stress (which OFHEO has termed "benchmark" rates) and (2) apply a stress test that subjects each Enterprise to a ten-year stress period with mortgage loss rates that are reasonably related to these benchmark rates. Interest rate shocks during the ten-year stress period are statutorily defined as well. During the first year of the stress period the ten-year constant maturity Treasury rate (CMT) must rise or fall by specified amounts. In both scenarios (rising or falling rates), the rate must remain constant for the remaining nine years of the stress period. The risk-based capital requirement is based upon the scenario that requires the higher capital amount at the beginning of the stress test for an Enterprise to maintain positive capital throughout the stress period.

Although the 1992 Act defines a general level of required stringency, OFHEO must make certain determinations reasonably related to historical experience and certain determinations consistent with the stress period. For example, the regulation must set forth the shape of the Treasury yield curve during the ten-

year period. The statute provides that the curve should be reasonably related to historical experience and otherwise judged reasonable by the Director. OFHEO also has discretion to determine the levels of non-Treasury interest rates, the rates of mortgage prepayments, dividend payments, and many other factors, provided that they are consistent with the stress period. The 1992 Act also requires that the stress test be made public so that it may be run by interested persons in the same manner as the Director. This requirement, together with the need to apply the same stress test to both Enterprises and the need to protect proprietary Enterprise data from disclosure, imposed certain limitations on alternative approaches that were available to implement the statute.

b. Use of Performance-Oriented Approach

The risk-based capital regulation, as anticipated by the 1992 Act, is a performance-oriented standard. Rather than a uniform ratio-based standard applied to both Enterprises without regard to their individual risk profiles, the capital standards set by the regulation are specific to each Enterprise's particular risk profile. The stress test takes into account the risk characteristics of the particular assets and liabilities and off-balance sheet obligations of each Enterprise and predicts how these specific instruments will perform under stress. Because the stress test models the entire existing business of an Enterprise, and takes into account the actions the Enterprise has taken to offset risk, there are numerous options (other than adjusting the amount of total capital it holds) for an Enterprise to satisfy the requirements of the regulation. To the extent that an Enterprise uses these other options to manage its risk, its capital requirement will be lower than it otherwise would be.

c. Alternative Levels of Stringency

The 1992 Act defines the general level of stringency of the risk-based capital regulation by requiring the Enterprises to have enough capital to survive statutorily prescribed stress conditions for a period of ten years, plus an additional 30 percent for management and operations risk. Stress conditions this severe have not been experienced nationally for a comparable period of time since the Great Depression. Within these parameters, certain decisions left to the Director's discretion affect the relative stringency of the stress test. These include decision rules for modeling credit enhancements and

¹⁷¹ *Economikc Analysis of Federal Regulations Under Executive Order 12866*. Office of Management and Budget (Undated document representing the result of two-year study to describe the "best practices" for preparing the economic analysis of a significant action called for by E.O. 12866).

¹⁷² 1992 Act, section 1302(2) (12 U.S.C. 4501(2)).

derivatives (including how to take counterparty risk into account), the payment of dividends, operating expenses, the issuance of debt and the investment of excess funds, rates of prepayment (which are affected by property valuation assumptions), and how to calculate the capital needed to survive the ten-year stress period.

In developing these decision rules, OFHEO exercised its discretion in a manner that it deemed consistent with the stress conditions mandated by the 1992 Act. That is, OFHEO specified other stress test conditions that were consistent with the stringency of the conditions specified in the statute. In the yield curve specification, for example, OFHEO could have chosen yield curves that would have had the effect of either greatly mitigating or exacerbating the most likely economic impact of the statutorily imposed shocks to the ten-year rate. Instead, OFHEO selected curves in both scenarios that did not, in OFHEO's judgment, have either effect.

In general, OFHEO modeled instruments according to their terms, in order to reflect accurately their performance under the conditions of the stress period. In the few instances where, because of the unavailability of data or satisfactory modeling techniques, it was not possible to model instruments in this way, OFHEO employed conservative measures, which have the effect of discouraging large volumes of activities the risk of which could not be quantified with some precision in the stress test. It follows, therefore, that the more precisely instruments and activities can be modeled, the lower the amount of capital that generally will be required. However, precise modeling requires adequate data and careful research. Therefore, the rule is structured to encourage the Enterprises to maintain and deliver good data, which will allow OFHEO to provide accurate and timely assessments of the risks of all Enterprise business activities.

d. Alternative Effective Dates

The 1992 Act provides that the regulation shall take effect upon issuance, but provides a one-year period from the effective date before the supervisory authorities that are tied to the risk-based capital level take effect.¹⁷³ These provisions override the Administrative Procedure Act (APA) requirement for a 30-day delayed effective date for substantive rules¹⁷⁴ and do not give the Director discretion

to alter the timetable. However, a subsequent Congressional enactment, the Small Business Regulatory Enforcement Fairness Act (SBREFA), delays the effective date for rules that OMB has determined to be "major rules" for at least 60 days from the date they are submitted to Congress for review or the date of publication, whichever is later.¹⁷⁵

OFHEO believes that the language in the two statutes can be harmonized by regarding the one-year transition period in the 1992 Act as a *de facto* delayed effectiveness date that runs concurrently with the 60-day delay required by SBREFA. In any event, SBREFA provides a good cause exception to the 60-day delayed effective date, which OFHEO has determined is appropriate to this rule. Because the 1992 Act already provides a one-year delay in enforcement of the regulation, during which Congress could act to overturn the rule if it chose, no further purpose would be served by adding on to that period the additional 60 days from SBREFA.¹⁷⁶ The requirement in the 1992 Act that the regulation become effective immediately reflects a Congressional determination, with which OFHEO agrees, that the public interest in safe and sound Enterprises is best served by implementing the rule without delay. The effect of an additional 60-day delay in the effective date would be to prevent OFHEO from using certain of its prompt corrective action authorities to deal with a deficiency in risk-based capital until 14 months after publication of the rule. Given that Congress has determined that 12 months is sufficient time for the Enterprises to adapt to the rule, the

¹⁷⁵ If a joint resolution of disapproval is passed by Congress during the 60-day period, the rule may be further delayed if the President does not sign the joint resolution of disapproval. 5 U.S.C. 801(a)(3).

¹⁷⁶ Provisions in the Enterprises' respective charter acts that limit capital distributions without the approval of the Director if an Enterprise does not meet its risk-based capital requirement do not include the one-year delay specified in the 1992 Act. However, OFHEO does not intend that the risk-based capital rule will require approval of ordinary-course dividend payments, share repurchases and redemptions that an Enterprise makes during the transition year. During that period, the rule would have no impact on an Enterprise's ability to make capital distributions absent adequate notice to the Enterprise of its capital position and adequate opportunity to take reasonable and prudent steps to address any articulated deficiency. *See, supra*, section III.B.6., Interaction with Charter Act Provisions. In any event, if an Enterprise fell short of its risk-based capital requirement during the first year after the rule's effective date, OFHEO would not withhold approval of capital distributions without careful consideration of the circumstances of the shortfall. These factors could include the causes of the shortfall and the likelihood it would soon be eliminated (or had already been eliminated).

public interest would not be served by extending that period. On the contrary, it would not be in the public interest to further delay the effective date of prompt corrective action authorities for longer than the one-year period specified in the 1992 Act. In short, OFHEO believes the Congress has provided an ample phase-in period for the implementation of this regulation and that further delay increases financial risk with no off-setting benefit to the general public or the Congress. It should be noted, however, that, after the end of this phase-in period, OFHEO has considerable discretion in its supervisory responses, depending upon the circumstances, in the event of a risk-based capital shortfall.

e. Alternative Methods of Ensuring Compliance

Alternative methods of compliance with reporting provisions were considered. Feeds of raw data from the Enterprises, which would be processed by OFHEO, were originally thought to be the least burdensome option, but ultimately were found by the Enterprises and OFHEO to be problematic. The Enterprises commented that the data normalization performed by OFHEO to ensure that comparable data was captured for both Enterprises resulted in data translation errors. They expressed concern that resolving these errors would consume so much time after the data was submitted that accurate capital classifications could not be produced with sufficient timeliness to be useful as a regulatory tool or useful to the Enterprises in their planning. The Enterprises suggested instead that they be allowed to process their data and run a stress test specified by OFHEO using their own internal systems. They would provide OFHEO with the capital numbers, which would be presumptively final, unless OFHEO found an error.

For reasons discussed in section III.A.2., Proprietary/Internal Models, OFHEO did not agree that presumptive finality should be accorded to the Enterprises' calculations of their risk-based capital requirements. However, OFHEO agreed that allowing the Enterprises to process most of the data required to run the stress test using their internal systems and to submit a report with the data appropriately aggregated in the standardized format specified by OFHEO (along with the raw loan data used in preparing the report) would eliminate the data normalization step and allow quicker capital classifications. The final rule, therefore, requires the Enterprises to submit a

¹⁷³ 12 U.S.C. 4611(e)(1), 4614(d), 4615(c).

¹⁷⁴ 5 U.S.C. 553(d).

Risk-Based Capital Report that contains the data required to run the stress test, aggregated by the Enterprises according to the stress test rules of aggregation specified by OFHEO. The stress test will be run by OFHEO using model-ready inputs submitted in the Risk-Based Capital Report. The accuracy and completeness of the Report, along with the raw data from which the Report is prepared, must be certified by the Enterprise official with responsibility for capital adequacy. The preparation of the Report, including the aggregation of data in a model-ready format, is subject to OFHEO's supervision and oversight, and appropriate penalties are available for false certification.

Methods of ensuring compliance with the substantive requirements of the rule—that is, ensuring that the Enterprises maintain adequate risk-based capital as determined under the rule—are largely prescribed by statute, based on the capital classification of the Enterprise. The 1992 Act requires that these classifications be determined at least quarterly and reported to the Congress annually. The Act provides OFHEO discretion to make more frequent capital determinations, but the alternative of substituting less frequent, random classifications, which is suggested in the OMB Best Practices Guide, is not an option under the statute. OFHEO does not presently find a need to specify by regulation the circumstances under which it might make determinations of capital classifications more frequently than quarterly. However, low capital levels, high risk activities, inadequacies in risk management techniques, or various adverse events external to the Enterprises are the types of concerns that could make more frequent capital classifications prudent.

The risk-based capital rule sets the standard and the procedure for determining whether an Enterprise is undercapitalized, but does not impose a specific sanction or remedial measure in the event of noncompliance. Those sanctions or other measures are not a subject of this rulemaking. OFHEO notes, however, that, under the 1992 Act, if an Enterprise fails to meet its applicable capital standard, it must submit a capital restoration plan for the approval of the Director. In addition, the Enterprise becomes subject to restrictions on capital distributions, only some of which may be waived or modified by the Director. Also, depending upon the severity of the undercapitalization, other enforcement tools are provided, some of which are mandatory.

f. Informational Measures

Executive Order 12866 contemplates that agencies should consider voluntary public disclosure systems as an alternative to other types of regulatory mechanisms. The 1992 Act does not allow for OFHEO to substitute such a voluntary system of financial disclosure for the mandatory risk-based capital determination. However, OFHEO agrees with the general implication in E.O. 12866 that financial disclosure enhances market discipline, and has chosen to publish its capital classifications of the Enterprises, together with their total and core capital levels and their respective risk-based, minimum, and critical capital requirements. Because the Enterprises' risk-based capital levels reflect the results of the stress test, and because the operation of the stress test is transparent to the public, OFHEO views the risk-based capital rule as an important step in providing greater public disclosure of financial risk at the Enterprises. Also, OFHEO is currently considering the extent to which disclosure of other financial data about the Enterprises may serve to improve market discipline without compromising information that, for legal or public-policy reasons, should remain non-public.

Given the legal structure of the Enterprises and their dominant position in the secondary market for conventional residential mortgage loans, there are also practical limits to the extent to which informational measures alone can provide sufficient market discipline to ensure their safety and soundness. The need for OFHEO and the other regulatory structures put in place by the 1992 Act arose in large part from the public perception that the Federal Government would intervene to prevent default by either of the Enterprises or by other Government-sponsored enterprises. Accordingly, Congress has made the determination that market discipline alone will be insufficient to prevent or serve as an early warning of Enterprise failure. To avoid the potential costs and disruptions that could occur in the event of the financial failure of an Enterprise, the 1992 Act established a regulatory system with sufficiently stringent capital requirements to prevent the insolvency of the Enterprises under extreme financial conditions. The risk-based capital regulation is a mandatory aspect of that system.

g. Market-Oriented Approaches

Within the bounds of the 1992 Act, OFHEO has chosen the most market-

oriented alternative available. By requiring OFHEO to base capital upon a stress test that takes into consideration both interest rate and credit risk, the 1992 Act contemplates a rule that will provide great flexibility to the Enterprises to determine the most cost-effective means to match capital to risk. OFHEO has maximized the market orientation of the statute in the regulation by using models that make risk-based distinctions between many characteristics of the thousands of different instruments, programs and activities of the Enterprises. Because the risk-based capital rule is sensitive to these distinctions, it gives the Enterprises a broad array of options in the market—including altering the risk characteristics of their assets and liabilities, using different hedging strategies, and raising capital—to maintain compliance.

OFHEO has compared its risk-based capital regulation to the risk-based capital systems in use by other Federal financial institution regulatory agencies and has found that OFHEO's is the most market-oriented approach. In particular, the system in use by bank and thrift regulators, which is essentially a set of leverage ratios that are assessed against relatively broad categories of instruments, provides the regulated entities relatively few compliance options in the marketplace. Although a financial institution may adjust its portfolio to hold relatively fewer risky assets, these ratios do not take into account many risk-mitigating actions that an institution might take to hedge its risk.¹⁷⁷ Further, the 1992 Act already specifies separate leverage ratios in the form of minimum and critical capital levels, which OFHEO has implemented in its minimum capital regulation. Other systems in use for assessing financial institution risk, such as value-at-risk models, are designed to serve more limited purposes (such as assessing risk in a trading portfolio) and are inappropriate to determine capital for an entire financial institution involved in diverse business activities and are inconsistent with the statutory mandate for a stress test. For these reasons, OFHEO concluded that its risk-based capital rule utilizes the most market-oriented approach reasonably available

¹⁷⁷ The recent Basel proposal is more risk-sensitive than the current capital regime. It would provide for more consideration of credit risk hedges, although the credit risk part of the proposal is ratio-based. Committee on Banking Supervision, "A New Capital Adequacy Framework," Bank for International Settlements, Basel, Switzerland (June 1999). A copy of this document may be obtained from the BIS website at <http://www.bis.org>.

to determine risk-based capital for the Enterprises.

h. Considering Specific Statutory Requirements

When a statute establishes a specific regulatory requirement and the agency has discretion to adopt a more stringent standard, E.O. 12866 provides that the agency should examine the benefits and costs of any more stringent alternative the agency proposes as well as the specific statutory requirement.

As explained above, OFHEO has proposed a standard that is consistent with the stringency provided for in the 1992 Act. The 1992 Act requires OFHEO to specify those elements of the stress test that are not specified or not specified fully in the Act, but in most cases, the specification must be either reasonably related to historical experience or consistent with the stress period. Within these statutory guidelines, OFHEO has significant discretion to make decisions about the assumptions and operation of the stress test. The specifications for some of these elements of the stress test have the potential to increase or decrease the overall stressfulness of the regulation. In each such case, OFHEO has chosen specifications that are consistent with the conditions of the stress period.

Yield curve specifications provide an example of a choice OFHEO made that is consistent with the conditions of the stress period. Both the flat yield curve in the up-rate scenario and the upward-sloping curve in the down-rate scenario are within the range of yield curves that have been experienced frequently. Some comments complained that these curves can result in short-term interest rates receiving a greater shock than long-term rates.¹⁷⁸ However, as explained in detail in the preamble to the final rule,¹⁷⁹ OFHEO found that such a result is most consistent with the changes in the ten-year rates, based upon historical experience. That is, when interest rates have risen precipitously in the past, yield curves have tended to flatten. When they drop precipitously, yield curves tend to steepen. Similarly, although yield curves never actually maintain a static slope over time, OFHEO found that maintaining a constant slope was most consistent with the 1992 Act's specification of a constant ten-year CMT and was the

¹⁷⁸ If the yield curve is upward sloping prior to the beginning of the stress test, short-term rates will move farther than long term rates in the up-rate scenario, and less than long-term rates in the down-rate scenario. If the yield curve is inverted or downward sloping, the opposite effect will occur.

¹⁷⁹ Section III.G.2.a., Specification of the Flat Yield Curve in the Up-Rate Scenario.

approach that best reflected the level of stringency intended in the statute.

4. Analysis of Costs and Benefits

a. Introduction

Executive Order 12866 provides that the issuing agency will establish a baseline against which the agency should measure a rule's resulting costs and benefits, including those that can be monetized and those that cannot. The agency must then explain how it weighed these costs and benefits in reaching its decision on the regulation. The Executive Order recognizes that in many cases the agency is required by statute to act notwithstanding the outcome of this cost-benefit analysis, but asks that it be performed nevertheless, so that the impact of the regulation can be understood and to show that the costs and benefits of any options that were available to the agency under the statute were weighed appropriately.

Executive Order 12866 also contemplates that, if a regulation is composed of a number of distinct provisions, the benefits and costs of these different provisions will be evaluated separately. The preambles to the final rule and the proposed rules break down the rule into such distinct provisions and detail the decision-making in each. These decisions typically were made after weighing the delays and costs of more precise modeling against the likely impact of that greater degree of precision on modeling. Because the number of decisions is large and the interaction effects of these decisions are extensive, it is impractical to analyze all possible combinations of possible decisions as to every provision in the rule. Therefore, only those provisions that OFHEO has found to be most significant or controversial have been targeted for analysis in this economic analysis.

b. Baseline

Because the risk-based capital regulation is mandated by Congress, OFHEO was faced with two choices for determining a baseline from which to measure costs and benefits of the regulation. OFHEO could either use a baseline scenario that assumes that the statutory requirement was absent, or a baseline that assumes that the statutory requirement is present but no regulation is adopted. For the purpose of this analysis, OFHEO chose the latter.

The Enterprises have stated publicly that they support the stress test that is embodied in the 1992 Act and implemented by the rule and that they would apply a stress test and maintain

capital in compliance with the 1992 Act voluntarily in the absence of a rule. The baseline scenario assumes, therefore, that each Enterprise constructs a stress test, determines its risk-based capital requirement, and submits the information to OFHEO quarterly. However, these voluntary numbers, which are not produced pursuant to a risk-based capital rule, could not form the basis for the Enterprises' capital classifications. The 1992 Act requires that until one year after OFHEO publishes its risk-based capital regulation, OFHEO must base the capital classifications upon the minimum and critical capital levels only.¹⁸⁰ Consequently, capital classification and supervisory actions related to capital classifications would continue to be based on the minimum and critical capital requirements. The baseline scenario also assumes that, although no standardized risk-based capital data submission would be required, the same types of information would be made available to OFHEO for the purpose of its examination and supervisory responsibilities, including examining the stress tests constructed by the Enterprises and the accuracy of the internal capital requirements produced thereby.

c. Benefits of the Rule

The benefits of the final rule over the baseline scenario are numerous. They accrue to the Federal Government (and hence taxpayers), the Enterprises, homeowners, and capital market participants. The most obvious and important of these benefits to all four groups is a reduced risk of failure of the Enterprises. The Enterprises have a dominant position in the secondary mortgage market and are a major presence in the debt markets. Were either Enterprise to fail, the disruption to the housing and financial markets likely would be significant. It could affect the cost of financing for housing and the availability of new housing, particularly affordable housing. The regulation will reduce the risk of failure by providing objective, conservative, and consistent standards for capital at the Enterprises. It will provide maximum transparency, create greater comparability with the capital requirements for other financial institutions, and allow OFHEO to respond quickly to capital weakness at an Enterprise.

