must be fully amortized by December 31, 1998. 12 CFR 35.3(b).

The OCC proposes to remove 12 CFR part 35, effective January 1, 1999, obviating the need for regulatory action in the future. Prior to that date, an annotation to part 35 in title 12 of the Code of Federal Regulations would indicate the effective date for removal of the part.

Regulatory Flexibility Act

It is hereby certified that this regulation will not have a significant economic impact on a substantial number of small entities. Accordingly, a regulatory flexibility analysis is not required. This regulation has no material impact on national banks, regardless of size.

Executive Order 12866

The OCC has determined that this proposal is not a significant regulatory action under Executive Order 12866.

Paperwork Reduction Act

The collection of information contained in 12 CFR 35.7 has been approved by the Office of Management and Budget (OMB) under OMB Control Number 1557–0186. This proposal would remove as unnecessary, for the reasons set forth in the preamble, that collection of information effective January 1, 1999. Comments on the OCC's proposed elimination of this collection of information should be sent to the Office of Management and Budget, Paperwork Reduction Project (1557–0186), Washington, DC 20503, with a copy to the OCC's Legislative and Regulatory Activities Division (Attn: 1557–0186) at the OCC address previously specified.

List of Subjects in 12 CFR Part 35

Accounting, Agriculture, National banks, Reporting and recordkeeping requirements.

Authority and Issuance

For the reasons set out in the preamble, and under the authority of 12 U.S.C. 93a and 1823(j), chapter I of title 12 of the Code of Federal Regulations is proposed to be amended as follows:

PART 35—[REMOVED]

1. Part 35 is removed effective January 1, 1999.

Dated: February 3, 1995.

Eugene A. Ludwig,

Comptroller of the Currency.

[FR Doc. 95–3117 Filed 2–7–95; 8:45 am]

BILLING CODE 4810–33–P

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT

Office of Federal Housing Enterprise Oversight

12 CFR Chapter XVII

RIN 2550–AA02

Risk-Based Capital

AGENCY: Office of Federal Housing Enterprise Oversight, HUD.

ACTION: Advance Notice of Proposed Rulemaking.

SUMMARY: Title XIII of the Housing and Community Development Act of 1992, known as the Federal Housing Enterprises Financial Safety and Soundness Act of 1992, gives the Office of Federal Housing Enterprise Oversight (OFHEO) the responsibility for developing a risk-based capital regulation for the Federal National Mortgage Association and the Federal Home Loan Mortgage Corporation (collectively, the Enterprises). To discharge this responsibility, OFHEO must develop and implement a risk-based capital ''stress test'' that, when applied to the Enterprises, determines the amount of capital that an Enterprise must hold initially to maintain positive capital throughout a ten-year period of economic stress.

This Advance Notice of Proposed Rulemaking (ANPR) announces OFHEO's intention to develop and publish a risk-based capital regulation and solicits public comment on a variety of issues prior to the publication of a proposed rule. OFHEO requests comment from the public concerning issues set forth in the ''Solicitation of Public Comment'' subsection of the **SUPPLEMENTARY INFORMATION** section below.

DATES: Comments regarding the ANPR must be received in writing on or before May 9, 1995.

ADDRESSES: Send written comments to Anne E. Dewey, General Counsel, Office of General Counsel, Office of Federal Housing Enterprise Oversight, 1700 G Street, NW, Fourth Floor, Washington, D.C. 20552.

FOR FURTHER INFORMATION CONTACT: David J. Pearl, Director, Research, Analysis and Capital Standards; or Gary L. Norton, Deputy General Counsel, Office of Federal Housing Enterprise Oversight, 1700 G Street, NW, Fourth Floor, Washington, D.C. 20552, telephone (202) 414–3800 (not a toll-free number).

SUPPLEMENTARY INFORMATION:

Background

Title XIII of the Housing and Community Development Act of 1992, Pub. L. No. 102–550, known as the Federal Housing Enterprises Financial Safety and Soundness Act of 1992, 12 U.S.C. 4501 et seq. (Act), established the Office of Federal Housing Enterprise Oversight (OFHEO) as an independent office within the Department of Housing and Urban Development. OFHEO's primary function is to ensure the financial safety and soundness and the capital adequacy of the nation's two largest housing finance institutions—the Federal National Mortgage Association (Fannie Mae) and the Federal Home Loan Mortgage Corporation (Freddie Mac) (collectively, the Enterprises).

Fannie Mae and Freddie Mac are Government-sponsored enterprises that serve important public purposes and receive significant financial benefits, including exemption from state and local income taxes and special treatment of their securities in a variety of regulatory and transactional situations. Although the securities that they issue or guarantee are not backed by the full faith and credit of the United States,[1] their status as Government-sponsored enterprises creates, in the view of financial market participants, an implicit Federal guarantee of those securities. Furthermore, the failure of either of the Enterprises would have serious consequences for the performance of the nation's housing markets, with a potentially disproportionate effect on low- and moderate-income families.

The Enterprises engage in two principal businesses. First, they maintain a portfolio of residential mortgages and, second, they issue and guarantee pools of residential mortgages—in the form of mortgage-backed securities (MBS)—that are held by investors. One of the Enterprises' principal financial risks stems from losses associated with defaults on mortgages that they hold or guarantee. The other financial risk stems from losses associated with changes in interest rates. Because the effective maturities of the Enterprises' assets and liabilities are not the same, interest rate changes could cause the margin between the average yield on assets and the average yield on liabilities to narrow or even become negative.

The Enterprises' capital serves as a cushion to absorb financial losses for a

[1] *See* section 306(h)(2), Federal Home Loan Mortgage Corporation Act (12 U.S.C. 1455(h)(2)) and section 304(b), Federal National Mortgage Association Charter Act (12 U.S.C. 1719(b)).

period of time until the cause of the losses can be remedied, thereby reducing the risk of failure. The Act requires OFHEO to establish, by regulation, risk-based capital standards for the Enterprises. The regulation will describe a risk-based capital stress test (stress test) that OFHEO will develop and implement to determine for each Enterprise the amount of capital [2] necessary to absorb losses throughout a hypothetical ten-year period marked by severely adverse circumstances (stress period).

Use of a stress test will enable OFHEO to tailor carefully the Enterprises' capital standards to the specific risks of the Enterprises' businesses. It also will provide a structure for incorporating interrelationships among different types of risk (prepayments, for example, relate to both credit and interest rate risk).

Statutory Requirements

The Act specifies a risk-based capital standard for each Enterprise. This standard establishes the amount of capital necessary to withstand simultaneously adverse credit and interest rate risk scenarios during the stress period plus an additional amount to cover management and operations risk, as follows:

Credit Risk

The Act establishes a credit risk scenario based on a regional recession involving the highest rates of default and loss severity experienced during a period of at least two years in an area containing at least five percent of the total U.S. population. The stress test will apply these default and loss rates, with any appropriate adjustments, over the ten-year stress period on a nationwide basis to the Enterprises' books of business.[3]

Interest Rate Risk

The Act presents two interest rate risk scenarios, one with rates rising and the other with rates falling. The Act further describes the path of the ten-year Constant Maturity Treasury (CMT) yield for each scenario and directs OFHEO to establish the yields of other financial instruments during the stress period in a reasonably consistent manner. The stress test for each Enterprise incorporates the scenario with the most adverse impact.[4]

In the rising rate scenario, the ten-year CMT yield increases during the first year of the stress period and then remains constant at the greater of (a) 600 basis points above the average yield during the preceding nine months or (b) 160 percent of the average yield during the preceding three years. The Act further limits the increase in yield to a maximum of 175 percent of the average yield over the preceding nine months.[5]

In the falling rate scenario, the ten-year CMT yield decreases during the first year of the stress period and then remains constant at the lesser of (a) 600 basis points below the average yield during the preceding nine months or (b) 60 percent of the average yield during the preceding three years. The Act further limits the decrease in yield to not more than 50 percent of the average yield in the preceding nine months.[6]

New Business and Other Activities and Considerations

Initially the stress test assumes that the Enterprises conduct no additional new business once the stress period begins, except for the fulfillment, in a manner consistent with recent experience and the economic characteristics of the stress period, of contractual commitments to purchase mortgages and issue securities.[7]

The stress test must take into account distinctions among mortgage product types, different loan-to-value ratios (LTVs), and any other appropriate factors.[8] OFHEO determines the appropriate consideration and treatment of all other factors, activities, or characteristics of the stress period not explicitly identified and/or treated in the Act—such as mortgage prepayments, hedging activities, operating expenses, dividend policies, etc.—on the basis of available information, in a manner consistent with the stress period.[9]

Management and Operations Risk

Finally, to provide for management and operations risk, after determining the amount of capital an Enterprise needs to survive the stress test, the Act requires OFHEO to increase that amount by 30 percent to set the required risk-based capital level for each Enterprise.[10]

Philosophy Guiding Stress Test Development

The mission of OFHEO is to ensure that the Enterprises are adequately capitalized and operating in a safe and sound manner, consistent with the achievement of their public purposes. The principal objective of risk-based capital standards is protection of the taxpayer from potential Enterprise insolvency. However, effective capital standards should also permit the Enterprises to fulfill their public purposes while pursuing prudent business practices and strategies. Although the stress test produces a single capital requirement, it effectively creates marginal capital requirements—incremental requirements for each additional dollar of business—for every type of product the Enterprises guarantee or hold in portfolio. Marginal capital requirements for mortgages held in portfolio will vary depending on the risk, as reflected in the stress test, of an Enterprise's funding strategy. These marginal capital requirements will have significant bearing on how the Enterprises choose to conduct their businesses.