The economic distress of Fannie Mae in the 1979–1985 period was significant and the 1992 Act was, in part, a response to Congressional concern that,

¹⁸⁰ 12 U.S.C. 4614(d).

but for a fortuitous change in interest rates, Fannie Mae might have collapsed, costing investors or the Government billions of dollars. Because of the growth of the Enterprises, a failure today could result in much greater loss. Depending on the response of the Government to such a failure, significant disruption to the financial and housing markets, significant burdens on taxpayers, or both would result. The losses resulting from the savings and loan crisis in the late 1980s, which ultimately were borne by the U.S. taxpayer, are estimated at more than \$100 billion. However, the Enterprises have considerably more dollar exposure than the entire savings and loan industry had in 1986. Also, because of the central role of the Enterprises in the affordable housing market, an Enterprise failure could have adverse impacts on the availability and affordability of housing in many areas of the United States.

The regulation has another important public benefit. A capital standard is likely to be more conservative if it is determined objectively and consistently for both Enterprises in a transparent and evenhanded way by an agency of the Government responsible for their safe and sound operation than if it is determined voluntarily by each Enterprise. The Enterprises, by virtue of their structure, have far less incentive than OFHEO to make conservative choices in the construction of the stress test. They, like other privately owned financial institutions, are subject to shareholder pressure to increase earnings per share. In the absence of substantial market discipline (based on fear of insolvency), a simple way to increase earnings per share is to increase capital leverage, which reduces capital ratios. In addition, non-compliance with the risk-based capital rule subjects an Enterprise to statutory restrictions on capital distributions and to special supervisory measures that could be imposed by OFHEO. Further, in the baseline scenario, the capital requirement for each Enterprise would be determined by a model tailored to that Enterprise's business mix and methods, and there would be no comparability between the two capital standards even if the risk profiles were the same. In sum, shareholder pressures, competitive pressures, and the lack of a binding regulation would likely result in weak and inconsistently applied standards.

Government involvement in and approval of capital standards is essential to create public confidence that they are appropriately stringent, transparent, and fair. Government oversight and

enforcement also foster public confidence that the Enterprises are complying with those standards. It is significant that, at least in the United States, Federal regulators determine the required capital levels for all federally regulated depository institutions. Given the sensitivity of econometric models to changes or variations in the economic analyses and assumptions that underlie them, the public would be appropriately skeptical of a system of risk-based capital standards based on stress tests designed, run, and monitored by the Enterprises themselves.

Further, although OFHEO's risk-based capital regulation falls within that class of regulations that the agency is required to issue notwithstanding the findings of the cost-benefit analysis, no commenters urged OFHEO to support a statutory change to allow self-regulation or eliminate the requirement for risk-based capital rules for the Enterprises. Rather, commenters generally agreed that well defined and stringent capital standards are important to ensuring the safety and soundness of the Enterprises. Moreover, as explained below, the costs of an effective risk-based capital rule are small relative to its significant and apparent public benefits.

A unique benefit of OFHEO's risk-based capital rule is its sensitivity to the credit and interest rate risk in each Enterprise's business. The marginal capital associated with the assets, liabilities and off-balance-sheet instruments of the Enterprises varies, not only based upon the characteristics of the particular instrument, but also based upon the mix of instruments in each Enterprise's portfolio.¹⁸¹ The stress test also takes into account the economic conditions as of the date for which the stress test is run. For example, if housing prices have been rising prior to the as-of date, a given portfolio of seasoned loans will have a lower credit loss experience than if prices have been declining, all other factors held equal. Likewise, current interest rates may have a significant impact on the amount of capital required of an Enterprise, depending upon how well hedged the Enterprise is against interest rate risk.

The existence of a rule that complies with the statutory mandate for notice and comment and replicability will create greater transparency and promote more market discipline than a voluntary system. Further, because OFHEO will design and run the stress test, OFHEO may be able to act more quickly to deal with capital inadequacies that may

arise. Also, the rule is forward-looking, which helps ensure that capital is built up as stressful economic periods develop, before losses occur. As a response to the regulation, OFHEO anticipates that the Enterprises may choose to build up a capital cushion during favorable economic conditions, when capital is inexpensive, to avoid having to raise capital or hedge risk in other ways during tough economic times. The Enterprises have, in fact, increased their capital levels since 1993 in response to the 1992 Act and in anticipation of OFHEO's capital rules. Another benefit of the rule is that it rewards risk reduction by the Enterprises with a lower capital requirement, providing appropriate incentives to the Enterprises to hedge risk.

The transparency of the stress test will improve the ability of market participants to evaluate each Enterprise's risk profile, risk management techniques, and capital adequacy. The existence of an independent and objective evaluation of capital adequacy and the knowledge that prompt supervisory action is available to correct deficiencies are likely to inspire greater investor confidence, which may lower the cost of debt and capital to the Enterprises. To the extent that these savings are passed along to consumers, the regulation may benefit homeowners with lower mortgage costs. To the extent they are not passed along, shareholders will benefit, offsetting, in part, any increase in capital costs. Most importantly, conservative, objectively determined capital standards mean that the Enterprises are more likely to be able to continue to perform their important public purposes, such as purchasing low- and moderate-income residential mortgage loans.

d. Costs of the Rule

OFHEO has also considered whether there are certain costs, tangible and intangible, associated with the regulation—that is, with a system of mandatory rather than voluntary compliance. First, there will be a reporting cost to the Enterprises. As a result of the need to report data in a standardized format there may an initial cost associated with the need to adapt existing computer systems to accommodate the periodic reporting within the regulatory time frames. However, these costs have largely been incurred already as OFHEO has worked with the Enterprises to obtain the data necessary to design and run the stress test.

¹⁸¹ See NPR2 section II.B Sensitivity of Capital Requirement to Risk, 64 FR 18097 (April 13, 1999).

There will be personnel costs to the Enterprises associated with preparation and certification of the quarterly data submissions. However, similar reporting would be required of the Enterprises even in the absence of the risk-based capital regulation, because OFHEO would need much the same data in order to monitor closely the Enterprises' internal modeling of the stress test and to support OFHEO's research and analysis functions. Therefore, there is no certainty that reporting costs to the Enterprises under the regulation will be significantly higher than under the baseline scenario. Further, any possible cost savings to the Enterprises in the baseline approach would be offset by an increase in OFHEO examination time. This increase would occur because, in the absence of a risk-based capital regulation, OFHEO would need to spend considerably more examination resources than are currently budgeted to validate the computer models (including the databases upon which the models are estimated and operated) that the Enterprises construct to run their internal stress tests. Examination of the Enterprises' computer models will continue to be an important aspect of OFHEO's functions after the risk-based capital rule is implemented. However, if risk-based capital were to be determined based upon the output of a single internal model at each Enterprise, that model would require far more intense scrutiny than other business models. Further, OFHEO would still need to maintain its internal modeling capability in order to perform its research and analysis functions under the 1992 Act. The net result would be considerably more expense for OFHEO than the approach in the regulation.

It has been argued that under the voluntary system, the Enterprises might be freer to modify many aspects of the stress test as soon as new data become available, because they would not have to wait for a regulator to determine capital treatments as their businesses change. If this were true, it might allow them to align their capital with risk more quickly than under the regulation. OFHEO views this benefit of a voluntary system as speculative, at best. OFHEO would require sufficient internal controls at the Enterprises to insure that treatments of new activities were appropriately conservative and capital calculations accurate. Moreover, OFHEO has streamlined its procedures to deal with new activities and other modeling issues that arise in order to provide prompt decisions on appropriate treatments. It is not clear that internal systems at both Enterprises

that are designed to do the same thing would be less expensive or time-consuming. It is clear, however, that the determinations made under such internal systems would lack the transparency of similar determinations made by OFHEO. It is also likely that the financial markets would have greater confidence in the objectivity and fairness of decisions of a Federal regulatory agency than in the internal decisions of the Enterprises. Greater confidence in the capital numbers could well reduce the overall cost of debt and capital to the Enterprises.

Each Enterprise could argue that its allocation of capital cost to various individual financial instruments would likely be different under a voluntary system, but each Enterprise allocates capital costs differently and bases those allocations upon numerous business considerations in addition to the capital regulations. OFHEO has found no basis for concluding that the rule would cause the Enterprises to change their internal capital allocations to impose any material additional cost on the various housing programs that comprise a primary mission of the Enterprises. Further, OFHEO has found that the capital requirements in the rule will not increase the cost of housing generally or create other costs to the housing market or the larger economy.

e. Costs and Benefits of Alternatives

The stress test contains many components and OFHEO considered numerous means to design and implement each of them. As explained in section IV.A.1., Introduction, the various combinations of these alternatives are so numerous that it would be impractical to discuss each possible combination. The preambles to the proposals and final rule examine the alternatives related to each individual decision discretely, and the preamble to the final rule analyzes the overall result for reasonableness and compliance with statutory intent. In addition, in the economic analysis below, OFHEO highlights selected issues that could have a significant impact on the amount of capital that an Enterprise might be required to hold and discusses the various alternatives considered as to these core issues.

(i) Determination of the Benchmark Loss Experience

A threshold issue in creating the stress test was determining the rates of default and severity "that occurred in contiguous areas of the United States containing an aggregate of not less than 5 percent of the total population of the United States that, for a period of not

less than 2 years, experienced the highest rates of default and severity of mortgage losses * * *"¹⁸² OFHEO considered numerous alternative statistical methodologies to make this determination. These included various methods for determining what constituted a "contiguous area," different methods for measuring default and severity rates, different potential databases that could be used in the analysis, and different methods of averaging and weighting the data from the two Enterprises.

The 1992 Act provides no guidance to OFHEO as to how a "contiguous area" should be defined. OFHEO decided to define the term to mean a group of contiguous states. Under this definition each state in the area must share a common border with another state in the area—the states could not simply meet at a point. OFHEO considered using smaller units, such as the first two or three numbers of zip codes. In general, the smaller the unit that is used in the aggregation, the higher the benchmark loss rate that would be determined. By connecting pockets of severe losses with narrow parcels of land, OFHEO could have created an area with much higher loss rates than the benchmark loss experience that was identified in NPR1. However, commenters on the issue unanimously supported the use of states as the smallest geographic unit, and suggested that using smaller units would create computational difficulties and likely result in an area that would look "gerrymandered." OFHEO found that conducting analysis at a state level is a common rating agency practice and was the most logical, efficient and reasonable approach to construct a benchmark area. Larger areas, such as Federal Home Loan Bank districts and Census Regions, were considered, but because each of these areas was comprised of a fixed group of states, they did not provide the same flexibility or range of potential areas as OFHEO's approach. Accordingly, they were less likely to identify an area of the country that had experienced sufficiently stressful economic circumstances to be appropriate for the stress test defined in the 1992 Act. OFHEO also considered a Freddie Mac suggestion that would have altered the formula for selecting areas for comparison to include a "compactness" requirement, but determined that this suggestion was inappropriate and unworkable. OFHEO disagreed with Freddie Mac that the proposed methodology did not result in reasonably compact areas. Moreover,

¹⁸² 12 U.S.C. § 4611(a)(1).

Freddie Mac's suggestion would have imposed an additional requirement, "compactness," that goes beyond what the 1992 Act specified and could well preclude identification of an appropriately stressful credit environment.

OFHEO also considered a number of options in deciding how to determine what event would constitute a default and how to measure the severity of a loss for purposes of the benchmark analysis. OFHEO considered including loans that had been subject to "loss mitigation" procedures (which ordinarily indicates that payments are not current on a loan), in addition to loans that resulted in preforeclosure sales, foreclosure, deed-in-lieu, or credit loss. OFHEO decided not to include loss mitigation events as defaults, because data were not adequate to identify them.

OFHEO considered whether to use loss severity rates in the benchmark analysis with or without the effect of mortgage insurance or other third-party credit enhancements taken into account. OFHEO determined that the purposes of the 1992 Act were better served by using loss severity rates without consideration of credit enhancements in determining where and when mortgage losses were highest. The Act requires OFHEO to identify the highest credit losses on mortgages, not the highest net credit losses to the Enterprises. Further, this methodology is more consistent with the stress test in the final rule, which first calculates losses on mortgages and then determines the extent to which those losses are reduced by credit enhancements.

OFHEO based the benchmark determination upon data on the Enterprises' loans. OFHEO considered using other loan data, including databases that were available on Federal Housing Administration loans and credit bureau data. As explained in NPR1, OFHEO decided that the Enterprises' loan data would be the most relevant source from which to determine a benchmark loss experience for the Enterprises. The quality and detail of those data are such that they reflect losses in recent periods as well as or better than data from any other sources. Moreover, using the Enterprises' data eliminates the problem of having to sift out loans that would not be eligible for purchase by the Enterprises or otherwise not be representative of the loans they purchase.

Having determined that the Enterprises' loan data were the best database for the analysis, OFHEO considered which group or groups of loans from that database would be used

to compare the many different state/year combinations that meet the population and contiguity requirements. The Enterprise loan data include information on loans of many different types (fixed rate, adjustable rate, balloon, graduated payment, second mortgages, etc.), supported by various types of residential collateral (single-family detached homes, planned unit developments, condominiums, multifamily buildings, two-to four-unit homes, etc.). OFHEO considered which of these loan and collateral types would be appropriate to include in an analysis of the worst loss experience that met the statutory criteria. In order to have a common loan type for comparison among potential benchmark periods and areas, OFHEO limited its analysis to 30-year, single family, fixed-rate mortgages. This group of loans was chosen because the Enterprises historically have purchased large volumes of them and because they are relatively homogenous, meaning their terms and conditions are relatively uniform as compared to the other loan and collateral types.

OFHEO also considered whether to take the loan-to-value ratio (LTV) of loans into account in determining the benchmark, because this ratio is highly correlated with loan losses. A method of doing so, which OFHEO considered, would determine loss rates by various LTV ranges and then compute overall default or loss rates by assuming some standard distribution of LTV ratios and weighting the LTV-specific loss rates according to this distribution. OFHEO did not use either of these alternative methodologies. Instead, OFHEO decided to compute loss rates for candidate benchmark periods and areas on a dollar-weighted basis only, without regard to LTV, for three reasons. First, in many candidate periods and areas, there were too few loans in some LTV ranges to use the LTV-weighting approach. Second, OFHEO found no acceptable basis for using any specific, standardized LTV weights. Finally, OFHEO was concerned that the LTV weighting approach might be inconsistent with the 1992 Act, because it would not identify the part of the country where mortgage losses were highest.

Other methodological alternatives were considered by OFHEO in the procedures for combining the default and severity rates of the two Enterprises. OFHEO chose to calculate the default and severity rates for each Enterprise separately for each candidate period and area and to use the average of the experience of the two Enterprises. OFHEO also considered averaging the rates based upon the market share of the

two Enterprises, as suggested by the Department of Housing and Urban Development, but finally determined that attempting to determine the historical relative market shares of the two Enterprises would be difficult. Further, OFHEO found the experiences of both Enterprises equally relevant to a determination of the highest rates of default and severity and, for this reason also, decided to weight their data equally.

(ii) General Modeling Approach

This discussion of the general modeling approach focuses on the macro-decisions made by OFHEO in the development of the stress test. Given the importance placed upon aligning capital to risk, OFHEO chose to model the Enterprises' books of business as precisely as possible. Examples of the decisions made by OFHEO that attempt to balance the costs against the benefits of precision are discussed below.

As a threshold matter, OFHEO chose to use a cash flow model that, to the extent possible, determines the cash flows for most instruments according to their terms, taking into account the availability of data and the need to avoid excessive complexity and regulatory burden. OFHEO could have chosen a simpler type of model that calculated gains and losses on most instruments as ratios of a few baseline instruments. For example, OFHEO could have assumed that losses on all other loan types were a fixed multiple of losses on a fixed rate, 30-year, owner-occupied mortgage loan. The benefit of such a model would have been its relative simplicity, but the costs of such an approach would have been a decrease in both the sensitivity of the stress test to risk and the usefulness of the stress test in aligning capital to risk.

Some commenters suggested that OFHEO adopt an approach similar to those adopted by the Farm Credit Administration (FCA) and the Federal Housing Finance Board (FHFB), which involve, to varying degrees, the use of internal proprietary models. OFHEO considered using internal models, but differences in regulatory responsibilities make the FCA and FHFB approaches unworkable for OFHEO. The entire statutory scheme governing the regulation of the Federal Home Loan Banks by the FHFB, including the Banks' ownership and capital structure, is very different from the regulatory framework established by the 1992 Act for the Enterprises. It is, therefore, reasonable to expect that a very different type of capital regulation would be required. The statutory language governing FCA's risk-based capital

regulations for the Federal Agricultural Mortgage Corporation is very similar to the language in the 1992 Act, but, because FCA's regulation applies to only one entity, FCA did not have the same concerns about consistency between Enterprises that OFHEO does. For the purpose of regulating Fannie Mae and Freddie Mac, OFHEO determined that the practical difficulties of implementing and monitoring proprietary, internal models that are consistent with OFHEO's statute more than offset any benefit associated with the use of such models. Most importantly, OFHEO believes that an independently constructed and administered stress test that measures risk consistently in both Enterprises is the best method to insure adequate capitalization of the Enterprises.

(iii) Interest Rates—Yield Curves Considered

The 1992 Act establishes the yield on the ten-year constant maturity Treasury (CMT) precisely, but for other CMTs requires only that they move in patterns and for durations relative to the ten-year CMT that are reasonably related to historical experience and that are determined to be reasonable by the Director. OFHEO interprets this latter requirement to require that the yield curves be reasonable within the context of the stress test and the overall purposes of the 1992 Act.

To select the yield curves, OFHEO examined historical average yield curves subsequent to significant interest rate movements and observed that they were consistently flatter the more the ten-year CMT yield increased and consistently steeper the more the ten-year CMT yield decreased. Consequently, OFHEO selected yield curves that reflect this general tendency. The yield curve in the up-rate scenario is flat for the last nine years of the stress period. In the down-rate scenario, the yield curve is upward sloping.

In selecting the yield curve for the stress test, OFHEO was guided by the general level of stringency of the statutorily prescribed interest rate changes and was mindful of the effect on the relative level of stress of holding the yield curve constant for a period of nine years. In the historical data, OFHEO observed more steeply sloping yield curves than the one selected in the down-rate scenario, and also observed that in periods of rapidly rising rates the yield curve is sometimes inverted. If OFHEO had chosen to hold the yield curve constant at these more unusual slopes, the stress test would have been more stressful than with the yield curves selected. Instead of these yield

curves, which only exist for short periods of time, OFHEO selected yield curves that are more representative of a long-term average after a severe interest rate shock and that are, nevertheless, unusually stressful.