OFHEO will seek to design the stress test so that the incentives it creates closely reflect the relative risks inherent

[2] For purposes of the ANPR, the term ''capital'' means ''total capital'' as defined under section 1303(18) of the Act (12 U.S.C. 4502(18)) to mean the sum of the following:

(A) The core capital of the [E]nterprise;

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

(i) shall include an allowance for portfolio mortgage losses, an allowance for nonreimbursable foreclosure costs on government claims, and an allowance for liabilities reflected on the balance sheet for the [E]nterprise for estimated foreclosure losses on mortgage-backed securities; and

(ii) shall not include any reserves of the [E]nterprise made or held against specific assets.

(C) Any other amounts from sources of funds available to absorb losses incurred by the [E]nterprise, that the [Director of OFHEO] by regulation determines are appropriate to include in determining total capital.

The term ''core capital'' is defined under section 1303(4) of the Act (12 U.S.C. 4502(4)) to mean the sum of the following (as determined in accordance with generally accepted accounting principles):

(A) The par or stated value of outstanding common stock.

(B) The par or stated value of outstanding perpetual, noncumulative preferred stock.

(C) Paid-in capital.

(D) Retained earnings.

The core capital of an [E]nterprise shall not include any amounts that the [E]nterprise could be required to pay, at the option of investors, to retire capital instruments.

[3] Section 1361(a)(1) (12 U.S.C. 4611(a)(1)).

[4] Section 1361(a)(2) (12 U.S.C. 4611(a)(2)).

[5] Section 1361(a)(2)(C) (12 U.S.C. 4611(a)(2)(C)).

[6] Sections 1361(a)(2)(B) (12 U.S.C. 4611(a)(2)(B)).

[7] The Act states that OFHEO may consider the impact of new business conducted during the stress period after taking into consideration the results of studies conducted by the Congressional Budget Office and the Comptroller General on the advisability and appropriate forms of new business assumptions. The studies must be completed within the first year after the issuance of the final risk-based capital regulation. OFHEO may incorporate new business into the stress test four years after the regulation is issued. Section 1361(a)(3)(C) and (D), (12 U.S.C. 4611(a)(3)(C) and (D)).

[8] Sections 1361(b)(1) and (d) (12 U.S.C. 4611(b)(1) and (d)). The Act uses the phrase ''differences in seasoning of mortgages'' which is equivalent to differences in LTVs. The term ''seasoning'' is defined as 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. Section 1361(d)(1) (12 U.S.C. 4611(d)(1)).

[9] Sections 1361(b) and (d)(2) (12 U.S.C. 4611(b) and (d)(2)).

[10] Section 1361(c)(2) (12 U.S.C. 4611(c)(2)).

in the Enterprises' different activities. To this end, OFHEO will incorporate, to the extent feasible, consistent relationships between the economic environment of the stress period and the Enterprises' businesses. This will require modeling the Enterprises' assets, liabilities, and off-balance sheet positions at a sufficient level of detail to capture their various risk characteristics. Taking all this into consideration will require a balance between the complexity and realism of the stress test and its timeliness.

Solicitation of Public Comments

OFHEO requests public comment on a number of subjects that must be addressed in its risk-based capital regulation. OFHEO will consider the comments received in response to this ANPR when developing a proposed rule. Following consideration of comments on the proposed rule, OFHEO will issue a final regulation. When addressing a specific question contained in this ANPR, OFHEO asks that commenters specifically note by number which question is being addressed.

I. Credit Risk

The Enterprises face similar mortgage credit risk in their portfolio and securitization businesses. OFHEO defines mortgage credit risk as the risk of financial loss due to borrower default and subsequent foreclosure and liquidation of a mortgaged property. Losses are realized when the unpaid loan balance on a defaulted mortgage exceeds the net proceeds of a foreclosure sale, after deducting carrying and selling costs, less any recoveries from any private mortgage insurer, recourse agreement, or other credit enhancements.

Loans with high current LTVs, where the borrowers have little to no equity in their homes, are the most likely to default.[11] For any given set of mortgage loans, the probability of default is typically low in the first year after origination, rises to a peak somewhere between the third and seventh year, and declines thereafter. If declining interest rates induce prepayments on a group of mortgage loans due to borrower refinancing activity, defaults and losses on those mortgage loans likely will be reduced, because some of the prepaid loans would ultimately have defaulted. However, the remaining group of loans is likely to be at greater risk of default, because it includes all of the original loans where the borrower would not have qualified for refinancing, but only some of the loans where the borrower was eligible.

Economic downturns result in more frequent and severe losses in all categories of mortgage loans, especially in a period of house price declines. The stress test will incorporate changes in the economic environment and simulate the relationship of those changes to mortgage defaults.

A. Defining a Stress Benchmark

The Act, in defining the risk-based capital stress test, refers to two time periods—a hypothetical ten-year ''stress period'' during which the Enterprises' capital should be sufficient to absorb losses and maintain a positive capital level while being subjected to adverse credit and interest rate risk scenarios, and the time period of ''not less than two years'' for which the ''highest rates of default and severity of mortgage losses'' occurred in a region containing at least five percent of the total population of the United States.[12] For the purposes of this ANPR, OFHEO characterizes the latter time period and region as a ''stress benchmark.'' The stress benchmark will provide the basis for the development of the credit risk stress scenario that will be applied during the ten-year stress period.

The Act permits the identification of one or more stress benchmarks. A single benchmark is conceptually appealing but presents a number of difficult issues. A single benchmark may not include sufficient data on all Enterprise product types. Patterns of multifamily and single family mortgage losses differ (see ''Mortgage Types'' below) and a stress benchmark for multifamily mortgages representing the worst regional experience for those mortgages may not coincide with the benchmark for single family mortgages based on their worst experience. Finally, data limitations may prevent OFHEO from determining loss severities during the period of highest default rates; alternatively, highest loss severities may not coincide with highest rates of default by time period or region.

Although the Act does not refer to a particular mortgage product in its reference to ''highest rates of default and severity,'' single family, 30-year, fixed-rate mortgages have long comprised the bulk of Enterprise mortgages. OFHEO expects to define a stress benchmark for these mortgages on the basis of a weighted average (by unpaid loan balance of various LTV groups) of default rates.

Existing data on loss severities may be inadequate to contribute to establishing the timing or location of the worst regional experience. Systems for the storage and analysis of data on foreclosed properties are a relatively recent development. To overcome these data deficiencies, OFHEO will consider a number of approaches to determining loss severity rates during the stress benchmark. These approaches include the use of loss severity estimates obtained from different sources and for different time periods and regions than those used to estimate the benchmark default rates.

OFHEO may use models (see ''Models of Default and Prepayment'' and ''Models of Loss Severity'' below) to establish aspects of the benchmark for which data are insufficient or unavailable. These might include, in addition to loss severities for all products, default rates for mortgage products poorly represented or non-existent in the stress benchmark. Econometric models for default, mortgage prepayment, and loss severity would facilitate consideration of the simultaneous impact of many factors on default rates, such as changes in LTVs, the impact of contemporaneous prepayments, and the impact of factors associated with mortgage product types. Models would provide a link between the performance of mortgages owned or guaranteed by the Enterprises during the stress period and performance during the stress benchmark, with due consideration of the economic circumstances of the stress period, e.g., interest rates and house prices.

Data Issues

OFHEO has received access to detailed information about the loss experience on mortgages that the Enterprises owned or guaranteed from the mid-1970s through the present. The type of information on mortgages that OFHEO needs to develop the stress test includes date of origination, original LTV ratio, type of mortgage, location, nature and degree of any credit enhancements, date of last paid installment, termination type, *e.g.*, default or prepayment, and the amount of any ultimate loss (including holding and selling costs). However, there are serious gaps in the data on loss severity through the early 1980s resulting from the lack of systems for the storage and

[11] For example, see C. Foster and R. Van Order, ''An Option Based Model of Mortgage Default Rick,'' Housing Finance Review, 3(4):351–372, 1984; C. Foster and R. Van Order, ''FHA Terminations: A Prelude to Rational Mortgage Pricing,'' AREUEA Journal, 13(3):273–291, 1985; and R.L. Cooperstein, F.S. Redburn, and H.G. Meyers, ''Modelling Mortgage Terminations in Turbulent Times,'' AREUEA Journal, 19(4):473–494. For a review of the literature in this area, see R.G. Quercia and M.A. Stegman, ''Residential Mortgage Default: A Review of the Literature,'' Journal of Housing Research, 3(2):341–379, 1992.

[12] Section 1361(a)(1) (12 U.S.C. 4611(a)(1)).

analysis of data on foreclosed properties and the manner in which loan balances were reported by seller/servicers.

In general, however, with the increase over time of the Enterprises' share of the overall mortgage market, the data grow increasingly rich. If necessary, OFHEO could supplement these data with data from the Federal Housing Administration or other sources such as TRW Redi and Mortgage Information Corporation.

If the stress benchmark is wholly or primarily based on Enterprise data, the loan-level data could be aggregated across the two Enterprises in order to determine the worst historical experience. Preliminary analysis suggests that the worst historical experience may be different for the two Enterprises. An alternative would be to determine the worst historical experience for each Enterprise separately and then use a simple or weighted average of default rates.

Question 1: What data and methodology should OFHEO use in its determination of the stress benchmark?

Benchmark Time Period and Region

OFHEO has considered at least two approaches for defining the benchmark time period. It could be defined as the period in which the highest rates of default occurred, that is, an ''exposure year'' approach; or the period in which the loans with the highest cumulative or lifetime rates of default were originated, which can be termed an ''origination year'' approach. At the start of the stress period, the Enterprises' books of business will include survivors from many loan origination years. An exposure year benchmark corresponds more closely to the manner in which the Enterprises' mortgage portfolios will experience the risk of credit losses as they move through the ten-year stress period. However, using exposure years may complicate adjustments for differences in LTVs and other factors (see ''Relating Stress Period Default Rates to Benchmark Default Rates'' below). Using origination years may require some adjustment for differences in mortgage age (see ''Mortgage Age'' below) since virtually all of the Enterprise mortgages will have been originated prior to the start of the stress period.