(iv) Interest Rates—50 Basis Point Premium on Enterprise Cost of Funds

Because the stress test at times generates a need for additional funding (for example, when Enterprise debt matures more quickly than loans in portfolio), it was necessary for OFHEO to adopt a decision rule about the rates at which new debt would be issued. NPR2 specified that after the first year of the stress period, a 50-basis-point premium would be added to the projected Agency Cost of Funds to reflect the premium that would be demanded by the market as a result of the credit and interest rate stress conditions. The proposal was based on a review of historical data, which showed a widening of greater than 50 basis points between Enterprise borrowing rates and the ten-year CMT in response to economic stress on another Government-sponsored enterprise. Upon consideration of the comments on this issue and after examination of the relevant historical data and the impact of the premium on capital requirements, OFHEO decided not to apply the premium to the Agency Cost of Funds in the final rule.

OFHEO was not convinced by arguments from commenters that the market would not demand a premium because investors would rely on the implied Federal guarantee and the Federal regulatory structure to prevent failure or because other spreads have allegedly widened by as much or more historically than Government-sponsored enterprises. The data are too sparse to support either of these conclusions. There has been only one, relatively brief, period of time in the early 1980s when one of the Enterprises experienced financial stress approaching the magnitude specified in the stress test. The only other similar event involved the Farm Credit System in the mid-1980s.

However, as some comments noted, it is possible that whatever events might cause a widening of the spread between the Enterprises' debt rates and Treasuries could also widen spreads of other interest rates and Treasuries. These spreads have an important effect on the value of hedging instruments and some Enterprise asset returns, and further consideration of these spreads may be appropriate. Current data are insufficient to determine appropriate spreads to the various non-Treasury

rates in the stress test, and data for determining an appropriate debt premium are sparse. Consequently, OFHEO determined not to include a premium on new debt in the final rule at this time. This is, however, a likely area for future research and for refinement of the rule, because assumptions about these various spreads may comprise an area of significant risk to the Enterprises.

(v) Property Valuation—Inflation Adjustment

The 1992 Act requires that if interest rates rise by more than 50 percent of the average ten-year CMT for the nine months prior to the start of the stress test, losses must be adjusted to account for general inflation. The stress test implements this requirement by increasing house prices by the amount any ten-year CMT, after the upward shock in interest rates, exceeds a 50 percent increase in the average ten-year CMT from the nine months prior to the start of the stress period. This amount is compounded over the remainder of the stress period for a cumulative inflation adjustment and applied during the last 60 months of the stress period.

Some commenters argued that house prices should be increased by the entire amount of the increase in the ten-year CMT, rather than just the component in excess of a 50 percent increase. OFHEO rejected this alternative based on OFHEO's analysis of historical experience of housing prices during periods of general inflation (as explained in the section III.H.1.b., Inflation Adjustment) and because it would have essentially negated the credit stress of the benchmark loss experience.

(vi) Mortgage Performance—General

Models of mortgage performance comprise the central core of the stress test. Models were the most viable means of complying with the statutory requirements that the loss rates produced by the model be reasonably related to the benchmark loss experience and that appropriate distinctions be made among different types of mortgage products. These models calculate prepayment and default rates and the dollar losses associated with the defaults based upon various economic variables. The models were estimated from data on millions of loans that were purchased by the Enterprises between 1975 and 1999. Creating a model that produces reasonable projections of loss under a wide variety of economic conditions and starting portfolio positions was a complex task, which involved extensive

economic analysis and the examination and testing of many different variables. The decisions made by OFHEO in creating the models are discussed in detail in the preambles to NPR2 and the final rule. The most significant of these decisions are summarized below.

(vii) Modeling Conditional vs. Cumulative Rates

Among the threshold issues confronting OFHEO was whether to construct statistical models of conditional rates of loan defaults and prepayments or to adopt a less detailed approach, such as calculating only cumulative rates and distributing them in fixed percentages across the ten years of the stress period. A conditional rate of default or prepayment refers to the volume of loans that default or prepay during any period, expressed as a percentage of the total volume of loans surviving at the start of that period. The term "surviving loans" means those from the group that have not previously prepaid or defaulted. A cumulative rate of default or prepayment is the total percentage of a group of loans that default or prepay during the entire period being studied (such as the ten-year stress period). A group of loans studied over a ten-year period would have a single cumulative default rate, but would have 120 monthly conditional default rates.

Comments regarding this aspect of the model were mixed. In their comments regarding the ANPR, the Enterprises favored using a cumulative rate model of defaults, with Freddie Mac suggesting that a cumulative rate of default be extracted from the benchmark loss experience and the resulting default events be distributed evenly across the stress period. It was argued that the cumulative approach was much simpler and would avoid possibly overstating defaults in the up-rate scenario. Other commenters urged a model of conditional default rates that would take into consideration the differences in prepayment rates in high-rate and low-rate environments. After a conditional default and prepayment rate model was proposed in NPR2, the Enterprises did not object further.

The final rule uses conditional rather than cumulative default rates in the stress test. For single family mortgages, the final rule uses statistical models for the conditional rates of both default and prepayment. For multifamily mortgages, the final rule combines a statistical model of conditional default rates with simple rules for setting conditional prepayment rates. In NPR2, five separate statistical models of conditional multifamily prepayments were

proposed. OFHEO considered comments about the adequacy of the data to support these models, whether the models accurately reflected costs incurred for prepayment within yield maintenance or prepayment penalty periods, and the overall complexity of the models, and decided that statistical models of conditional prepayment for multifamily mortgages would not provide greater precision or risk sensitivity than the simple set of prepayment rules implemented in the final rule.

The advantages of using conditional rates are numerous. This approach automatically accounts for the impact of prior defaults on the number of loans remaining active and subject to the risk of prepayment, and, conversely, the impact of prior prepayments on the number of loans remaining subject to the risk of default. This feature is essential to developing a reasonable representation of Enterprise mortgage cash flows across the different economic scenarios envisioned by the stress test. It also avoids potential numerical anomalies that might arise when total or annual defaults during the stress test are fixed, such as years in which total defaults would exceed total surviving loans due to high prepayment levels in the declining rate scenario of the stress test. Also, the periodic nature of mortgage payments, scheduled amortization, and the coupon adjustments on adjustable rate loans, all of which affect mortgage performance, require a model that predicts an exact number of default and prepayment events in each discrete time period of the stress test.

OFHEO believes that a statistical model of conditional defaults and prepayments is more accurate and more sensitive to stress test economic factors, and to the Enterprises' starting books of business, than are simpler methods that might be developed. Each quarter the test is applied, a statistical model can account for changes in economic conditions (such as the level and shape of the Treasury yield curve or recent trends in house prices) and the composition of an Enterprise's business since the last time the test was performed. That is, the rates of default and prepayment applied when the stress test is run are adjusted to reflect current circumstances. Such adjustments are particularly important because mortgage prepayment and default rates are highly time-dependent, characteristically increasing during the first years following origination, peaking sometime between the fourth and seventh years, and declining over the remaining years.

However, this time-dependent pattern is itself affected by economic conditions.

Another advantage of modeling conditional default and prepayment rates is the support this approach provides for the proper treatment of loss severity. Loss severity is affected significantly by factors that affect the timing and amount of defaults in the stress test. Loss of loan principal balance, the single largest cost element in determining loss severity, is dependent upon house price declines, which are dependent upon economic conditions leading up to the date of default. Funding costs are also affected by the changing interest rates in the stress test. For all of these reasons, using conditional default and prepayment rates during each month of the stress period greatly improves the sensitivity of the stress test to risk factors.

(viii) Use of Joint Default/Prepayment vs. Total Termination Models

Another key issue for OFHEO was whether or not to use joint prepayment and default models, in which the conditional rates of default and prepayment interact statistically, or to use some simpler assumptions about how default and prepayment rates relate to each other in the stress test.

Fannie Mae favored the use of a statistical model that would determine only total terminations (defaults plus prepayments) in each of the two stress test scenarios. The Enterprise further commented that total defaults in each scenario be set at levels that occurred in the benchmark loss experience. Prepayments would be calculated by subtracting total defaults from total terminations. Fannie Mae viewed this approach as consistent with industry practice and asserted that it would be easier for the company to manage a capital standard based on such an approach than one based upon a joint statistical model.

Freddie Mac commented that a joint statistical model of default and prepayment rates would be preferable to total termination models in the stress test context because (1) joint models ensure that defaults and prepayments correctly "add up" to total mortgage terminations, (2) total termination models put undue focus on interest rate movements because default is a small part of total termination under normal conditions (an assumption Freddie Mac found unwarranted in a stress test environment), and (3) standard total termination models capture small effects such as seasoning that would unnecessarily complicate the stress test. However, Freddie Mac did not recommend that OFHEO use joint

statistical models in the stress test, asserting OFHEO would have difficulty using the data from the benchmark loss experience to estimate the models. Instead, Freddie Mac recommended estimating a statistical equation for prepayments based on historical data from a distressed region to factor prepayments into the stress test, while using cumulative default rates from the benchmark loss experience as the stress test default rates.

As discussed in greater detail in section III.I.1.a., Modeling Approach, the final rule uses joint statistical models in the stress test for single family loans, reflecting the recommendations of many other commenters.¹⁸³ In doing so, OFHEO recognized that models of mortgage performance are actually models of borrower behavior—individual borrowers' decisions whether to continue making monthly mortgage payments, to prepay, or to default. This "options theoretic" conceptual framework, which underlies the joint determination of defaults and prepayments, is the basis for nearly all mortgage performance research. In sum, the joint modeling approach is based on well known and accepted statistical methods that are widely applied in mortgage performance research. Researchers have found multi-choice statistical models to be necessary for this research, because the borrower's options to default or prepay are interrelated.

OFHEO considered the use of total terminations models, such as those recommended by Fannie Mae's comments on the ANPR, but found joint statistical models superior for theoretical reasons noted above and also for reasons cited by Freddie Mac in its comments. However, Freddie Mac's recommendation to estimate statistical prepayment equations using historical data from a distressed region while using the cumulative default rates from the benchmark loss experience was also determined by OFHEO to be inadequate for the purposes of the regulation. Instead, OFHEO addressed Freddie Mac's concern about the use of joint models—specifically, the difficulty of retaining a reasonable relationship to the benchmark loss experience—in OFHEO's decisions to adjust the

underlying default and severity equations to replicate the benchmark loss experience, as noted below.

(ix) Relating Mortgage Loss Rates to the Benchmark Loss Experience

One of the challenges in developing a suitable model of mortgage performance was the statutory requirement that the stress test retain a reasonable relationship to the benchmark loss experience, while also taking into consideration a variety of variables such as house price changes, loan seasoning, and loan type. Ultimately, OFHEO chose to relate the stress test losses to the benchmark loss experience in two ways. First, the rule applies certain economic factors from the benchmark area and time period—specifically, house prices, rent growth rates and rental vacancy rates—in the stress test. Second, OFHEO applied the single family mortgage model to the loans used to determine the benchmark, broken down by loan-to-value ratio (LTV) category and using the actual interest rates from the benchmark period. The default and severity rates predicted by the model were then compared to the higher actual benchmark rates for each LTV category. Ratios of actual to predicted rates for each category are applied in the default and severity equations used in the stress test to increase credit losses to a level reasonably related to the benchmark loss experience.¹⁸⁴ Modeling the effects of differences in starting coupons and interest rates from the benchmark loss experience was possible because OFHEO's database allowed the models to be estimated based upon a broad and representative sample of historical mortgage performance data. The statistical equations therefore yield reasonable estimates that can be used to project mortgage prepayment under many different circumstances, including stress test interest rate scenarios.

There were many different alternatives that OFHEO could have selected to relate stress test loss rates to the benchmark loss experience. For example, comments on the ANPR suggested that OFHEO apply the cumulative default rate from the benchmark loss experience directly to the current books of business in the stress test. OFHEO considered this option, which seems simpler in concept than predicting conditional default probabilities. However, OFHEO determined that attempting to make adjustments to benchmark default levels

to take into account the various factors specified in the statute and other appropriate factors would be more complex and less likely to yield reasonable capital requirements than the approach selected. OFHEO also considered an approach, which was proposed in NPR2, that would apply the same benchmark adjustment or calibration factor to all single family loans regardless of the LTV category. Although simpler than the final rule, this approach was criticized by many commenters for failing to take into consideration the mix of LTVs in the benchmark loss experience, because the difference between model predictions and the actual loss rates in the benchmark loss experience varied significantly between LTV categories. Accordingly, in the final rule, different benchmark adjustment factors are applied for each LTV category.

To summarize, the methodology OFHEO selected relates losses in the stress test to the benchmark loss experience in a manner that is reasonable within the context of the entire stress test. More specifically, the mortgage performance models, with the benchmark adjustments, not only generate loss rates that are consistent with the benchmark loss experience, but also produce reasonable loss rates under a wide variety of starting positions under both the up-rate and down-rate scenarios. No alternative has been suggested that, in OFHEO's view, would accomplish these objectives as well as the final rule.

(x) Single Family Mortgage Performance

(a) Default and Prepayment Variable Selection

In selecting appropriate variables to project single family default and prepayment rates during the stress test, OFHEO considered only variables that had strong intuitive as well as statistical causal relationships with mortgage defaults or prepayments. As reflected in Table 8, certain variables that strongly influenced prepayment behavior did help to explain defaults. All three single family models simulate defaults and prepayments based on projected interest rates and property values and on variables capturing the mortgage risk characteristics described below.

¹⁸³ OFHEO found it necessary to use a simpler methodology for multifamily loans. Because the multifamily model utilizes a set of prepayment rules, the model is "joint" only to the extent that conditional prepayment and default rates combine to determine loans that survive from year to year. Conditional rates of default and prepayment are determined separately. See section III.I.3., Multifamily Loan Performance.

¹⁸⁴ Multifamily loan data are too limited to allow an adjustment factor to be developed for those loans.

TABLE 8.—SINGLE FAMILY DEFAULT & PREPAYMENT VARIABLES

Variables for All Single Family Models	Single Family Default Variables	Single Family Prepayment Variables
Mortgage Age ...	X	X
Original LTV	X	X
Probability of Negative Equity	X	X
Burnout	X	X
Occupancy Status	X	X
Relative Spread		X
Yield Curve Slope		X
Relative Loan Size		X
Product Type (ARMs, Other Products only)	X	X
Payment Shock (ARMs only) ..	X	X
Initial Rate Effect (ARMs only)	X	X

- **Mortgage Age**—Patterns of mortgage default and prepayment have characteristic age profiles; defaults and prepayments increase during the first years following loan origination, with a peak between the fourth and seventh years.

- **Original LTV**—The LTV at the time of mortgage origination serves as a proxy for factors relating to the financial status of a borrower, which reflects the borrower's future ability to make loan payments. Higher original LTVs, which generally reflect fewer economic resources and greater financial risk, increase the probability of default and lower the probability of prepayment. The reverse is true for lower original LTVs.

- **Probability of Negative Equity**—Borrowers whose current loan balance is higher than the current value of their mortgaged property (reflecting negative borrower equity) are more likely to default than those with positive equity in their properties. The probability of negative borrower equity within a loan group is a function of (1) house price changes (based on the HPI) and amortization of loan principal, which together establish the average current LTV, and (2) the dispersion of actual house prices around the HPI value.

Thus, even when the average current LTV for a loan group is less than one (positive equity), some percentage of the loans will have LTVs greater than one (negative equity).

- **Burnout**—This variable reflects whether a borrower has passed up earlier opportunities to refinance at favorable interest rates during the previous eight quarters. Such a borrower is less likely to prepay the current loan and refinance, and more likely to default in the future.

- **Occupancy Status**—This variable reflects the higher probability of default by investor-owners compared with that of owner-occupants. The RBC Report specifies the proportion of investor loans for each loan group.

- **Relative Spread**—The stress test uses the relative spread between the interest rate on a loan and the current market rate on loans as a proxy for the mortgage premium value, which reflects the value to a borrower of the option to prepay and refinance.

- **Yield Curve Slope**—This variable measures the relationship between short and long term interest rates. The shape of the yield curve, which reflects expectations for the future levels of interest rates, influences a borrower's decision to prepay a mortgage.

- **Relative Loan Size**—This variable reflects whether a loan is significantly larger or smaller than the State average. Generally, lower balance loans are less likely to refinance (and therefore prepay) because refinancing costs are proportionately larger, and the interest savings are proportionately smaller, than a larger balance loan.

- **Product Type**—The differences in performance between 30-year fixed-rate loans and other products, such as ARM and balloon loans, are captured by this variable.

- **Payment Shock**—This variable captures the effect of increasing or decreasing interest rates on the payments for ARMs. Although a borrower with an ARM loan may still have positive equity in the mortgaged property, the borrower may be unwilling or unable to make a larger monthly payment when interest rates increase, resulting in increases to ARM default and prepayment rates. Conversely, decreasing interest rates make it easier and more desirable for borrowers to make monthly payments, resulting in lower ARM default and prepayment rates.

- **Initial Rate Effect**—Borrowers with ARM loans with a “teaser rate” (an initial interest rate lower than the market rate) may experience payment shock, even if market rates do not rise, as the low teaser rate adjusts to the

market rate over the first few years of the loan. The stress test includes a variable which captures this effect in the first three years of the life of the loan.

OFHEO considered using a number of other variables in both the default and prepayment equations that had been suggested by commenters or that appeared to explain default or prepayment rates, but found them inappropriate for the stress test for various reasons. Unemployment rates were suggested by several commenters as an appropriate variable, but, as explained in the preamble to NPR2, OFHEO chose not to make assumptions about macroeconomic factors, such as unemployment, that are not specified or required by statute. To use unemployment as a variable, OFHEO would have to create a model of unemployment rates or apply simpler assumptions about unemployment rates through the stress period. OFHEO is not convinced that adding this additional complexity would improve the rule's sensitivity to risk or otherwise enhance the rule. Further, the macroeconomic factors of the benchmark area and time period are captured implicitly to some extent by relating default and prepayment rates to the benchmark loss experience. Where, however, the 1992 Act required OFHEO to consider economic factors, such as house prices and interest rates, and OFHEO found those factors strongly correlated with mortgage performance, OFHEO incorporated them as variables in the models.

The season-of-the-year variable, originally found useful in estimating the single family default model, did not improve results when the model was reestimated for the final rule. Another variable, relative loan size, which was found significant and included in the model for prepayments, was determined not to have a significant impact on defaults.

OFHEO considered comments suggesting that the LTV variable should provide for further disaggregation of high LTV loans. OFHEO also considered comments recommending the creation of variables to account for the use of credit scoring and for subprime lending, structured mortgages (in which a second mortgage is created coincident with the first), assumable loans, and loans that were seasoned (as opposed to newly-originated) at acquisition. Although there is good reason to believe that these factors influence mortgage performance, OFHEO found the data and research insufficient to incorporate any of these factors into the stress test at this time. For example, OFHEO expects that

automated credit scoring may result in lower default rates, but the lack of data regarding the impact of credit scoring during economic experiences equivalent to the benchmark loss experience makes it difficult to assess to what extent lower recent default rates observed on credit-scored mortgages would continue during such difficult times. As more data become available, OFHEO will explore the significance of these and other new variables and will continue to consider refinements to the variables that are included currently in the rule. Where appropriate, OFHEO will consider modifying the stress test to take them into account. OFHEO recognizes that to remain sensitive to risk, the stress test must constantly be reevaluated, updated, and refined to accommodate changes in the Enterprises' businesses and the state of the art in modeling and risk management. The research and analysis necessary to retain appropriate sensitivity to risk in the regulation is central to the mission of OFHEO.

(b) Respecification of ARM Model

OFHEO considered two general alternatives in the modeling of single family adjustable rate mortgages (ARMs). One possible approach was a simple model based upon fixed multiples of the 30-year fixed rate mortgage (FRM) performance. The other alternative required estimating a separate model for ARM performance. The fixed multiple approach, although simpler to apply and calculate, failed to take into account the very different default and prepayment patterns that apply to ARMs as compared to FRMs. In other words, it is inaccurate to assume that ARM prepayments and defaults will always be a fixed percentage higher or lower than on FRMs. Accordingly, OFHEO chose to develop a separate model of ARM performance that takes into account the variables, such as payment shock when rates adjust, that uniquely affect ARM performance.

In the final regulation, OFHEO reestimated and respecified the NPR2 ARM models using a pooled dataset of ARMs and 30-year FRMs in order to compensate for lack of computational detail in Enterprise data for ARM loans and to respond to comments about the insensitivity of the NPR2 ARM model to payment shock. This reestimation corrected an under-representation of ARM defaults and prepayments in the data on which the NPR2 model had been estimated. The respecified ARM model includes the same set of explanatory variables as the 30-year FRM model, along with three additional variables unique to ARMs. The

additional variables account for differences in ARM performance relative to 30-year FRMs due to payment shock, initial (teaser) rate effects, and ARM product type (to capture other performance differences).

(xi) Multifamily Mortgage Performance

Modeling multifamily loans presented unique challenges for OFHEO, particularly in light of the lack of clear statutory guidance. When the 1992 Act was being considered by Congress, multifamily lending comprised a relatively small portion of the Enterprises' total business. In fact, Freddie Mac had discontinued multifamily lending altogether at that time. Consequently, no special provision was made for multifamily loans; the statute generally treated multifamily loans as just another type of single family loan. Through the 1990s, however, multifamily lending has grown in importance at both Enterprises and has become a key element in their strategies to meet affordable housing goals. What also became clear during that period is that multifamily loans perform very differently than single family loans. Default and prepayment behavior of commercial multifamily borrowers is affected by different factors than single family residential borrowers. Hence, models designed to simulate the performance of single family loans are not necessarily appropriate for multifamily loans and vice versa. Accordingly, OFHEO was required to build a stress test that complies with the requirements of the 1992 Act (which are oriented toward single family lending), but nevertheless includes a multifamily performance model that is sensitive to the risks associated with multifamily loans. OFHEO achieved this goal by basing the model on the same geographical region and time period used for the single family model, but exercising appropriate discretion to ensure that the stress level for multifamily loans is consistent with that for single family loans. OFHEO was particularly mindful of comments on NPR2 that highlighted inappropriately low loss rates for certain categories of multifamily loans, which would have had the effect of creating perverse business incentives for an Enterprise. The final rule is based upon a reestimated model that addresses these and other concerns raised by commenters, as further explained below.

(a) Multifamily Defaults

OFHEO considered many potential variables and combinations of variables in constructing the multifamily default

model. Given the increasing importance of multifamily lending to the Enterprises, OFHEO sought to improve, where possible, upon previous models of multifamily loan loss behavior and has spent several years testing and evaluating the factors that affect losses on these loans. In this regard, OFHEO's proposed rule included the "double trigger" variable, which was designed to measure the likelihood that a particular loan was experiencing two important determinants of default, negative cash flow and negative equity, simultaneously. This variable was based upon the premise that a rational business person would be less likely to default on a loan so long as the property had either positive equity or positive cash flow. Although the underlying premise still appears sound, OFHEO found after further research, conducted in response to comments, that the proposed means of projecting multifamily property values during the stress period resulted in unrealistic volatility in property values and unreasonable loss projections for certain categories of loans. Accordingly, in the final rule, OFHEO has modified the multifamily default model to eliminate one of the "triggers" and uses current debt service coverage ratio or "DCR," a measure of net cash flow, by itself as a variable. In addition, OFHEO has included a variable that adjusts for the increased probability of default when net cash flow is negative and a variable that reflects the direct relationship between LTV at loan origination and the subsequent likelihood of default. As explained in the preamble to the final rule, these three variables capture essentially the same mortgage performance factors that the double trigger was designed to capture, but avoided the difficulties of projecting multifamily property values over time.

OFHEO also recognized that additional variables were necessary to account for the fact that the Enterprises underwent major and permanent changes to their multifamily loan programs beginning in 1988 (Fannie Mae) and in 1993 (Freddie Mac). Freddie Mac, in particular, had losses so severe on early multifamily loans that it suspended its multifamily lending entirely until its programs could be completely overhauled. Fannie Mae's multifamily lending programs have undergone similar changes, but somewhat more gradually, since approximately 1988.

In NPR2, OFHEO employed two default models to distinguish between the Enterprises' loan programs—Negotiated Transactions (NT) and Cash. Further, a program restructuring

variable captured the improved performance of multifamily cash loans after the changes in loan programs described above. Commenters on these models recommended that the two-model approach be dropped, because the distinction between the two categories of loans was too difficult to define and replicate. All commenters on the subject concurred that the underwriting and servicing practices of the Enterprises underwent major and permanent changes that should be reflected in the stress test. These comments came not only from the Enterprises, but also from multifamily seller-servicers, who were concerned that imposing inappropriately large marginal capital costs on multifamily loans would adversely affect seller-servicers, who should be given credit for the many improvements they had made in originating and servicing multifamily loans.

In response to the comments, OFHEO created a single multifamily default model that utilizes two variables to distinguish between multifamily loan programs. The first of these variables distinguishes loans based upon their date of origination, crediting loans originated under more recent programs at both Enterprises with lower default rates.¹⁸⁵ The second variable identifies a subset of the newer loans that were purchased under certain programs at the Enterprises that include more rigorous and conservative underwriting and servicing policies. These loans receive additional favorable default treatment. OFHEO believes that the revised variables accomplish the purpose of distinguishing the less risky loan programs and product types from other more risky loan programs and product types better than the variables used in NPR2. OFHEO further believes that these variables create appropriate capital incentives for the Enterprises to improve risk-management in all their multifamily lending programs.

(b) Multifamily Prepayments

OFHEO considered two alternative means to model multifamily loan prepayments. In NPR2, OFHEO proposed five statistical models of prepayments that were used for different types of multifamily loans. These models were similar in some respects to the prepayment model used for single family loans. None of the comments supported this approach and many were highly critical of it.

¹⁸⁵ Adjustable-rate loans and fixed-rate balloon loans exhibited improve performance, but less than fixed-rate fully amortizing loans. Therefore, different variables are used for these different loan types.

Commenters pointed out that multifamily loans are very different from single family loans and that assumptions that are incorporated into single family loan models may be inappropriate for multifamily loans. Commenters also argued that the prepayment models were overly complex in the number and treatment of variables. The Enterprises both recommended that the final rule eliminate much of the complexity of the proposal in favor of using fixed prepayment percentages for each month of the stress test.

OFHEO considered these comments, studied the operation of the prepayment model and reviewed the current literature regarding prepayments. Given the limitations in relevant data, OFHEO concluded that the commenters were correct, that a statistical model would not provide greater precision or risk sensitivity than a fixed schedule of prepayments for each of the two interest rate scenarios. Accordingly, the final rule adopts such a schedule.¹⁸⁶

(c) Multifamily Loss Severity

To determine appropriate multifamily loan loss severity rates, OFHEO considered a number of alternatives. In NPR2, OFHEO proposed six separate calculations for different categories of loans. In estimating these calculations, OFHEO utilized data from Freddie Mac's multifamily loans originated in the 1980s. While agreeing with the general methodology, some commenters argued that it was inappropriate to use these Freddie Mac data to estimate severity rates. They suggested that OFHEO add more recent severity data to the sample used to determine severity rates. In developing the final rule, OFHEO considered this alternative, but decided to continue using the Freddie Mac data from the 1980s to determine loss severity rates. OFHEO concluded that these data represented an appropriately stressful experience from which to extract severity rates. To the extent that later loan programs have experienced lower severity rates, data are inadequate to determine how much of the difference is due to improvement in loan programs and how much is due to differences in economic conditions. OFHEO also considered, as an alternative to the NPR2 approach, reducing the six severity calculations to a single equation. In the final rule,

¹⁸⁶ In the up-rate scenario, the final rule includes no prepayments. In the down-rate scenario, the final rule applies a two percent annual prepayment rate to loans that are subject to prepayment penalty provisions and a 25 percent annual rate to loans that are not subject to these provisions or to loans after the provisions have expired.

OFHEO implemented this alternative, because it simplified the stress test with no demonstrable loss of sensitivity to risk.

(xii) Counterparty Haircuts

In addition to mortgage credit quality, the stress test considers the creditworthiness of companies and financial instruments to which the Enterprises have credit exposure. These include most mortgage credit enhancement counterparties, securities held as assets, and derivative contract counterparties. The stress test gives credit only to investment grade counterparties.

For these contract or instrument counterparties, the stress test reduces—or applies “haircuts” to—the amounts due from these instruments or counterparties according to their level of risk.¹⁸⁷ The level of risk is determined by public credit ratings at the start of the stress test, classified into five categories: AAA, AA, A, BBB and unrated/below BBB. When no rating is available or the instrument or counterparty has a rating below BBB (below investment grade), the stress test applies a 100 percent haircut in the first month of the stress test, with the exception of unrated seller/servicers, which are treated as BBB. For other categories, the stress test phases in the haircuts monthly in equal increments until the total reduction listed in Table 9 is reached five years into the stress period. For the remainder of the stress test, the maximum haircut applies.

TABLE 9.—STRESS TEST FINAL HAIRCUTS BY CREDIT RATING CATEGORY

Ratings Classification	Derivative Contract Counterparties	Nondervative Contract Counterparties or Instruments
AAA	2%	5%
AA	4%	15%
A	8%	20%
BBB	16%	40%
Unrated/Below BBB ¹	100%	100%

¹ Unrated, unsubordinated obligations issued by Government-sponsored enterprises other than the reporting Enterprise are treated as AAA. Unrated seller/servicers are treated as BBB. Other unrated counterparties and securities are subject to a 100% haircut applied in the first month of the stress test.

¹⁸⁷ In the case of swaps, the stress test cancels a portion of “in-the-money” swaps based on the haircut amount.

OFHEO considered a number of alternatives to the haircuts in the final rule. NPR2 proposed a schedule of non-derivative haircuts that were approximately double those in the final rule, but were phased in over ten years rather than five.

In response to comments that those counterparty haircuts were too severe, OFHEO conducted extensive analysis of the historical data, including some updated rating agency data and studies submitted by commenters. As a result, haircuts were lowered. However, OFHEO determined that phasing the haircuts in more quickly would be more consistent with the probable impact on counterparties of stress test conditions. Also in response to comments regarding the proposed rule, OFHEO added a category that increased the haircuts on below-investment-grade and unrated counterparties. However, OFHEO decided to except unrated seller-servicers from this new category, continuing the NPR2 treatment of them as triple-B counterparties. OFHEO found this exception warranted because of (1) The seller-servicers' close and ongoing relationships with the Enterprises, (2) the types of controls available to the Enterprises under their seller-servicer contracts, and (3) factors other than lack of creditworthiness that may account for seller-servicers not having a rating, such as their small size. In the future, OFHEO will consider how Enterprise internal ratings can be used to make finer, but consistent, risk distinctions between such seller-servicers.

(xiii) New Debt

NPR2 specified that when the stress test resulted in a cash deficit requiring the issuance of new debt, all such debt would have a six-month maturity. OFHEO considered comments recommending a balance of long- and short-term debt to reflect better the rebalancing strategies that the Enterprises would be likely to follow. OFHEO agrees with the comments that a mix of long and short maturities may be more appropriate, but disagrees with those commenters who suggested that the stress test specify the issuance of primarily long-term debt as interest rates rise and short-term debt as they fall. OFHEO did not believe this approach would create a reasonable model of the reactions of the Enterprises to interest rate shocks, especially because the Enterprises do not manage their debt issuances in this manner. Moreover, it would have created interest rate hedges in both scenarios that were not appropriate. However, the Enterprises do generally manage the

maturities in their debt portfolios to achieve a balance in the entire portfolio and OFHEO selected a similar approach to issuing new debt in the stress test. OFHEO constructed the stress test to add either long- or short-term debt as required to achieve and maintain a 50/50 balance of long- and short-term debt. The 50/50 balance was selected because it is more risk-neutral than the proposed approach, and because OFHEO will not try to model an Enterprise's internal predictions about whether interest rates will go up or down.

OFHEO also considered whether to change the short-term debt from a six-month maturity to a one-month maturity, as suggested by some commenters, but determined that a six-month rate is more representative of the mix of short-term maturities issued by the Enterprises. OFHEO also considered a commenter's suggestion to use a ten-year maturity for the long-term debt, but determined that a five-year callable bond was a more representative proxy for the typical mix of long-term Enterprise debt than ten-year bullet debt.

(xiv) Operating Expenses

The proposed decision rule for operating expenses was that these expenses would decline in proportion to the decline in the mortgage portfolio. Specifically, the operating expense for a given month was determined by multiplying the ratio of assets remaining at the end of each month to assets at the beginning of the stress test by one-third of the Enterprise's total operating expenses in the quarter immediately preceding the start of the stress test. No distinction was made between fixed and variable expenses. This treatment caused the expense reduction pattern for the up-rate scenario to differ from the down-rate scenario and within each scenario depending on the changes in the characteristics of an Enterprise's total mortgage portfolio.

The final rule reflects OFHEO's consideration of comments regarding the proposed rule, which linked operating expenses directly to the size of the mortgage portfolio, assumed all operating expenses were variable, did not exclude a portion of expenses associated with new business, and tied operating expenses to the previous quarter's operating expenses. The final rule modifies the proposal in only two respects. To recognize that operating expenses are partly fixed and partly variable, one third of each Enterprise's operating expenses at the start of the stress test remain fixed throughout the stress period, while the remainder declines in proportion to the decline in

the mortgage portfolio. Secondly, a reduction of one third in the total of the fixed and variable components has been included to recognize that a cessation of new business would have a significant impact upon operating expenses. That reduction is phased in on a straight-line basis over the first 12 months of the stress period, because it would take an Enterprise at least that long to implement such a reduction. An impact of these changes is to reduce the differences in operating expenses between the up- and down-rate scenarios. OFHEO considered the Enterprises' recommendation that the stress test use a fixed expense ratio between 1.5 and 5.0 basis points of unpaid principal balance per year, but believed such a ratio would be unreasonably low, because, as one commenter noted, the ratio of Enterprise expenses to outstanding mortgage-backed securities and portfolio balances has averaged over 7.0 basis points for the past ten years. OFHEO also considered a commenter's recommendation to hold the level of expenses constant throughout the stress period based on the experience of financial institutions under stress. Although this argument has intuitive appeal for some types of financial institutions, adopting such an approach would have resulted in unreasonably high capital requirements relative to operating expenses in OFHEO's stress test. The approach in the final rule, which fixes only a portion of the expenses, seemed more appropriate for the Enterprises.

(xv) Distinction Between Preferred and Common Stock Dividends

The final rule adopts the proposed treatment of dividends, distinguishing between preferred stock and common stock by allowing the payment of preferred stock dividends as long as an Enterprise meets the minimum capital requirement, while terminating the payment of common stock dividends after the first year of the stress test. The payout rate (dividends as a percentage of earnings) is based on the trend in earnings. If earnings are increasing, the dividend payout rate is equal to the average of the payout rate of the preceding four quarters. If earnings are not increasing, the dividend payout is based on the preceding quarter's dollar amount of dividends per share. The final rule also modified the proposal to include repurchases of stock in the first two quarters of the stress period, based upon any such repurchases within the previous four quarters.

OFHEO considered and rejected a suggestion to lengthen the look-back

period used to determine payout ratios from one to three years. OFHEO recognizes a shorter look-back period may add volatility in the capital requirement, but determined that relating the payout to the experience of the last four quarters is more appropriate because it is more reflective of current policies, because dividends are only paid for one year in the stress test, and because market considerations generally cause companies to be cautious in making changes to dividend policies. Relating dividend payouts to recent dividend payout experience is also more consistent with the need to provide a timely early warning of potential capital deficiencies. For similar reasons, OFHEO also rejected a proposal to use a long-term industry average dividend rate of approximately 25 percent of earnings. Also, a review of the Enterprises' payout ratios over a ten-year period revealed that such payouts would frequently not have been reflective of reality for each Enterprise.

(xvi) Capital Calculation

To calculate the amount of capital that an Enterprise would need just to maintain positive capital during the stress test, the final rule discounts the monthly capital balances back to the start date of the stress period and adjusts the starting capital by the lowest of the discounted capital balances. This approach converts future surpluses or deficits into current dollars. OFHEO also considered an approach that would use a series of iterative simulations to adjust the Enterprise's balance sheet until a starting level of capital was found that was just sufficient to maintain positive capital throughout the stress period. Either approach would ensure that an Enterprise would have enough capital to survive the stress test regardless of when losses associated with management and operations risk might occur, even if that were the first day of the stress period. OFHEO adopted the discounting approach because it is much simpler to design and replicate.

OFHEO rejected a recommendation by the Enterprises to assume that the amount of capital needed was the simple result of subtracting the maximum undiscounted amount of total capital consumed during the stress period from the starting position total capital. Such an approach is easier to implement, but it does not take into account the time value of money and would not ensure that the Enterprises hold capital sufficient to survive the stress test if management and operations losses occurred at any time during the ten-year stress period. Also, OFHEO

believes that a present-value approach is preferable because it requires an Enterprise to create a greater capital cushion (as compared to the Enterprises' recommendation) when credit risk and interest rate risks are relatively low, making it more likely that an Enterprise can survive subsequent, more stressful periods.

5. Analysis of Relative Costs and Benefits

The 1992 Act presumptively determined that the benefit/cost ratio favors a detailed and complete stress test and risk-based capital regulation such as that in the final rule, and OFHEO has found no reason to question that judgment. The nation faces huge potential liabilities and economic disruption if the Enterprises are allowed to operate in an undercapitalized state, and all parties agree that a clear capital standard that is also sensitive to risk is an important tool for avoiding undercapitalization.

OFHEO has balanced the cost of capital or other forms of risk mitigation against the risk of loss in the Enterprises' operations and designed a risk-based capital rule that requires adequate capital or risk mitigation for activities that pose credit or interest rate risk, while not imposing inordinate costs on any area of the Enterprises' business. That is, the stress test reflects incremental capital charges associated with the Enterprises business activities that are consistent with risk. The stress test imposes higher capital costs on new activities and unusual activities for which the Enterprises lack adequate data about risks than on activities for which sufficient data is available to model them precisely. These higher costs help to insure that there is adequate capital for the risks that may be associated with the new or unusual activities and provide appropriate incentives for the Enterprises to maintain top quality data on all activities and to pay close attention to risk management. To the extent that requiring adequate capital may prevent certain innovations from being rushed to market before their risks are fully understood, OFHEO believes that result is appropriate.