Alternative approaches to defining the stress benchmark (exposure year versus origination year) suggest alternative analyses of defaults. An exposure year approach requires the determination of default rates on loans of varying age at risk of failure within a specified period. The resulting time-period specific default rates for loans outstanding at the beginning of the period can be termed ''conditional rates.'' Because default rates vary with the age of a mortgage (see ''Mortgage Age'' below), OFHEO might define an age schedule of conditional default rates for loans outstanding at the start of the stress benchmark.[13] For comparison across time periods and regions, synthetic cumulative default rates for the stress benchmark could be derived under a common set of prepayment assumptions. In an origination year approach, either cumulative or conditional default rates could be used.

The Act requires that the benchmark region comprise a contiguous area containing at least five percent of the total United States population. Part or all of states such as Texas or California satisfy this population requirement; however, areas experiencing the highest rates of default may cross over one of these state's boundaries into adjoining states. As appropriate, OFHEO will use a definition of benchmark region that includes more than one state, part of one state, or parts of several states.

Question 2: How should the benchmark time period be defined?

Measurement of Default

Default can be defined in several ways: Defaults can be deemed to occur at the time a borrower ceases making payments, when a loan payment is past due by a contractually specified number of days, on the date of foreclosure, or on the date when losses are recognized. Defaults can be measured on a gross basis or net of any subsequent cures.

Question 3: What are the relative merits of the alternative approaches for the measurement of mortgage defaults?

B. Relating Stress Period Default Rates to Benchmark Default Rates

Default rates during the stress period may differ from the default rates associated with the stress benchmark. This difference may result from differences between the characteristics and composition of an Enterprise's mortgages at the start of the stress period relative to those of the mortgages identified with the stress benchmark. Stress period default rates may also differ from stress benchmark rates as a result of differences in the stress period environment, such as interest rates and inflation. OFHEO must also specify the timing of defaults and losses during the stress period.

The Act requires that OFHEO, in establishing the stress test, take into account appropriate distinctions among types of mortgage products, differences in LTVs, and other factors that OFHEO's Director considers appropriate.[14] Such factors include prepayment activity, mortgage age, and loan size. The Act also requires an adjustment for the effects of general inflation in the highest interest rate environment in the stress test.[15]

Loan-to-Value Ratios

The payment of principal and changes in the value of the property securing a mortgage affect LTVs over time. Repayments of loan principal and rising property values lower LTVs, while falling property values raise LTVs. Because LTV is a common measure of borrower equity, and borrower equity is a major factor determining defaults and losses, the stress test must take into account changes in LTVs. If distributions of LTVs during the stress period differ from those for the same types of loans associated with the stress benchmark, defaults and losses during the stress period will likely differ from those of the benchmark.

All loans owned or guaranteed by the Enterprises at the start of the stress period will have been originated prior to that time. Although relatively good estimates of property value are available at the time of loan origination, OFHEO will need to use house price indexes to obtain estimates of the LTVs for mortgages at the start of, and possibly throughout, the stress period.[16] OFHEO

[13] Age is often a proxy for additional unobserved factors affecting the default probabilities of individual mortgages. Immediately after origination, default is unlikely for all borrowers. Default rates first rise over time as new information about properties and borrowers is revealed. Then as relatively weaker borrowers default, the average rate of default declines. See, for example, the discussion in C. Pestre, P. Richardson, and C. Webster, ''The Lehman Brothers Mortgage Default Model and Credit-Adjusted Spread Framework,'' Mortgage Market Analysis, Lehman Brothers, Fixed Income Research, January 28, 1992. Other influential default studies that have included mortgage age as an explanatory factor include: T. Campbell and J. Dietrich, ''The Determinants of Default on Conventional Residential Mortgages,'' Journal of Finance, 38(5):1569–1581, 1983; D. Cunningham and C. Capone, ''The Relative Termination Experience of Adjustable to Fixed-Rate Mortgages,'' The Journal of Finance, 45(5):1687–1703, 1990; and J.M. Quigley and R. Van Order, ''More on the Efficiency of the Market for Single Family Homes: Default,'' Center for Real Estate and Urban Economics, University of California, Berkeley, 1992.

[14] Section 1361(b)(1) (12 U.S.C. 4611(b)(1)).

[15] Section 1361(a)(2)(E) (12 U.S.C. 4611(a)(2)(E)).