In any event, OFHEO does not believe that the regulation will impede innovation and the timely introduction of new activities. The regulation provides a flexible and responsive procedure that has been designed to develop appropriate capital treatments as the Enterprises bring products to market. Moreover, when engaging in activities in which the financial risks are not fully understood, an Enterprise

should hold capital (or utilize some type of risk mitigation) sufficient to cover the risks that might be associated with them. Prudent risk management under a voluntary system would require the same, and OFHEO's rule is designed to provide a regulatory incentive for prudent risk management. Further, even in the absence of a risk-based capital rule, OFHEO's safety and soundness examinations would require similarly conservative treatments of activities that pose risks that cannot be quantified accurately.

OFHEO has not performed more detailed analyses of the relative costs of a voluntary versus a mandatory system, because the 1992 Act does not make voluntary risk-based capital an option. However, if the Enterprises were to design and run the stress test internally, OFHEO's costs might be higher than otherwise, because of the need to monitor and examine two separate systems. Therefore, OFHEO views the net difference in cost between a voluntary versus a mandatory risk-based capital system as likely to be *de minimus*.

B. Executive Order 13132, Federalism

Executive Order 13132 requires that Executive departments and agencies identify regulatory actions that have significant Federalism implications. "Policies that have Federalism implications" are defined as regulations or actions that have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities between the various levels of government. The agency certifies that this rule has no such Federalism implications.

C. Executive Order 12988, Civil Justice Reform

Executive Order 12988 sets forth guidelines to promote the just and efficient resolution of civil claims and to reduce the risk of litigation to the government. The rule meets the applicable standards of sections 3(a) and (b) of Executive Order 12988.

D. 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 must include a regulatory flexibility analysis describing the rule's impact on small entities. Such an analysis need not be undertaken if the agency head certifies that the rule will not have a significant economic impact on a substantial number of small entities. 5 U.S.C. 605(b).

OFHEO has considered the impacts of the risk-based capital regulation under the Regulatory Flexibility Act. The regulation does not have a significant effect on a substantial number of small entities since it is applicable only to the Enterprises, which are not small entities for purposes of the Regulatory Flexibility Act. Therefore, the General Counsel of OFHEO, acting under delegated authority, has certified that the regulation will not have a significant economic impact on a substantial number of small entities.

Although not expressly referencing the Regulatory Flexibility Act, a trade association representing credit unions requested that OFHEO address the regulation's impact on its members. OFHEO has determined that such an analysis is not required. The Regulatory Flexibility Act requires such an analysis only for entities the agency has direct statutory authority to regulate. In this case, OFHEO only has direct authority to regulate the Enterprises.

E. Paperwork Reduction Act

The risk-based capital rule contains no information collection requirements that require OMB approval under the Paperwork Reduction Act, 44 U.S.C. Chapter 35.

F. Unfunded Mandates Reform Act

Title II of the Unfunded Mandates Reform Act of 1995 (UMRA) establishes requirements for Federal agencies to assess the effects of their regulatory actions on State, local, and tribal governments, and the private sector. This final rule would not impose any Federal mandates on any State, local, or tribal governments, or on the private sector, within the meaning of the UMRA.

List of Subjects in 12 CFR Part 1750

Capital classification, Mortgages, Risk-based capital.

Accordingly, for reasons set forth in the preamble, the Office of Federal Housing Enterprise Oversight amends 12 CFR part 1750 as follows:

PART 1750—CAPITAL

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

Authority: 12 U.S.C. 4513, 4514, 4611, 4612, 4614, 4615, 4618.

2. Add new subpart B to part 1750 to read as follows:

Subpart B—Risk-Based Capital

Sec.

1750.10 General.

1750.11 Definitions.

1750.12 Procedures and timing.

1750.13 Risk-based capital level computation.

Appendix A to subpart B of part 1750—Risk-Based Capital Test Methodology and Specifications

Subpart B—Risk-Based Capital

§ 1750.10 General.

The regulation contained in this subpart B establishes the methodology for computing the risk-based capital level for each Enterprise. The board of directors of each Enterprise is responsible for ensuring that the Enterprise maintains total capital at a level that is sufficient to ensure the continued financial viability of the Enterprise and is equal to or exceeds the risk-based capital level computed pursuant to this subpart B.

§ 1750.11 Definitions.

Except where a term is explicitly defined differently in this subpart, all terms defined at § 1750.2 of subpart A of this part shall have the same meanings for purposes of this subpart. For purposes of subpart B of this part, the following definitions shall apply:

(a) *Benchmark loss experience* means the rates of default and severity for mortgage loans that—

(1) Were originated during a period of two or more consecutive calendar years in contiguous areas that together contain at least five percent of the population of the United States, and

(2) Experienced the highest loss rate for any period of such duration in comparison with the loans originated in any other contiguous areas that together contain at least five percent of the population of the United States.

(b) *Constant maturity Treasury yield* means the constant maturity Treasury yield, published by the Board of Governors of the Federal Reserve System.

(c) *Contiguous areas* means all the areas within a state or a group of two or more states sharing common borders. "Sharing common borders" does not mean meeting at a single point. Colorado, for example, is contiguous with New Mexico, but not with Arizona.

(d) *Credit risk* means the risk of financial loss to an Enterprise from nonperformance by borrowers or other obligors on instruments in which an Enterprise has a financial interest, or as to which the Enterprise has a financial obligation.

(e) *Default rate* of a given group of loans means the ratio of the aggregate original principal balance of the defaulted loans in the group to the aggregate original principal balance of all loans in the group.

(f) *Defaulted loan* means a loan that, within ten years following its origination:

- (1) Resulted in pre-foreclosure sale,
- (2) Completed foreclosure,
- (3) Resulted in the acquisition of real estate collateral, or
- (4) Otherwise resulted in a credit loss to an Enterprise.

(g) *Financing costs* of property acquired through foreclosure means the product of:

- (1) The number of years (including fractions) of the period from the completion of foreclosure through disposition of the property,
- (2) The average of the Enterprises' short-term funding rates, and
- (3) The unpaid principal balance at the time of foreclosure.

(h) *Interest rate risk* means the risk of financial loss due to the sensitivity of earnings and net worth of an Enterprise to changes in interest rates.

(i) *Loss* on a defaulted loan means:

- (1) With respect to a loan in category 1, 2, or 3 of the definition of defaulted loan the difference between:

(i) The sum of the principal and interest owed when the borrower lost title to the property securing the mortgage; financing costs through the date of property disposition; and cash expenses incurred during the foreclosure process, the holding period for real estate collateral acquired as a result of default, and the property liquidation process; and

(ii) The sum of the property sales price and any other liquidation proceeds (except those resulting from private mortgage insurance proceeds or other third-party credit enhancements).

(2) With respect to defaulted loans not in categories 1, 2, or 3, the amount of the financial loss to the Enterprise.

(j) *Mortgage* means any loan secured by such classes of liens as are commonly given or are legally effective to secure advances on, or the unpaid purchase price of, real estate under the laws of the State in which the real estate is located; or a manufactured house that is personal property under the laws of the State in which the manufactured house is located, together with the credit instruments, if any, secured thereby, and includes interests in mortgages.

(k) *Seasoning* means the change over time in the ratio of the unpaid principal balance of a mortgage to the value of the property by which such mortgage loan is secured.

(l) *Severity rate* for any group of defaulted loans means the aggregate losses on all loans in that group divided by the aggregate original principal balances of those loans.

(m) *Stress period* means a hypothetical ten-year period immediately following the day for which capital is being measured, which is a period marked by the severely adverse economic circumstances defined in 12 CFR 1750.13 and Appendix A to this subpart.

(n) *Total capital* means, with respect to an Enterprise, the sum of the following:

(1) The core capital of the Enterprise;

(2) A general allowance for foreclosure losses, which—

(i) Shall include an allowance for portfolio mortgage losses, an allowance for non-reimbursable foreclosure costs on government claims, and an allowance for liabilities reflected on the balance sheet for the Enterprise for estimated foreclosure losses on mortgage-backed securities; and

(ii) Shall not include any reserves of the Enterprise made or held against specific assets.

(3) Any other amounts from sources of funds available to absorb losses incurred by the Enterprise, that the Director by regulation determines are appropriate to include in determining total capital.

(o) *Type of mortgage product* means a classification of one or more mortgage products, as established by the Director, that have similar characteristics from each set of characteristics under the paragraphs (o)(1) through (o)(7) of this section:

(1) The property securing the mortgage is—

(i) A residential property consisting of 1 to 4 dwelling units; or

(ii) A residential property consisting of more than 4 dwelling units.

(2) The interest rate on the mortgage is—

(i) Fixed; or

(ii) Adjustable.

(3) The priority of the lien securing the mortgage is—

(i) First; or

(ii) Second or other.

(4) The term of the mortgage is—

(i) 1 to 15 years;

(ii) 16–30 years; or

(iii) More than 30 years.

(5) The owner of the property is—

(i) An owner-occupant; or

(ii) An investor.

(6) The unpaid principal balance of the mortgage—

(i) Will amortize completely over the term of the mortgage, and will not increase significantly at any time during the term of the mortgage;

(ii) Will not amortize completely over the term of the mortgage, and will not increase significantly at any time during the term of the mortgage; or

(iii) May increase significantly at some time during the term of the mortgage.

(7) Any other characteristics of the mortgage, as specified in Appendix A to this subpart.

§ 1750.12 Procedures and timing.

(a) Each Enterprise shall file with the Director a Risk-Based Capital Report each quarter, and at such other times as the Director may require, in his or her discretion. The report shall contain the information required by the Director in the instructions to the Risk-Based Capital Report in the format or media specified therein and such other information as may be required by the Director.

(b) The quarterly Risk-Based Capital Report shall contain information for the last day of the quarter and shall be submitted not later than 30 days after the end of the quarter. Reports required by the Director other than quarterly reports shall be submitted within such time period as the Director shall specify.

(c) When an Enterprise contemplates entering into a new activity, as that term is defined in section 3.11 of Appendix A to this subpart, the Enterprise shall notify the Director as soon as possible while the transaction or activity is under consideration, but in no event later than 5 calendar days after settlement or closing. The Enterprise shall provide to the Director such information regarding the activity as the Director may require to determine a stress test treatment. OFHEO will inform the Enterprise as soon as possible thereafter of the proposed stress test treatment of the new activity. In addition, the notice of proposed capital classification required by § 1750.21 of subpart C of this part will inform the Enterprise of the capital treatment of such new activity used in the determination of the risk-based capital requirement.

(d) If an Enterprise discovers that a Risk-Based Capital Report previously filed with OFHEO contains any errors or omissions, the Enterprise shall notify OFHEO immediately of such discovery and file an amended Risk-Based Capital Report not later than three days thereafter.

(e) Each capital classification shall be determined by OFHEO on the basis of the Risk-Based Capital Report filed by the Enterprise under paragraph (a) of this section; provided that, in the event an amended Risk-Based Capital Report is filed prior to the issuance of the final notice of capital classification, the Director has the discretion to determine the Enterprise's capital classification on the basis of the amended report.

(f) Each Risk-Based Capital Report or any amended Risk-Based Capital Report shall contain a declaration by the officer who has been designated by the Board as responsible for overseeing the capital adequacy of the Enterprise that the report is true and correct to the best of such officer's knowledge and belief.

§ 1750.13 Risk-based capital level computation.

(a) *Risk-Based Capital Test*—OFHEO shall compute a risk-based capital level for each Enterprise at least quarterly by applying the risk-based capital test described in Appendix A to this subpart to determine the amount of total capital required for each Enterprise to maintain positive capital during the stress period. In making this determination, the Director shall take into account any appropriate distinctions among types of mortgage products, differences in seasoning of mortgages, and other factors determined appropriate by the Director in accordance with the methodology specified in Appendix A to this subpart. The stress period has the following characteristics:

(1) *Credit risk*—With respect to mortgages owned or guaranteed by the Enterprise and other obligations of the Enterprise, losses occur throughout the United States at a rate of default and severity reasonably related, in accordance with Appendix A to this subpart, to the benchmark loss experience.

(2) *Interest rate risk*—(i) *In general.* Interest rates decrease as described in paragraph (a)(2)(ii) of this section or increase as described in paragraph (a)(2)(iii) of this section, whichever would require more capital in the stress test for the Enterprise. Appendix A to this subpart contains a description of the methodology applied to implement the interest rate scenarios described in paragraphs (a)(2)(ii) and (iii) of this section.

(ii) *Decreases.* The 10-year constant maturity Treasury yield decreases during the first year of the stress period and remains at the new level for the remainder of the stress period. The yield decreases to the lesser of (A) 600 basis points below the average yield during the 9 months immediately preceding the stress period, or

(B) 60 percent of the average yield during the 3 years immediately preceding the stress period, but in no case to a yield less than 50 percent of the average yield during the 9 months immediately preceding the stress period.

(iii) *Increases.* The 10-year constant maturity Treasury yield increases during the first year of the stress period

and will remain at the new level for the remainder of the stress period. The yield increases to the greater of—

(A) 600 basis points above the average yield during the 9 months immediately preceding the stress period, or

(B) 160 percent of the average yield during the 3 years immediately preceding the stress period, but in no case to a yield greater than 175 percent of the average yield during the 9 months immediately preceding the stress period.

(iv) *Different terms to maturity.* Yields of Treasury instruments with terms to maturity other than 10 years will change relative to the 10-year constant maturity Treasury yield in patterns and for durations that are reasonably related to historical experience and are judged reasonable by the Director. The methodology used by the Director to adjust the yields of those other instruments is specified in Appendix A to this subpart.

(v) *Large increases in yields.* If the 10-year constant maturity Treasury yield is assumed to increase by more than 50 percent over the average yield during the 9 months immediately preceding the stress period, the Director shall adjust the losses resulting from the conditions specified in paragraph (a)(2)(iii) of this section to reflect a correspondingly higher rate of general price inflation. The method of such adjustment by the Director is specified in Appendix A to this subpart.

(3) *New business.* Any contractual commitments of the Enterprise to purchase mortgages or issue securities will be fulfilled. The characteristics of resulting mortgages purchased, securities issued, and other financing will be consistent with the contractual terms of such commitments, recent experience, and the economic characteristics of the stress period, as more fully specified in Appendix A to this subpart. No other purchases of mortgages shall be assumed.

(4) *Other activities.* Losses or gains on other activities, including interest rate and foreign exchange hedging activities, shall be determined by the Director, in accordance with Appendix A to this subpart and on the basis of available information, to be consistent with the stress period.

(5) *Consistency.* Characteristics of the stress period other than those specifically set forth in paragraph (a) of this section, such as prepayment experience and dividend policies, will be determined by the Director, in accordance with Appendix A to this subpart, on the basis of available information, to be most consistent with the stress period.

(b) *Risk-Based Capital Level.* The risk-based capital level of an Enterprise, to be used in determining the appropriate capital classification of each Enterprise, as required by section 1364 of the Federal Housing Enterprises Financial Safety and Soundness Act of 1992 (12 U.S.C. 4614), shall be equal to the sum of the following amounts:

(1) *Credit and Interest Rate Risk.* The amount of total capital determined by applying the risk-based capital test under paragraph (a) of this section to the Enterprise.

(2) *Management and Operations Risk.* To provide for management and operations risk, 30 percent of the amount of total capital determined by applying the risk-based capital test under paragraph (a) of this section to the Enterprise.

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

- 1.0 Identification of the Benchmark Loss Experience
 - 1.1 Definitions
 - 1.2 Data
 - 1.3 Procedures
- 2.0 Identification of a New Benchmark Loss Experience
- 3.0 Computation of the Risk-Based Capital Requirement
 - 3.1 Data
 - 3.1.1 Introduction
 - 3.1.2 Risk-Based Capital Report
 - 3.1.2.1 Whole Loan Inputs
 - 3.1.2.2 Mortgage Related Securities Inputs
 - 3.1.2.3 Nonmortgage Instrument Cash Flows Inputs
 - 3.1.2.4 Inputs for Alternative Modeling Treatment Items
 - 3.1.2.5 Operations, Taxes, and Accounting Inputs
 - 3.1.3 Public Data
 - 3.1.3.1 Interest Rates
 - 3.1.3.2 Property Valuation Inputs
 - 3.1.4 Constant Values
 - 3.1.4.1 Single Family Loan Performance
 - 3.1.4.2 Multifamily Loan Performance
 - 3.2 Commitments
 - 3.2.1 Commitments Overview
 - 3.2.2 Commitments Inputs
 - 3.2.2.1 Loan Data
 - 3.2.2.2 Interest Rate Data
 - 3.2.3 Commitments Procedures
 - 3.2.4 Commitments Outputs
 - 3.3 Interest Rates
 - 3.3.1 Interest Rates Overview
 - 3.3.2 Interest Rates Inputs
 - 3.3.3 Interest Rates Procedures
 - 3.3.4 Interest Rates Outputs
 - 3.4 Property Valuation
 - 3.4.1 Property Valuation Overview
 - 3.4.2 Property Valuation Inputs
 - 3.4.3 Property Valuation Procedures for Inflation Adjustment
 - 3.4.4 Property Valuation Outputs
 - 3.5 Counterparty Defaults
 - 3.5.1 Counterparty Defaults Overview
 - 3.5.2 Counterparty Defaults Input