[16] For an origination year benchmark, OFHEO will likely have access to accurate information about the original LTVs for all benchmark loans. On the other hand, to develop an exposure year benchmark, OFHEO will have to estimate LTVs during the benchmark time period for all loans

Continued

intends to use a repeat sales index based on sales (or appraisals undertaken by borrowers in conjunction with refinancing the mortgages) of the Enterprises' owned and guaranteed portfolios (see ''House Price Indexes'' below).

Models of mortgage default and prepayment (see ''Models of Default and Prepayment'' below) emphasize the importance of LTV because of its direct relationship to homeowner's equity, defined as the difference between the value of a property and the outstanding principal balance of the related mortgage. These models differ in their treatment of house price changes and with regard to how changes in equity affect default and prepayment. For example, one approach assumes that defaults occur only among loans with negative equity.[17] House price indexes only provide estimates of the average change in property values between two dates. Because changes in individual property values are not continuously observed, simulation models have been used to characterize the distribution of changes in house prices relative to the market average. Estimates of the percentage of loans with negative equity and estimates of default rates can be derived from these distributions.

This approach assumes that homeowner's equity includes not just the difference between property value and outstanding loan amount, but also the current value of the mortgage to the borrower. A below-market rate loan has positive value. The precise value of the mortgage depends on the loan interest rate relative to the current market rate and the borrower's expectations about future interest rates and mobility. A borrower whose loan has a fixed contract rate below current market yields has more to lose by defaulting than a borrower with a note rate above the current market rate.

Question 4: What is the appropriate way in which to adjust the LTVs of mortgages in the stress test?

Question 5: If estimates of the distribution of house price changes are used to adjust the LTVs of mortgages, what is an appropriate method, e.g., stochastic process?

Question 6: In what manner, if at all, should OFHEO incorporate mortgage value as a factor affecting defaults?

Mortgage Types

Single Family

The Act requires that the stress test consider differences in mortgage types (single family or multifamily, fixed or adjustable rate, first or second lien, owner-occupied or investor owned, positive or negative amortization, alternate term to maturity, etc.).[18] Risk characteristics of different types of mortgages vary considerably. Because of the fundamental differences between single family and multifamily mortgage risk, we discuss the latter in a separate section below.

Given that OFHEO plans to establish the stress benchmark based on single family, 30-year, fixed-rate mortgages, the Act calls for OFHEO to identify the worst rates of default and losses for any time period or region.[19] The Enterprises may not have held certain types of single family mortgages in the stress benchmark OFHEO identifies. Other types of single family mortgages held during the stress benchmark may have experienced their worst defaults and losses at other times or in other regions.

Alternative approaches could include use of multivariate models to estimate separate equations for different mortgage products or different mortgage features, default rates representing some multiple of the standard single family mortgage, or some combination of these approaches (see ''Models of Default and Prepayment'' below).

Question 7: How should OFHEO relate other types of mortgages to a single stress benchmark developed based on single family, 30-year, fixed-rate mortgages?

Multifamily

While single family properties are both a source of shelter and, for most families, their most valuable financial asset, multifamily properties are primarily income-producing businesses for their owners. Multifamily loans are less homogeneous and subject to a more diverse set of risks than single family loans. The multifamily market has more pronounced business cycles and is heavily affected by tax and regulatory policy. Patterns of losses over time for multifamily loans have not tracked those of the single family market. The Enterprises operate several different types of multifamily programs, some of which rely heavily on lender recourse or other forms of credit enhancement with differing risk characteristics.

Data needs in analyzing multifamily loans are greater than for single family loans and yet the quality of such data is poorer. Data are incomplete and cover a smaller portion of the multifamily market than the single family market. There is also a dearth of research on critical multifamily credit risk issues.

For the owner of a multifamily property, net operating income (NOI) plays a more important role than equity in the decision to default. A property's debt service coverage, rather than LTV ratio, may be the most important indicator of multifamily credit risk, yet available data can only provide a short time-series for income. Multifamily value indexes are problematic because there are fewer transactions than in the single family market and property appraisals are less reliable. Appraisals are less reliable due to the varying methodologies used to calculate multifamily property income and the application of so-called ''capitalization rates'' to NOI.[20]

Prepayments play a far less significant role in the analysis of multifamily credit risk than single family credit risk because ''lockouts'' and yield maintenance agreements effectively prevent most multifamily borrowers from refinancing to take advantage of declining interest rates. The Enterprises' activity in the multifamily market is expected to increase significantly in future years in order to meet the affordable housing goals established under the Act.[21] Thus, the treatment of multifamily risks will be increasingly important.

Question 8: How should existing and emerging multifamily data sources be identified?

Question 9: What are alternative empirical and theoretical approaches to the estimation of multifamily credit risk?

Question 10: How should the projection of defaults and losses on the Enterprises' multifamily portfolio be related to a single family stress benchmark?

General Price Inflation

The Act requires that OFHEO adjust credit losses in the stress test when large increases in interest rates imply higher rates of general price inflation.[22] If the ten-year CMT yield is assumed to increase by more than 50 percent over the average yield during the preceding

originated earlier. OFHEO would use house price indexes for this purpose.

[17] *See* Foster and Van Order, *supra*, (1984, 1985).

[18] Sections 1361(b)(1) and (d)(2) (12 U.S.C. 4611(b)(1) and (d)(2)).

[19] Section 1361(a)(1) (12 U.S.C. 4611(a)(1)).

[20] Government Accounting Office, ''Federal Home Loan Mortgage Corporation: Abuses in Multifamily Program Increase Exposure to Financial Losses'' (Oct. 1991); J.M. Abraham, ''On the Use of a Cash Flow Time-Series to Measure Property Performance,'' forthcoming in Journal of Real Estate Research; and J.M. Abraham, ''Credit Risk in Commercial Real Estate Lending, ''Federal Home Loan Mortgage Corporation, 1994 presented at the 1994 meetings of the American Real Estate and Urban Economics Association (available from OFHEO).

[21] Sections 1331–1336 (12 U.S.C. 4561–4566).

[22] Section 1361(a)(2)(E) (12 U.S.C. 4611(a)(2)(E)).

nine months, inflation is presumed to be ''correspondingly higher.'' If, for example, the ten-year CMT yield were to have averaged eight percent during the past nine months, a 50 percent increase would raise it to 12 percent. The Act, however, would permit an increase to 14 percent.

OFHEO would first determine what annual percentage difference in general inflation rates best corresponds to the difference between a 12 percent and a 14 percent ten-year CMT yield over a nine-year period. The difference in inflation rates could be assumed to be equal to the difference in interest rates or it could be based on an estimated historical relationship.

OFHEO would then translate that higher inflation rate into individual house price changes. Again, the differences in house price changes could be assumed to be equal to the difference in general price inflation rates or could be based on an estimated relationship.

As the last step, OFHEO would translate the difference in house price changes into differences in defaults. This could be done in the context of a multivariate default and prepayment model used for making many adjustments simultaneously (see ''Models of Default and Prepayment'' below), or it could be the subject of a separate analysis.

Question 11: Should OFHEO assume a ''one-to-one'' relationship between long-term differences in interest rates, general price inflation rates, and house price inflation rates or should it estimate more complex, but potentially more realistic, relationships between these phenomena?

Question 12: What is the best method of modeling the effects of higher house prices on defaults?

Mortgage Prepayments—Credit Risk

Prepayments are a significant factor in interest rate risk, but they also affect credit losses. Interest rate changes have a significant influence on mortgage prepayments. Prepayment rates are sensitive to the differences between current market yields and the levels of mortgage rates among outstanding mortgages. A homeowner today will refinance (and prepay) when current mortgage rates fall as little as 50 basis points below the rate on his or her mortgage.

Prepayment rates also depend on the time paths of interest rates. Homeowners who fail to refinance once mortgage rates become advantageous are relatively unlikely to do so in the future (many may not qualify for refinancing). Thus, prepayment rates for mortgages with a given coupon rate rise as interest rates fall below a particular threshold, but they eventually will slow, even if interest rates remain at the new lower levels or continue to decline. This phenomenon is commonly known as ''burn-out.''

The expected pattern of prepayments in the stress period might be quite different from the pattern experienced during the benchmark period. The drastic yield curve shifts that will be experienced during the initial year of the stress period will almost certainly not be found during the benchmark period that OFHEO must identify. The greater number of mortgages that prepay, the fewer are the candidates for subsequent default. Conversely, the fewer mortgages that prepay, the greater the number remaining that might default. At the same time, the default risk of mortgages remaining after a refinancing wave may be higher than previously. Many homeowners who did not take advantage of attractive refinancing opportunities may have been unable to do so because of higher risk profiles. Given the widely divergent interest rate movements that the Enterprises may experience during the stress period, loss adjustments for differing prepayment behavior could be considerable.

If OFHEO expresses mortgage default rates as conditional rates, defaults during any given time interval of the stress period will depend on the proportion of mortgages outstanding at the beginning of that time interval. Such an approach would, in effect, make a substantial adjustment for prepayments. A more complicated adjustment would take into account the generally higher quality of loans eligible for refinancing. In a stress scenario involving falling interest rates, for example, the stress test might take into account the generally higher quality of loans that qualify for refinancing and the potentially lower quality of surviving loans (see ''Models of Default and Prepayment'' below). Alternatively, if the stress test involves no interaction of the total amount of defaults and prepayments, OFHEO still might adjust the timing of defaults during the stress period to be consistent with prepayments expected in a particular interest rate scenario. Mortgage prepayments are discussed further under ''Interest Rate Risk'' below.

Question 13: Should anticipated prepayments affect the volume or timing of defaults in the stress period?

Mortgage Age

Holding homeowner's equity constant, a number of factors make the likelihood of borrower default vary over the life of a loan. On one hand, changes in a borrower's circumstances subsequent to the loan's origination, such as unemployment, marriage, divorce, childbearing, mortality, and residential mobility, affect the likelihood of default and prepayment, and the cumulative frequency of such events increases as a loan ages. On the other hand, a record of consistent payments by a borrower over time increases the probability of continued loan performance.