- 3.5.3 Counterparty Defaults Procedures
- 3.5.4 Counterparty Defaults Outputs
- 3.6 Whole Loan Cash Flows
 - 3.6.1 Whole Loan Cash Flows Overview
 - 3.6.2 Whole Loan Cash Flows Inputs
 - 3.6.3 Whole Loan Cash Flows Procedures
 - 3.6.3.1 Timing Conventions
 - 3.6.3.2 Payment Allocation Conventions
 - 3.6.3.3 Mortgage Amortization Schedule
 - 3.6.3.4 Single Family Default and Prepayment Rates
 - 3.6.3.5 Multifamily Default and Prepayment Rates
 - 3.6.3.6 Calculation of Single Family and Multifamily Mortgage Losses
 - 3.6.3.7 Stress Test Whole Loan Cash Flows
 - 3.6.3.8 Whole Loan Accounting Flows
 - 3.6.4 Final Whole Loan Cash Flow Outputs
- 3.7 Mortgage-Related Securities Cash Flows
 - 3.7.1 Mortgage-Related Securities Overview
 - 3.7.2 Mortgage-Related Securities Inputs
 - 3.7.2.1 Inputs Specifying Individual Securities
 - 3.7.2.2 Interest Rate Inputs
 - 3.7.2.3 Mortgage Performance Inputs
 - 3.7.2.4 Third-Party Credit Inputs
 - 3.7.3 Mortgage-Related Securities Procedures
 - 3.7.3.1 Single Class MBSs
 - 3.7.3.2 REMICs and Strips
 - 3.7.3.3 Mortgage Revenue Bonds and Miscellaneous MRS
 - 3.7.3.4 Accounting
 - 3.7.4 Mortgage-Related Securities Outputs
- 3.8 Nonmortgage Instrument Cash Flows
 - 3.8.1 Nonmortgage Instrument Overview
 - 3.8.2 Nonmortgage Instrument Inputs
 - 3.8.3 Nonmortgage Instrument Procedures
 - 3.8.3.1 Apply Specific Calculation Simplifications
 - 3.8.3.2 Determine the Timing of Cash Flows
 - 3.8.3.3 Obtain the Principal Factor Amount at Each Payment Date
 - 3.8.3.4 Calculate the Coupon Factor
 - 3.8.3.5 Project Principal Cash Flows or Changes in the Notional Amount
 - 3.8.3.6 Project Interest and Dividend Cash Flows
 - 3.8.3.7 Apply Call, Put, or Cancellation Features, if Applicable
 - 3.8.3.8 Calculate Monthly Interest Accruals for the Life of the Instrument
 - 3.8.3.9 Calculate Monthly Amortization (Accretion) of Premiums (Discounts) and Fees
 - 3.8.3.10 Apply Counterparty Haircuts
 - 3.8.4 Nonmortgage Instrument Outputs
- 3.9 Alternative Modeling Treatments
 - 3.9.1 Alternative Modeling Treatments Overview
 - 3.9.2 Alternative Modeling Treatments Inputs
 - 3.9.3 Alternative Modeling Treatments Procedures
 - 3.9.3.1 Off-Balance Sheet Items
 - 3.9.3.2 Reconciling Items
 - 3.9.3.3 Balance Sheet Items
 - 3.9.4 Alternative Modeling Treatments Outputs
- 3.10 Operations, Taxes, and Accounting

- 3.10.1 Operations, Taxes, and Accounting Overview
- 3.10.2 Operations, Taxes, and Accounting Inputs
- 3.10.3 Operations, Taxes, and Accounting Procedures
 - 3.10.3.1 New Debt and Investments
 - 3.10.3.2 Dividends and Share Repurchases
 - 3.10.3.3 Allowances for Loan Losses and Other Charge-Offs
 - 3.10.3.4 Operating Expenses
 - 3.10.3.5 Income Taxes
 - 3.10.3.6 Accounting
- 3.10.4 Operations, Taxes, and Accounting Outputs
- 3.11 Treatment of New Enterprise Activities
 - 3.11.1 New Enterprise Activities Overview
 - 3.11.2 New Enterprise Activities Inputs
 - 3.11.3 New Enterprise Activities Procedures
 - 3.11.4 New Enterprise Activities Outputs
- 3.12 Calculation of the Risk-Based Capital Requirement
 - 3.12.1 Risk-Based Capital Requirement Overview
 - 3.12.2 Risk-Based Capital Requirement Inputs
 - 3.12.3 Risk-Based Capital Requirement Procedures
 - 3.12.4 Risk-Based Capital Requirement Output
- 4.0 Glossary

1.0 Identification of the Benchmark Loss Experience

OFHEO will use the definitions, data, and methodology described below to identify the Benchmark Loss Experience.

1.1 Definitions

The terms defined in the Glossary to this Appendix shall apply for this Appendix.

1.2 Data

[a] OFHEO identifies the Benchmark Loss Experience (BLE) using historical loan-level data required to be submitted by each of the two Enterprises. OFHEO's analysis is based entirely on the data available through 1995 on conventional, 30-year, fixed-rate loans secured by first liens on single-unit, owner-occupied, detached properties. For this purpose, detached properties are defined as single family properties excluding condominiums, planned urban

developments, and cooperatives. The data includes only loans that were purchased by an Enterprise within 12 months after loan origination and loans for which the Enterprise has no recourse to the lender.

[b] OFHEO organizes the data from each Enterprise to create two substantially consistent data sets. OFHEO separately analyzes default and severity data from each Enterprise. Default rates are calculated from loan records meeting the criteria specified above. Severity rates are calculated from the subset of defaulted loans for which loss data are available.

1.3 Procedures

[a] Cumulative ten-year default rates for each combination of states and origination years (state/year combination) that OFHEO examines are calculated for each Enterprise by grouping all of the Enterprise's loans originated in that combination of states and years. For origination years with less than ten-years of loss experience, cumulative-to-date default rates are used. The two Enterprise default rates are averaged, yielding an "average default rate" for that state/year combination.

[b] An "average severity rate" for each state/year combination is determined in the same manner as the average default rate. For each Enterprise, the aggregate severity rate is calculated for all loans in the relevant state/year combination and the two Enterprise severity rates are averaged.

[c] The "loss rate" for any state/year combination examined is calculated by multiplying the average default rate for that state/year combination by the average severity rate for that combination.

[d] The rates of default and Loss Severity of loans in the state/year combination containing at least two consecutive origination years and contiguous areas with a total population equal to or greater than five percent of the population of the United States with the highest loss rate constitutes the Benchmark Loss Experience.

2.0 Identification of a New Benchmark Loss Experience

OFHEO will periodically monitor available data and reevaluate the Benchmark Loss Experience using the methodology set forth in this Appendix. Using this methodology, OFHEO may identify a new Benchmark Loss Experience that has a higher rate of loss than

the Benchmark Loss Experience identified at the time of the issuance of this regulation. In the event such a Benchmark Loss Experience is identified, OFHEO may incorporate the resulting higher loss rates in the Stress Test.

3.0 Computation of the Risk-Based Capital Requirement

3.1 Data

3.1.1 Introduction

[a] The Stress Test requires data on all of an Enterprise's assets, liabilities, stockholders equity, accounting entries, operations and off-balance sheet obligations, as well as economic factors that affect them: interest rates, house prices, rent growth rates, and vacancy rates. The Enterprises are responsible for compiling and aggregating data on at least a quarterly basis into a standard format called the Risk-Based Capital Report (RBC Report). Each Enterprise is required to certify that the RBC Report submission is complete and accurate. Data on economic factors, such as interest rates, are compiled from public sources. The Stress Test uses proprietary and public data directly, and also uses values derived from such data in the form of constants or default values. (See Table 3-1, Sources of Stress Test Input Data.) Data fields from each of these sources for Stress Test computations are described in the following tables and in each section of this Appendix.

[b] The RBC Report includes information for all the loans owned or guaranteed by an Enterprise, as well as securities and derivative contracts, the dollar balances of these instruments and obligations, as well as all characteristics that bear on their behavior under stress conditions. As detailed in the RBC Report, data are required for all the following categories of instruments and obligations:

- Mortgages owned by or underlying mortgage-backed securities (MBS) issued by the Enterprises (whole loans)
- Mortgage-related securities
- Nonmortgage related securities, whether issued by an Enterprise, (e.g., debt) or held as investments
- Derivative contracts
- Other off-balance sheet guarantees (e.g., guarantees of private-issue securities).

TABLE 3-1—SOURCES OF STRESS TEST INPUT DATA

Section of this Appendix	Table	Data Source(s)			Intermediate Outputs
		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			3.3.4, Interest Rates Outputs
3.2.3, Commitments Procedures	3-25, Monthly Deliveries as a Percentage of Commitments Outstanding (MDP)			F	

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	Intermediate Outputs
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
3.6.3.4.3.2, 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	
3.6.3.5.3.2, 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
3.6.3.6.2.2, 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
3.6.3.6.3.2, 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
3.6.3.6.4.2, Mortgage Credit Enhancement Inputs	3-10, 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 3.6.3.6.2.4, Single Family Gross Loss Severity Outputs 3.6.3.6.3.4, 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 3.6.3.6.5.2, 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	3-65, Input Variables for Nonmortgage Instrument Cash flows	R			

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	Intermediate Outputs
3.9.2, Alternative Modeling Treatments Inputs	3-69, Alternative Modeling Treatment Inputs	R			
3.10.2, Operations, Taxes, and Accounting Inputs	3-70, 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 Risk-Based Capital Report

The Risk-Based Capital Report is comprised of information on whole loans, mortgage-related securities, nonmortgage instruments (including liabilities and derivatives), and accounting items (including off-balance sheet guarantees). In addition to their reported data, the Enterprises may report scale factors in order to reconcile this reported data with their published financials (see section 3.10.2[b] of this Appendix). If so, specific data items, as indicated, are adjusted by appropriate scale factors before any calculations occur.

3.1.2.1 Whole Loan Inputs

[a] Whole loans are individual single family or multifamily mortgage loans. The Stress Test distinguishes between whole loans that the Enterprises hold in their

investment portfolios (retained loans) and those that underlie mortgage-backed securities (sold loans). Consistent with Table 3-2, Whole Loan Classification Variables, each Enterprise aggregates the data for loans with similar portfolio (retained or sold), risk, and product characteristics. The characteristics of these loan groups determine rates of mortgage Default, Prepayment and Loss Severity and cash flows.

[b] The characteristics that are the basis for loan groups are called "classification variables" and reflect categories, e.g., fixed interest rate versus floating interest rate, or identify a value range, e.g., original loan-to-value (LTV) ratio greater than 80 percent and less than or equal to 90 percent.

[c] All loans with the same values for each of the relevant classification variables

included in 3-2 (and where applicable 3-3 and 3-4) comprise a single loan group. For example, one loan group includes all loans with the following characteristics:

- Single family
- Sold portfolio
- 30-year fixed rate conventional loan
- Mortgage age greater than or equal to 36 months and less than 48 months
- Original LTV greater than 75 percent and less than or equal to 80 percent
- Current mortgage interest rate class greater than or equal to six percent and less than seven percent
- Secured by property located in the East North Central Census Division
- Relative loan size greater than or equal to 75 percent and less than 100 percent of the average for its state and origination year.

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

TABLE 3-2—WHOLE LOAN CLASSIFICATION VARIABLES—Continued

Variable	Description	Range
		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
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 Period >60
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 Period >15
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

TABLE 3-2—WHOLE LOAN CLASSIFICATION VARIABLES—Continued

Variable	Description	Range
		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

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 Adjustable Rate 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. It is expressed as a percent	0<=Size<=40% 40%<Size<=60% 60%<Size<=75% 75%<Size<=100% 100%<Size<=125% 125%<Size<=150% Size>150%

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

TABLE 3-4—ADDITIONAL MULTIFAMILY LOAN CLASSIFICATION VARIABLES—Continued

Variable	Description	Range
		1.80 <=DCR<1.90 1.90 <=DCR<2.00 2.00 <=DCR<2.50 2.50 <=DCR<4.00 DCR >= 4.00

3.1.2.1.1 Loan Group Inputs

TABLE 3-5—MORTGAGE AMORTIZATION CALCULATION INPUTS

Variable	Description
	Rate Type (Fixed or Adjustable)
	Product Type (30/20/15-Year FRM, ARM, Balloon, Government, etc.)
UPB _{ORIG}	Unpaid Principal Balance at Origination (aggregate for Loan Group)
UPB ₀	Unpaid Principal Balance at start of Stress Test (aggregate for Loan Group), adjusted by UPB scale factor.
MIR ₀	Mortgage Interest Rate for the Mortgage Payment prior to the start of the Stress Test, or Initial Mortgage Interest Rate for new loans (weighted average for Loan Group) (expressed as a decimal per annum)
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), adjusted by UPB scale factor.
AT	Original loan Amortizing Term in months (weighted average for Loan Group)
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)
A ₀	Age of the loan at the start of Stress Test, in months (weighted average for Loan Group)
Unamortized Balance Scale Factor	Factor determined by reconciling reported Unamortized Balance to published financials
UPB Scale Factor	Factor determined by reconciling reported UPB to published financials
Additional Interest Rate Inputs	
GFR	Guarantee Fee Rate (weighted average for Loan Group) (decimal per annum)
SFR	Servicing Fee Rate (weighted average for Loan Group) (decimal per annum)
Additional Inputs for ARMs (weighted averages for Loan Group, except for Index)	
INDEX _m	Monthly values of the contractual Interest Rate Index
LB	Look-Back period, in months
MARGIN	Loan Margin (over index), decimal per annum
RRP	Rate Reset Period, in months
	Rate Reset Limit (up and down), decimal per annum
	Maximum Rate (life cap), decimal per annum
	Minimum Rate (life floor), decimal per annum
NAC	Negative Amortization Cap, decimal fraction of UPB _{ORIG}
	Unlimited Payment Reset Period, in months
PRP	Payment Reset Period, in months
	Payment Reset Limit, as decimal fraction of prior payment
IRP	Initial Rate Period, in months
Additional Inputs for Multifamily Loans	
	Interest-only Flag
RIOP	Remaining Interest-only period, in months (weighted average for loan group)

TABLE 3-6—ADDITIONAL INPUTS FOR SINGLE FAMILY DEFAULT AND PREPAYMENT

Variable	Description
PROD	Mortgage Product Type
A ₀	Age <i>immediately prior to</i> start of Stress Test, in months (weighted average for Loan Group)
LTV _{ORIG}	Loan-to-Value ratio at Origination (weighted average for Loan Group)
UPB _{ORIG}	UPB at Origination (aggregate for Loan Group), adjusted by UPB scale factor.
MIR _{ORIG}	Mortgage Interest Rate at origination ("Initial Rate" for ARMs), decimal per annum (weighted average for loan group)
UPB ₀	Unpaid Principal Balance immediately prior to start of Stress Test (aggregate for Loan Group),
IF	Fraction (by UPB, in decimal form) of Loan Group backed by Investor-owned properties
RLS _{ORIG}	Weighted average Relative Loan Size at Origination (Original UPB as a fraction of average UPB for the state and Origination Year of loan origination)
CHPGF ₀ ^{L,G}	Cumulative House Price Growth Factor since Loan Origination (weighted average for Loan Group)

TABLE 3-7—ADDITIONAL INPUTS FOR MULTIFAMILY DEFAULT AND PREPAYMENT

Variable	Description
	Mortgage Product Type
A ₀	Age <i>immediately prior to</i> start of Stress Test, in months (weighted average for Loan Group)
NBF	New Book Flag
RUF	Ratio Update Flag
LTV _{ORIG}	Loan-to-Value ratio at loan origination
DCR ₀	Debt Service Coverage Ratio at the start of the Stress Test
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)
PPEM	Prepayment Penalty End Month number in the Stress Test (weighted average for Loan Group)
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)

TABLE 3-8—MISCELLANEOUS WHOLE LOAN CASH AND ACCOUNTING FLOW INPUTS

Variable	Description
GF	Guarantee Fee rate (weighted average for Loan Group) (decimal per annum)
FDS	Float Days for Scheduled Principal and Interest
FDP	Float Days for Prepaid Principal
FREP	Fraction Repurchased (weighted average for Loan Group) (decimal)
RM	Remaining Term to Maturity in months
UPD ₀	Unamortized Premium (positive) or Discount (negative) (Deferred Balances) for the Loan Group at the start of the Stress Test, adjusted by Unamortized Balance scale factor
SUPD ₀	Security Unamortized Premium (positive) or Discount (negative) associated with the repurchase price of a Repurchased MBS (aggregate over all purchases of the same MBS)

TABLE 3-9—ADDITIONAL INPUTS FOR REPURCHASED MBS

Variable	Description
Wtd Ave Percent Repurchased	For sold loan groups, the percent of the loan group UPB that gives the actual dollar amount of loans that collateralize single class MBSs that the Enterprise holds in its own portfolio
Security Unamortized Balances	The aggregate sum of all unamortized discounts, premiums, fees, commissions, etc. associated with the securities modeled using the Wtd Ave Percent Repurchased

3.1.2.1.2 Credit Enhancement Inputs

To calculate reductions in mortgage credit losses due to credit enhancements, the

following data are required for any credit-enhanced loans in a loan group. For this purpose, a Loan Group is divided into

Distinct Credit Enhancement Combinations, as further described in section 3.6.3.6.4,

Mortgage Credit Enhancement, of this Appendix.

TABLE 3-10—CE INPUTS FOR EACH LOAN GROUP

Variable	Description
UPB _{ORIG} ^{LG}	Origination UPB.
LTV _{ORIG} ^{LG}	Original LTV.

TABLE 3-11—INPUTS FOR EACH DISTINCT CE COMBINATION (DCC)

Variable	Description
P _{DCC}	Percent of Initial Loan Group UPB represented by individual loan(s) in a DCC
R _{MI,DCC} or R _{LSA,DCC}	Credit rating of Loan Limit CE (MI or LSA) Counterparty
C _{MI,DCC} or C _{LSA,DCC}	Weighted Average Coverage Percentage for MI or LSA Coverage (weighted by Initial UPB)
AB _{0,DCC,C1}	DCC Available First Priority CE Balance immediately prior to start of the Stress Test
AB _{0,DCC,C2}	DCC Available Second Priority CE Balance immediately prior to start of the Stress Test
R _{DCC,C1}	DCC Credit Rating of First Priority CE Provider or Counterparty; or Cash/Cash Equivalent (which is not Haircutted)
R _{DCC,C2}	DCC Credit Rating of Second Priority CE Provider or Counterparty; or Cash/Cash Equivalent (which is not Haircutted)
C _{DCC,C1}	DCC Loan-Level Coverage Limit of First Priority Contract (If Subtype is MPI; otherwise = 1)
C _{DCC,C2}	DCC Loan-Limit Coverage Limit of Second Priority Contract (if Subtype is MPI; otherwise = 1)
ExpMo _{DCC,C1}	Month in the Stress Test (1...120 or after) in which the DCC First Priority Contract expires
ExpMo _{DCC,C2}	Month in the Stress Test (1...120 or after) in which the DCC Second Priority Contract expires
ELPF _{DCC,C1}	DCC Enterprise Loss Position Flag for First Priority Contract (Y or N)
ELPF _{DCC,C2}	DCC Enterprise Loss Position Flag for Second Priority Contract (Y or N)

3.1.2.1.3 Commitments Inputs

[a] The Enterprises report Commitment Loan Group categories based on specific product type characteristics of securitized single family loans originated and delivered during the six months prior to the start of the Stress Test (see section 3.2, Commitments, of this Appendix). For each category, the Enterprises report the same information as for Whole Loan Groups with the following exceptions:

1. Amortization term and remaining term are set to those appropriate for newly originated loans;

- 2. Unamortized balances are set to zero;
- 3. The House Price Growth Factor is set to one;
- 4. Age is set to zero;
- 5. Any credit enhancement coverage other than mortgage insurance is not reported.

3.1.2.2 Mortgage Related Securities Inputs

[a] The Enterprises hold mortgage-related securities, including single class and Derivative Mortgage-Backed Securities (certain multi-class and strip securities) issued by Fannie Mae, Freddie Mac, and Ginnie Mae; mortgage revenue bonds issued

by State and local governments and their instrumentalities; and single class and Derivative Mortgage-Backed Securities issued by private entities. The Stress Test models the cash flows of these securities individually. Table 3-12, Inputs for Single Class MBS Cash Flows sets forth the data elements that the Enterprises must compile in the RBC Report regarding each MBS held in their portfolios. This information is necessary for determining associated cash flows in the Stress Test.

TABLE 3-12—INPUTS FOR SINGLE CLASS MBS CASH FLOWS

Variable	Description
Pool Number	A unique number identifying each mortgage pool
CUSIP Number	A unique number assigned to publicly traded securities by the Committee on Uniform Securities Identification Procedures
Issuer	Issuer of the mortgage pool
Government Flag	Indicates Government insured collateral
Original UPB Amount	Original pool balance adjusted by UPB scale factor and multiplied by the Enterprise's percentage ownership
Current UPB Amount	Initial Pool balance (at the start of the Stress Test), adjusted by UPB scale factor and multiplied by the Enterprise's percentage ownership
Product Code	Mortgage product type for the pool
Security Rate Index	If the rate on the security adjusts over time, the index that the adjustment is based on
Unamortized Balance	The sum of all unamortized discounts, premiums, fees, commissions, etc. adjusted by Unamortized Balance scale factor

TABLE 3-12—INPUTS FOR SINGLE CLASS MBS CASH FLOWS—Continued

Variable	Description
Wt Avg Original Amortization Term	Original amortization term of the underlying loans, in months (weighted average for underlying loans)
Wt Avg Remaining Term of Maturity	Remaining maturity of the underlying loans at the start of the Stress Test (weighted average for underlying loans)
Wt Avg Age	Age of the underlying loans at the start of the Stress Test (weighted average for underlying loans)
Wt Avg Current Mortgage Interest rate	Mortgage Interest Rate of the underlying loans at the start of the Stress Test (weighted average for underlying loans)
Wt Avg Pass-Through Rate	Pass-Through Rate of the underlying loans at the start of the Stress Test (Sold loans only) (weighted average for underlying loans)
Wt Avg Original Mortgage Interest Rate	The current UPB weighted average mortgage interest rate in effect at origination for the loans in the pool
Security Rating	The most current rating issued by any Nationally Recognized Statistical Rating Organization (NRSRO) for this security, as of the reporting date
Wt Avg Gross Margin	Gross margin for the underlying loans (ARM MBS only) (weighted average for underlying loans)
Wt Avg Net Margin	Net margin (used to determine the security rate for ARM MBS) (weighted average for underlying loans)
Wt Avg Rate Reset Period	Rate reset period in months (ARM MBS only) (weighted average for underlying loans)
Wt Avg Rate Reset Limit	Rate reset limit up/down (ARM MBS only) (weighted average for underlying loans)
Wt Avg Life Interest Rate Ceiling	Maximum rate (lifetime cap) (ARM MBS only) (weighted average for underlying loans)
Wt Avg Life Interest Rate Floor	Minimum rate (lifetime floor) (ARM MBS only) (weighted average for underlying loans)
Wt Avg Payment Reset Period	Payment reset period in months (ARM MBS only) (weighted average for underlying loans)
Wt Avg Payment Reset Limit	Payment reset limit up/down (ARM MBS only) (weighted average for underlying loans)
Wt Avg Lockback Period	The number of months to look back from the interest rate change date to find the index value that will be used to determine the next interest rate. (weighted average for underlying loans)
Wt Avg Negative Amortization Cap	The maximum amount to which the balance can increase before the payment is recast to a fully amortizing amount. It is expressed as a fraction of the original UPB. (weighted average for underlying loans)
Wt Avg Original Mortgage Interest Rate	The current UPB weighted average original mortgage interest rate for the loans in the pool
Wt Avg Initial Interest Rate Period	Number of months between the loan origination date and the first rate adjustment date (weighted average for underlying loans)
Wt Avg Unlimited Payment Reset Period	Number of months between unlimited payment resets i.e., not limited by payment caps, starting with origination date (weighted average for underlying loans)
Notional Flag	Indicates if the amounts reported in Original Security Balance and Current Security Balance are notional
UPB Scale Factor	Factor determined by reconciling reported UPB to published financials
Unamortized Balance Scale Factor	Factor determined by reconciling reported Unamortized Balance to published financials
Whole Loan Modeling Flag	Indicates that the Current UPB Amount and Unamortized Balance associated with this repurchased MBS are included in the Wt Avg Percent Repurchased and Security Unamortized Balance fields
FAS 115 Classification	The financial instrument's classification according to FAS 115
HPGR _K	Vector of House Price Growth Rates for quarters q=1...40 of the Stress Period

[b] Table 3-13, Information for Multi-Class and Derivative MBS Cash Flows Inputs sets forth the data elements that the Enterprises must compile regarding multi-class and Derivative MBS (e.g., REMICs and Strips). This information is necessary for determining associated cash flows in the Stress Test.

TABLE 3-13—INFORMATION FOR MULTI-CLASS AND DERIVATIVE MBS CASH FLOWS INPUTS

Variable	Description
CUSIP Number	A unique number assigned to publicly traded securities by the Committee on Uniform Securities Identification Procedures
Issuer	Issuer of the security: FNMA, FHLMC, GNMA or other
Original Security Balance	Original principal balance of the security (notional amount for interest-only securities) at the time of issuance, adjusted by UPB scale factor, multiplied by the Enterprise's percentage ownership

TABLE 3-13—INFORMATION FOR MULTI-CLASS AND DERIVATIVE MBS CASH FLOWS INPUTS—Continued

Variable	Description
Current Security Balance	Initial principal balance, or notional amount, at the start of the Stress Period, adjusted by UPB scale factor, multiplied by the Enterprise's percentage ownership
Current Security Percentage Owned	The percentage of a security's total current balance owned by the Enterprise
Notional Flag	Indicates if the amounts reported in Original Security Balance and Current Security Balance are notional
Unamortized Balance	The sum of all unamortized discounts, premiums, fees, commissions, etc. Components of the balance that amortize as a gain (like discounts) should be positive. Components that amortize as a cost or as a loss (premiums, fees, etc.) should be negative
Unamortized Balance Scale Factor	Factor determined by reconciling reported Unamortized Balance to published financials
UPB Scale Factor	Factor determined by reconciling the reported current security balance to published financials
Security Rating	The most current rating issued by any Nationally Recognized Statistical Rating Organization (NRSRO) for this security, as of the reporting date

[c] Table 3-14, Inputs for MRBs and Derivative MBS Cash Flows Inputs sets forth the data elements that the Enterprises must compile in the RBC Report regarding mortgage revenue bonds and private issue mortgage related securities (MRS). The data in this table is supplemented with public securities disclosure data. This information is necessary for determining associated cash flows in the Stress Test.

TABLE 3-14—INPUTS FOR MRBs AND DERIVATIVE MBS CASH FLOWS INPUTS

Variable	Description
CUSIP Number	A unique number assigned to publicly traded securities by the Committee on Uniform Securities Identification Procedures
Original Security Balance	Original principal balance, adjusted by UPB scale factor and multiplied by the Enterprise's percentage ownership
Current Security Balance	Initial Principal balance (at start of Stress Period), adjusted by UPB scale factor and multiplied by the Enterprise's percentage ownership
Unamortized Balance	The sum of all unamortized discounts, premiums, fees, commissions, etc. adjusted by Unamortized Balance scale factor
Unamortized Balance Scale Factor	Factor determined by reconciling reported Unamortized Balance to published financials
UPB Scale Factor	Factor determined by reconciling the reported current security balance to published financials
Floating Rate Flag	Indicates the instrument pays interest at a floating rate
Issue Date	The issue date of the security
Maturity Date	The stated maturity date of the security
Security Interest Rate	The rate at which the security earns interest, as of the reporting date
Principal Payment Window Starting Date, Down-Rate Scenario	The month in the Stress Test that principal payment is expected to start for the security under the statutory "down" interest rate scenario, according to Enterprise projections
Principal Payment Window Ending Date, Down-Rate Scenario	The month in the Stress Test that principal payment is expected to end for the security under the statutory "down" interest rate scenario, according to Enterprise projections
Principal Payment Window Starting Date, Up-Rate Scenario	The month in the Stress Test that principal payment is expected to start for the security under the statutory "up" interest rate scenario, according to Enterprise projections
Principal Payment Window Ending Date, Up-Rate Scenario	The month in the Stress Test that principal payment is expected to end for the security under the statutory "up" interest rate scenario, according to Enterprise projections
Notional Flag	Indicates if the amounts reported in Original Security Balance and Current Security Balance are notional
Security Rating	The most current rating issued by any Nationally Recognized Statistical Rating Organization (NRSRO) for this security, as of the reporting date
Security Rate Index	If the rate on the security adjusts over time, the index on which the adjustment is based
Security Rate Index Coefficient	If the rate on the security adjusts over time, the coefficient is the number used to multiply by the value of the index
Security Rate Index Spread	If the rate on the security adjusts over time, the spread is added to the value of the index multiplied by the coefficient to determine the new rate
Security Rate Adjustment Frequency	The number of months between rate adjustments

TABLE 3-14—INPUTS FOR MRBS AND DERIVATIVE MBS CASH FLOWS INPUTS—Continued

Variable	Description
Security Interest Rate Ceiling	The maximum rate (lifetime cap) on the security
Security Interest Rate Floor	The minimum rate (lifetime floor) on the security
Life Ceiling Interest Rate	The maximum interest rate allowed throughout the life of the security
Life Floor Interest Rate	The minimum interest rate allowed throughout the life of security

3.1.2.3 Nonmortgage Instrument Cash Flows Inputs

Table 3-15, Input Variables for Nonmortgage Instrument Cash flows sets forth the data elements that the Enterprises must compile in the RBC Report to identify

individual securities (other than Mortgage Related Securities) that are held by the Enterprises in their portfolios. These include debt securities, preferred stock, and derivative contracts (interest rate swaps, caps, and floors). All data are instrument specific. The data in this table are

supplemented by public securities disclosure data. For instruments with complex or non-standard features, the Enterprises may be required to provide additional information such as amortization schedules, interest rate coupon reset formulas, and the terms of the call options.

TABLE 3-15—INPUT VARIABLES FOR NONMORTGAGE INSTRUMENT CASH FLOWS

Data Elements	Description
Amortization Methodology Code	Enterprise method of amortizing deferred balances (e.g., straight line)
Asset ID	CUSIP or Reference Pool Number identifying the asset underlying a derivative position
Asset Type Code	Code that identifies asset type used in the commercial information service (e.g. ABS, Fannie Mae pool, Freddie Mac pool)
Associated Instrument ID	Instrument ID of an instrument linked to another instrument
Coefficient	Indicates the extent to which the coupon is leveraged or de-leveraged
Compound Indicator	Indicates if interest is compounded
Compounding Frequency	Indicates how often interest is compounded
Counterparty Credit Rating	NRSRO's rating for the counterparty
Counterparty Credit Rating Type	An indicator identifying the counterparty's credit rating as short-term ('S') or long-term ('L')
Counterparty ID	Enterprise counterparty tracking ID
Country Code	Standard country codes in compliance with Federal Information Processing Standards Publication 10-4
Credit Agency Code	Identifies NRSRO (e.g., Moody's)
Current Asset Face Amount	Current face amount of the asset underlying a swap adjusted by UPB scale factor
Current Coupon	Current coupon or dividend rate of the instrument
Current Unamortized Discount	Current unamortized premium or unaccreted discount of the instrument adjusted by Unamortized Balance scale factor
Current Unamortized Fees	Current unamortized fees associated with the instrument adjusted by Unamortized Balance scale factor
Current Unamortized Hedge	Current unamortized hedging gains or losses associated with the instrument adjusted by Unamortized Balance scale factor
Current Unamortized Other	Any other unamortized items originally associated with the instrument adjusted by Unamortized Balance scale factor
CUSIP_ISIN	CUSIP or ISIN Number identifying the instrument
Day Count	Day count convention (e.g. 30/360)
End Date	The last index repricing date
EOP Principal Balance	End of Period face, principal or notional, amount of the instrument adjusted by UPB scale factor
Exact Representation	Indicates that an instrument is modeled according to its contractual terms
Exercise Convention	Indicates option exercise convention (e.g., American Option)
Exercise Price	Par = 1.0; Options
First Coupon Date	Date first coupon is received or paid
Index Cap	Indicates maximum index rate
Index Floor	Indicates minimum index rate
Index Reset Frequency	Indicates how often the interest rate index resets on floating-rate instruments
Index Code	Indicates the interest rate index to which floating-rate instruments are tied (e.g., LIBOR)

TABLE 3-15—INPUT VARIABLES FOR NONMORTGAGE INSTRUMENT CASH FLOWS—Continued

Data Elements	Description
Index Term	Point on yield curve, expressed in months, upon which the index is based
Instrument Credit Rating	NRSRO credit rating for the instrument
Instrument Credit Rating Type	An indicator identifying the instruments credit rating as short-term ('S') or long-term ('L')
Instrument ID	An integer used internally by the Enterprise that uniquely identifies the instrument
Interest Currency Code	Indicates currency in which interest payments are paid or received
Interest Type Code	Indicates the method of interest rate payments (e.g., fixed, floating, step, discount)
Issue Date	Indicates the date that the instrument was issued
Life Cap Rate	The maximum interest rate for the instrument throughout its life
Life Floor Rate	The minimum interest rate for the instrument throughout its life
Look-Back Period	Period from the index reset date, expressed in months, that the index value is derived
Maturity Date	Date that the instrument contractually matures
Notional Indicator	Identifies whether the face amount is notional
Instrument Type Code	Indicates the type of instrument to be modeled (e.g., ABS, Cap, Swap)
Option Indicator	Indicates if instrument contains an option
Option Type	Indicates option type (e.g., Call option)
Original Asset Face Amount	Original face amount of the asset underlying a swap adjusted by UPB scale factor
Original Discount	Original discount or premium amount of the instrument adjusted by Unamortized Balance scale factor
Original Face	Original face, principal or notional, amount of the instrument adjusted by UPB scale factor
Original Fees	Fees associated with the instrument at inception adjusted by Unamortized Balance scale factor
Original Hedge	Hedging gain or loss to be amortized or accreted at inception adjusted by Unamortized Balance scale factor
Original Other	Any other amounts originally associated with the instrument to be amortized or accreted adjusted by Unamortized Balance scale factor
Parent Entity ID	Enterprise internal tracking ID for parent entity
Payment Amount	Interest payment amount associated with the instrument (reserved for complex instruments where interest payments are not modeled) adjusted by UPB scale factor
Payment Frequency	Indicates how often interest payments are made or received
Performance Date	"As of" date on which the data is submitted
Periodic Adjustment	The maximum amount that the interest rate for the instrument can change per reset
Position Code	Indicates whether the Enterprise pays or receives interest on the instrument
Principal Currency Code	Indicates currency in which principal payments are paid or received
Principal Factor Amount	EOP Principal Balance expressed as a percentage of Original Face
Principal Payment Date	A valid date identifying the date that principal is paid
Settlement Date	A valid date identifying the date the settlement occurred
Spread	An amount added to an index to determine an instrument's interest rate
Start Date	The date, spot or forward, when some feature of a financial contract becomes effective (e.g., Call Date), or when interest payments or receipts begin to be calculated
Strike Rate	The price or rate at which an option begins to have a settlement value at expiration, or, for interest-rate caps and floors, the rate that triggers interest payments
Submitting Entity	Indicates which Enterprise is submitting information
Trade ID	Unique code identifying the trade of an instrument
Transaction Code	Indicates the transaction that an Enterprise is initiating with the instrument (e.g. buy, issue reopen)
Transaction Date	A valid date identifying the date the transaction occurred
UPB Scale Factor	Factor determined by reconciling reported UPB to published financials

TABLE 3-15—INPUT VARIABLES FOR NONMORTGAGE INSTRUMENT CASH FLOWS—Continued

Data Elements	Description
Unamortized Balances Scale Factor	Factor determined by reconciling reported Unamortized Balances to published financials

3.1.2.4 Inputs for Alternative Modeling Treatment Items

TABLE 3-16—INPUTS FOR ALTERNATIVE MODELING TREATMENT ITEMS

Variable	Description
TYPE	Type of item (asset, liability or off-balance sheet item)
BOOK	Book Value of item (amount outstanding adjusted for deferred items)
FACE	Face Value or notional balance of item for off-balance sheet items
REMATUR	Remaining Contractual Maturity of item in whole months. Any fraction of a month equals one whole month
RATE	Interest Rate
INDEX	Index used to calculate Interest Rate
FAS115	Designation that the item is recorded at fair value, according to FAS 115
RATING	Instrument or counterparty rating
FHA	In the case of off-balance sheet guarantees, a designation indicating 100% of collateral is guaranteed by FHA
UABAL	Unamortized Balance (Book minus Face)
MARGIN	Margin over an Index

3.1.2.5 Operations, Taxes, and Accounting Inputs

[a] Table 3-17, Operations, Taxes, and Accounting Inputs sets forth the data the Enterprises must compile in the RBC Report to permit the calculation of taxes, operating expenses, and dividends. These data include:

- Average monthly Operating Expenses (i.e., administrative expenses, salaries and benefits, professional services, property costs, equipment costs) for the quarter prior to the beginning of the Stress Test;
- Income for the current year-to-date, one year, and two years prior to the beginning of the stress test, before taxes and provision for income taxes;
- Dividend payout ratio for the four quarters prior to the beginning of the Stress Period;
- Minimum capital requirement as of the beginning of the Stress Period.

TABLE 3-17—OPERATIONS, TAXES, AND ACCOUNTING INPUTS

Input	Description
FAS 115 and 125 fair value adjustment on retained mortgage portfolio	
FAS 133 fair value adjustment on retained mortgage portfolio	
Reserve for losses on retained mortgage portfolio	
FAS 115 and 125 fair value adjustments on non-mortgage investments	
FAS 133 fair value adjustments on non-mortgage investments	
Total cash	
Accrued interest receivable on mortgages	
Accrued interest receivable on non-mortgage investment securities	
Accrued interest receivable on non-mortgage investment securities denominated in foreign currency—hedged	
Accrued interest receivable on non-mortgage investment securities denominated in foreign currency—unhedged	
Accrued interest receivable on mortgage-linked derivatives, gross	
Accrued interest receivable on investment-linked derivatives, gross	
Accrued interest receivable on debt-linked derivatives, gross	
Other accrued interest receivable	
Accrued interest receivable on hedged debt-linked foreign currency swaps	Underlying instrument is GSE issued debt
Accrued interest receivable on unhedged debt-linked foreign currency swaps	

TABLE 3-17—OPERATIONS, TAXES, AND ACCOUNTING INPUTS—Continued

Input	Description
Accrued interest receivable on hedged asset-linked foreign currency swaps	Underlying instrument is an asset
Accrued interest receivable on unhedged asset-linked foreign currency swaps	
Currency transaction adjustments—hedged assets	Cumulative gain or loss due to changes in foreign exchange rates relative to on-balance sheet assets originally denominated in foreign currency
Currency transaction adjustments—unhedged assets	Cumulative gain or loss due to changes in foreign exchange rates relative to unhedged assets and off-balance sheet items originally denominated in foreign currency
Federal income tax refundable	
Accounts receivable	
Fees receivable	
Low income housing tax credit investments	
Fixed assets, net	
Clearing accounts	Net book value of all clearing accounts
Other assets	
Foreclosed property, net	Real estate owned including property acquired through foreclosure proceedings
FAS 133 fair value adjustment on debt securities	
Accrued interest payable on existing fixed-rate debt securities	
Accrued interest payable on existing floating-rate debt securities	
Accrued interest payable on existing debt issued in foreign currency—hedged	
Accrued interest payable on existing debt issued in foreign currency—unhedged	
Accrued interest payable on mortgage-linked derivatives, gross	
Accrued interest payable on investment-linked derivatives, gross	
Accrued interest payable on debt-linked derivatives, gross	
Other accrued interest payable	
Accrued interest payable debt-linked foreign currency swaps—hedged	
Accrued interest payable debt-linked foreign currency swaps—unhedged	
Accrued interest payable asset-linked foreign currency swaps—hedged	
Accrued interest payable asset-linked foreign currency swaps—unhedged	
Principal and interest due to mortgage security investors	Cash received on sold mortgages for onward submission to mortgage security investors
Currency transaction adjustments—hedged debt	Cumulative gain or loss due to changes in foreign exchange rates relative to on-balance sheet debt originally denominated in foreign currency
Currency transaction adjustments—unhedged debt	Cumulative gain or loss due to changes in foreign exchange rates relative to unhedged liabilities and off-balance sheet items originally denominated in foreign currency
Escrow deposits	Cash balances held in relation to servicing of multi-family loans
Federal income taxes payable	
Preferred dividends payable	
Accounts payable	
Other liabilities	
Common dividends payable	
Reserve for losses on sold mortgages	
Common stock	
Preferred stock, non-cumulative	
Additional paid-in capital	

TABLE 3-17—OPERATIONS, TAXES, AND ACCOUNTING INPUTS—Continued

Input	Description
Retained earnings	
Treasury stock	
Unrealized gains and losses on available-for-sale securities, net of tax, in accordance with FAS 115 and 125	
Unrealized gains and losses due to mark to market adjustments, FAS 115 and 125	
Unrealized gains and losses due to deferred balances related to pre-FAS 115 and 125 adjustments	
Unrealized gains and losses due to other realized gains, FAS 115	
Other comprehensive income, net of tax, in accordance with FAS 133	
OCI due to mark to market adjustments, FAS 133	
OCI due to deferred balances related to pre-FAS 133 adjustments	
OCI due to other realized gains, FAS 133	
Operating expenses	Average of prior three months
Common dividend payout ratio (average of prior 4 quarters)	Sum dollar amount of common dividends paid over prior 4 quarters and divided by the sum of total of after tax income less preferred dividends paid over prior 4 quarters
Common dividends per share paid 1 quarter prior to the beginning of the stress period	
Common shares outstanding	
Common Share Market Price	
Dividends paid on common stock 1 quarter prior to the beginning of the stress period	
Share Repurchases (average of prior 4 quarters)	Sum dollar amount of repurchased shares, net of newly issued shares, over prior 4 quarters and divided by 4
Off-balance-sheet Guarantees	Guaranteed instruments not reported on the balance sheet, such as whole loan REMICs and multifamily credit enhancements, and not 100% guaranteed by the FHA
Other Off-Balance Sheet Guarantees	All other off-balance sheet guaranteed instruments not included in another category, and not 100% guaranteed by the FHA
YTD provision for income taxes	Provision for income taxes for the period beginning January 1 and ending as of the report date
Tax loss carryforward	Net losses available to write off against future years' net income
Tax liability for the year prior to the beginning of the Stress Test	
Tax liability for the year 2 years prior to the beginning of the Stress Test (net of carrybacks)	
Taxable income for the year prior to the beginning of the Stress Test	
Taxable income for the year 2 years prior to the beginning of the Stress Test (net of carrybacks)	
Net after tax income for the quarter preceding the start of the stress test	
YTD taxable income	Total amount of taxable income for the period beginning January 1 and ending as of the report date
Minimum capital requirement at the beginning of the Stress Period	
Specific allowance for loan losses	Loss allowances calculated in accordance with FAS 114
Zero coupon swap receivable	
Unamortized discount on zero coupon swap receivable	

3.1.3 Public Data

3.1.3.1 Interest Rates

[a] The Interest Rates component of the Stress Test projects Treasury yields as well as other interest rate indexes that are needed to calculate cash flows, to simulate the performance of mortgages and other financial

instruments, and to calculate capital for each of the 120 months in the Stress Period. Table 3-18, Interest Rate and Index Inputs, sets forth the interest rate indexes used in the Stress Test

[b] The starting values for all of the Interest Rates are the monthly average of daily rates

for the month preceding the start of the stress test.

[c] For the 10-year CMT, monthly values are required for the three years prior to the start of the Stress Test (m = -35, -34...0). For all other indexes, monthly values for the prior two years are required (m = -23, -22...0).

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)
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: FFTD01W (index)
6 Month Fed Funds	6 month Federal Funds rate, monthly simple average of daily rates	Bloomberg Term Fed Funds U.S. Domestic, Ticker: FFTD06M (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
FHLB 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)

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

Interest Rate Index	Description	Source
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)
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

3.1.3.2 Property Valuation Inputs

Table 3-19, Stress Test Single Family Quarterly House Price Growth Rates and

Table 3-21, HPI Dispersion Parameters, set forth inputs which are used to project single family mortgage performance. Table 3-20, Multifamily Monthly Rent Growth and

Vacancy Rates, sets forth inputs which are used to project multifamily mortgage performance.

TABLE 3-19—STRESS TEST SINGLE FAMILY QUARTERLY HOUSE PRICE GROWTH RATES ¹

Stress Test Months	Historical Months	House Price Growth Rate	Stress Test Months	Historical Months	House Price Growth Rate
1-3	Jan-Mar 1984	-0.005048	61-63	Jan-Mar 1989	0.006292
4-6	Apr-Jun 1984	0.001146	64-66	Apr-Jun 1989	0.010523
7-9	Jul-Sep 1984	0.001708	67-69	Jul-Sep 1989	0.017893
10-12	Oct-Dec 1984	-0.007835	70-72	Oct-Dec 1989	-0.004881
13-15	Jan-Mar 1985	-0.006975	73-75	Jan-Mar 1990	-0.000227
16-18	Apr-Jun 1985	0.004178	76-78	Apr-Jun 1990	0.008804
19-21	Jul-Sep 1985	-0.005937	79-81	Jul-Sep 1990	0.003441
22-24	Oct-Dec 1985	-0.019422	82-84	Oct-Dec 1990	-0.003777
25-27	Jan-Mar 1986	0.026231	85-87	Jan-Mar 1991	0.009952
28-30	Apr-Jun 1986	0.022851	88-90	Apr-Jun 1991	0.012616
31-33	Jul-Sep 1986	-0.021402	91-93	Jul-Sep 1991	0.002267
34-36	Oct-Dec 1986	-0.018507	94-96	Oct-Dec 1991	0.012522
37-39	Jan-Mar 1987	0.004558	97-99	Jan-Mar 1992	0.013378
40-42	Apr-Jun 1987	-0.039306	100-102	Apr-Jun 1992	-0.000519
43-45	Jul-Sep 1987	-0.024382	103-105	Jul-Sep 1992	0.016035
46-48	Oct-Dec 1987	-0.026761	106-108	Oct-Dec 1992	0.005691
49-51	Jan-Mar 1988	-0.003182	109-111	Jan-Mar 1993	0.005723
52-54	Apr-Jun 1988	0.011854	112-114	Apr-Jun 1993	0.010614
55-57	Jul-Sep 1988	-0.020488	115-117	Jul-Sep 1993	0.013919
58-60	Oct-Dec 1988	-0.007260	118-120	Oct-Dec 1993	0.011267

¹ Source: OFHEO House Price Report, 1996:3.

TABLE 3-20—MULTIFAMILY MONTHLY RENT GROWTH ¹ AND VACANCY RATES ²

Stress Test Month	Historical Month	Rent Growth Rate	Vacancy Rate	Stress Test Month	Historical Month	Rent Growth Rate	Vacancy Rate
1	Jan 1984	0.001367	0.136	61	Jan 1989	0.000052	0.135
2	Feb 1984	0.001186	0.136	62	Feb 1989	0.000284	0.135
3	Mar 1984	0.001422	0.136	63	Mar 1989	0.000404	0.135
4	Apr 1984	0.001723	0.136	64	Apr 1989	0.000150	0.135
5	May 1984	0.001537	0.136	65	May 1989	0.000331	0.135
6	Jun 1984	0.001354	0.136	66	Jun 1989	0.001483	0.135
7	Jul 1984	0.000961	0.136	67	Jul 1989	0.000759	0.135
8	Aug 1984	0.000601	0.136	68	Aug 1989	0.001502	0.135
9	Sep 1984	0.001106	0.136	69	Sep 1989	0.002254	0.135
10	Oct 1984	0.001623	0.136	70	Oct 1989	0.002768	0.135
11	Nov 1984	0.001395	0.136	71	Nov 1989	0.002220	0.135
12	Dec 1984	0.001170	0.136	72	Dec 1989	0.002040	0.135
13	Jan 1985	0.001014	0.150	73	Jan 1990	0.002180	0.120
14	Feb 1985	0.000857	0.150	74	Feb 1990	0.002772	0.120
15	Mar 1985	0.000315	0.150	75	Mar 1990	0.002867	0.120
16	Apr 1985	-0.000225	0.150	76	Apr 1990	0.003243	0.120
17	May 1985	0.000154	0.150	77	May 1990	0.002963	0.120
18	Jun 1985	0.000534	0.150	78	Jun 1990	0.003588	0.120
19	Jul 1985	0.001115	0.150	79	Jul 1990	0.004885	0.120
20	Aug 1985	0.001702	0.150	80	Aug 1990	0.004564	0.120
21	Sep 1985	0.001576	0.150	81	Sep 1990	0.005491	0.120
22	Oct 1985	0.001450	0.150	82	Oct 1990	0.005475	0.120
23	Nov 1985	0.001357	0.150	83	Nov 1990	0.005763	0.120
24	Dec 1985	0.001266	0.150	84	Dec 1990	0.005817	0.120
25	Jan 1986	0.001823	0.168	85	Jan 1991	0.005261	0.108
26	Feb 1986	0.002392	0.168	86	Feb 1991	0.005456	0.108
27	Mar 1986	0.002665	0.168	87	Mar 1991	0.005637	0.108
28	Apr 1986	0.002942	0.168	88	Apr 1991	0.005843	0.108
29	May 1986	0.002517	0.168	89	May 1991	0.005970	0.108
30	Jun 1986	0.002105	0.168	90	Jun 1991	0.005719	0.108
31	Jul 1986	0.001372	0.168	91	Jul 1991	0.005533	0.108
32	Aug 1986	0.000652	0.168	92	Aug 1991	0.004512	0.108
33	Sep 1986	0.000110	0.168	93	Sep 1991	0.003916	0.108
34	Oct 1986	-0.000431	0.168	94	Oct 1991	0.003779	0.108
35	Nov 1986	-0.000201	0.168	95	Nov 1991	0.004226	0.108
36	Dec 1986	0.000030	0.168	96	Dec 1991	0.004791	0.108
37	Jan 1987	-0.001448	0.175	97	Jan 1992	0.005361	0.098
38	Feb 1987	-0.002162	0.175	98	Feb 1992	0.004085	0.098
39	Mar 1987	-0.001202	0.175	99	Mar 1992	0.003885	0.098
40	Apr 1987	-0.001136	0.175	100	Apr 1992	0.002992	0.098
41	May 1987	-0.001466	0.175	101	May 1992	0.002941	0.098

TABLE 3-20—MULTIFAMILY MONTHLY RENT GROWTH ¹ AND VACANCY RATES ²—Continued

Stress Test Month	Historical Month	Rent Growth Rate	Vacancy Rate	Stress Test Month	Historical Month	Rent Growth Rate	Vacancy Rate
42	Jun 1987	-0.002809	0.175	102	Jun 1992	0.002851	0.098
43	Jul 1987	-0.002069	0.175	103	Jul 1992	0.002346	0.098
44	Aug 1987	-0.002530	0.175	104	Aug 1992	0.003850	0.098
45	Sep 1987	-0.001033	0.175	105	Sep 1992	0.003245	0.098
46	Oct 1987	-0.001148	0.175	106	Oct 1992	0.003194	0.098
47	Nov 1987	-0.001617	0.175	107	Nov 1992	0.001931	0.098
48	Dec 1987	-0.002064	0.175	108	Dec 1992	0.001494	0.098
49	Jan 1988	-0.001372	0.158	109	Jan 1993	0.001527	0.104
50	Feb 1988	-0.001524	0.158	110	Feb 1993	0.002317	0.104
51	Mar 1988	-0.001972	0.158	111	Mar 1993	0.001904	0.104
52	Apr 1988	-0.001363	0.158	112	Apr 1993	0.002545	0.104
53	May 1988	-0.001143	0.158	113	May 1993	0.002570	0.104
54	Jun 1988	-0.001194	0.158	114	Jun 1993	0.002449	0.104
55	Jul 1988	-0.001429	0.158	115	Jul 1993	0.002161	0.104
56	Aug 1988	-0.001315	0.158	116	Aug 1993	0.001857	0.104
57	Sep 1988	-0.002581	0.158	117	Sep 1993	0.001664	0.104
58	Oct 1988	-0.002337	0.158	118	Oct 1993	0.002184	0.104
59	Nov 1988	-0.001218	0.158	119	Nov 1993	0.002932	0.104
60	Dec 1988	-0.000203	0.158	120	Dec 1993	0.002776	0.104

¹ Source: U.S. Department of Labor, Bureau of Labor Statistics, Rent of Primary Residence component of the Consumer Price Index—All Urban Consumers.

² Source: U.S. Census Bureau, Housing Vacancy Survey—Annual 1999.

TABLE 3-21—HPI DISPERSION PARAMETERS ¹

Dispersion Parameter	Linear (α)	Quadratic (β)
	0.002977	-0.000024322

¹ Source: OFHEO House Price Report, 1996:3.

3.1.4 Constant Values

Certain values are numerical constants that are parameters of the cash flow simulation. These values are established by OFHEO on the basis of analysis of Benchmark and other historical data.

3.1.4.1 Single Family Loan Performance

TABLE 3-22—LOAN GROUP INPUTS FOR SINGLE FAMILY GROSS LOSS SEVERITY

Variable	Description	Value	Source
MQ	Months Delinquent: time during which Enterprise pays delinquent loan interest to MBS holders	4 for sold loans 0 otherwise	
MF	Months to Foreclosure: number of missed payments through completion of foreclosure	13 months	Average value of BLE data
MR	Months in REO	7 months	Average value of BLE data
F	Foreclosure Costs as a decimal fraction of Defaulted UPB	0.037	Average of historical data from Enterprise loans, 1979-1999
R	REO Expenses as a decimal fraction of Defaulted UPB	0.163	Average of historical data from Enterprise loans, 1979-1999

TABLE 3-22—LOAN GROUP INPUTS FOR SINGLE FAMILY GROSS LOSS SEVERITY—Continued

Variable	Description	Value	Source
RR	Recovery Rate for Defaulted loans in the BLE, as a percent of predicted house price using HPI (decimal)	0.61	Average value of BLE data

See also Table 3-35, Coefficients for Single Family Default and Prepayment Explanatory Variables.

3.1.4.2 Multifamily Loan Performance

TABLE 3-23—LOAN GROUP INPUTS FOR MULTIFAMILY DEFAULT AND PREPAYMENT

Variable	Description	Value	Source
OE	Operating expenses as a share of gross potential rents	0.472	Average ratio of operating expenses to gross rents, 1970-1992 Institute for Real Estate Management annual surveys of apartments.
RVR ₀	Initial rental vacancy rate	0.0623	National average vacancy rate, 1970-1995, from census surveys.

TABLE 3-24—LOAN GROUP INPUTS FOR MULTIFAMILY GROSS LOSS SEVERITY

Variable	Description	Value	Source
MQ	Time during which delinquent loan interest is passed-through to MBS holders	4 for sold loans 0 otherwise	
RHC	Net REO holding costs as a decimal fraction of Defaulted UPB	0.1333	UPB-weighted average, Freddie Mac "old book" REO through 1995.
MF	Time from Default to completion of foreclosure (REO acquisition)	18 months	UPB-weighted average, Freddie Mac "old book" REO through 1995.
MR	Months from REO acquisition to REO disposition	13 months	UPB-weighted average, Freddie Mac "old book" REO through 1995.
RP	REO proceeds as a decimal fraction of Defaulted UPB	0.5888	UPB-weighted average, Freddie Mac "old book" REO through 1995.

See also Table 3-39, Explanatory Variable Coefficients for Multifamily Default.

3.2 Commitments

3.2.1 Commitments Overview

The Enterprises make contractual commitments to purchase or securitize mortgages. The Stress Test provides for deliveries of mortgages into the commitments that exist at the start of the Stress Period. These mortgages are grouped into "Commitment Loan Groups" that reflect the characteristics of the mortgages that were originated in the six months preceding the start of the Stress Period and securitized by the Enterprise, except that they are assigned coupon rates consistent with the projected delivery month in each interest rate scenario. These Commitment Loan Groups are added to the Enterprise's sold portfolio and the Stress Test projects their performance during the Stress Period. In the down-rate scenario, the Stress Test provides that 100 percent of the mortgages specified in the commitments are delivered within the first three months. In the up-rate scenario, 75 percent are delivered within the first six months.

3.2.2 Commitments Inputs

The Stress Test uses two sources of data to determine the characteristics of the mortgages delivered under commitments:

- Information from the Enterprises on the characteristics of loans originated and delivered to the Enterprises in the six months preceding the start of the Stress

Period, broken out into four categories, scaled by the dollar value of commitments outstanding at the start of the Stress Period;

- Interest Rate series generated by the Interest Rates component of the Stress Test.

3.2.2.1 Loan Data

[a] The Enterprises report Commitment Loan Group categories based on the following product type characteristics of securitized single family loans originated and delivered during the six months prior to the start of the Stress Test:

- 30-year fixed-rate
- 15-year fixed-rate
- One-year CMT ARM
- Seven-year balloon

[b] For each Commitment Loan Group category, the Enterprises report the same information as in section 3.6 for Whole Loan groups with the following exceptions:

- Amortization term and remaining term are set to those appropriate for newly originated loans
- Unamortized balances are set to zero
- The House Price Growth Factor is set to one
- Age is set to zero
- Any credit enhancement coverage other than mortgage insurance is not reported.

[c] For each Commitment Loan Group category, the Enterprises report the Starting UPB defined as follows:

$$\text{Starting UPB} = \left[\frac{\text{Total dollar amount of Commitments Outstanding}}{\text{Total Starting UPB for all Commitment Loan Group Categories}} \right] \times$$

$$\left[\frac{\text{Starting UPB for the Commitment Loan Group Category}}{\text{Total Starting UPB for all Commitment Loan Group Categories}} \right]$$

3.2.2.2 Interest Rate Data

The Stress Test uses the following Interest Rate series, generated from section 3.3, Interest Rates, of this Appendix, for the first 12 months of the Stress Period:

- One-year Constant Maturity Treasury yield (CMT)
- Conventional mortgage rate (30-year fixed rate)
- 15-year fixed-rate mortgage rate
- Seven-year balloon mortgage rate.

3.2.3 Commitments Procedures

[a] Determine Commitment Loan Groups from the Commitment Loan Group categories as follows:

- Divide each category into one subcategory for each delivery month. Three subcategories are created in the down-rate scenario and six in the up-rate scenario.