Models that have included variables for both homeowner's equity and mortgage age have found the contribution of age to be statistically significant.[23] This may be particularly important if an origination year approach is used in the benchmark. Using an origination year approach, loans in the stress benchmark would all be newly originated loans, while those at the beginning of the stress period would be a mixture of old and new loans.

Question 14: Is it appropriate for OFHEO to factor mortgage age into the stress test, and, if so, what is the best method of doing so?

C. Models of Default and Prepayment

There are a number of approaches to relating the factors discussed above, such as LTV, mortgage type, mortgage age, and prepayments, to the performance of the Enterprises during the stress period. A comprehensive way to incorporate all of these factors into the stress test would be to estimate joint multivariate models of default and prepayment.[24] A joint model of default and prepayment would ensure the consistency of these key variables and reflect an appropriate time pattern of defaults as well. Researchers have estimated a number of such models.[25]

[23] For example, see the papers cited in footnote 11 above.

[24] Due to the unique difficulties of modeling multifamily default and prepayment, multifamily and single-family loans would probably need to be modeled separately. The modeling of loss severity is discussed in the next section.

[25] Multinomial logit models for default have been estimated by Campbell and Dietrich (1983) *supra*; P. Zorn and M. Lea, ''Mortgage Borrower Repayment Behavior: A Microeconomic Analysis with Canadian Adjustable Rate Mortgage Data, AREUEA Journal, 17(1):188–136, 1989; and Cunningham and Capone (1990) *supra.* More recently, proportional hazards models have been used to analyze default and prepayment. See, for example, J. Quigley, ''Interest Rate Variations, Mortgage Prepayments and Household Mobility, Review of Economics and Statistics, 119(4):636–643, 1987; and J.M. Quigley and R. Van Order, ''More on the Efficiency of the Market for Single Family Homes: Default,'' Center for Real Estate and Urban Economics, University of California, Berkeley, 1992.

A joint approach to default and prepayment would generate default rates reasonably related to the stress benchmark, while simultaneously generating prepayment rates that are consistent with the interest rate characteristics of the ten-year stress period. To estimate a multivariate default/prepayment model, OFHEO could draw on all relevant historical data, not just data from the stress benchmark. The model might include explanatory variables such as LTVs at origination, current LTVs (determined through the application of an appropriate house price index), differences between actual mortgage coupons and current market rates, interest rate paths, mortgage age, dummy variables for time period and location of mortgaged property, and additional characteristics specific to different mortgage products. The estimation procedure could allow for changing coefficients over time to reflect structural changes in prepayment and default behavior. During the stress period, explanatory or dummy variables, reflecting the special circumstances of the stress benchmark, would be set at their benchmark levels.

While multivariate models allow for the most realistic estimates of defaults and prepayments, OFHEO recognizes the difficulties of such an approach. Insufficient data may complicate model selection and the estimation of some individual parameters. One of the most simple approaches would be to measure cumulative defaults in the stress benchmark for the most common 30-year, fixed-rate, 80 percent LTV mortgages and then spread those defaults evenly or according to some predetermined pattern over the ten-year stress period, with no consideration of prepayments. Losses on other mortgage types and LTVs could be set at simple multiples of the ''standard'' loss rate based on average historical experience. All other possible variables might be ignored.

Many approaches of intermediate complexity exist. For example, OFHEO could determine the stress benchmark default rates for standard 30-year, fixed-rate, single family mortgages for several LTV categories and a few other types of mortgages. Relative defaults on additional mortgage types would be determined from more recent data using multivariate models, which would also provide adjustment factors for some mortgage features and other relevant variables. Prepayments could be modeled separately, affecting projected defaults by changing the volume of surviving loans (See ''Mortgage Prepayments—Interest Rate Risk'' below). The time patterns of defaults could also be modeled separately as a function of mortgage age.

Question 15: What are the relative merits of using a joint model of default and prepayment in the stress test?

Question 16: What is an appropriate statistical method for estimating a joint model of default and prepayment?

Question 17: Should defaults be expressed in terms of conditional failure rates (hazards), cumulative default rates, or in some other manner?

Question 18: What explanatory variables should be included in a statistical model for default and prepayment?

Question 19: What is an appropriate level of statistical aggregation for the estimation of a joint model of default and prepayment?

Question 20: How should the impact of house price trends, interest rates, and other economic factors be incorporated into a model of default and prepayment?

D. Models of Loss Severity

Due to the varying quality of data on losses on defaulting loans, OFHEO may be unable to establish actual loss severities for the stress benchmark. Even if loss severities are incorporated in the stress benchmark, OFHEO may make adjustments to reflect changes in factors that affect loss severities. Consequently, OFHEO will conduct a separate analysis of loss severity based on all available data. This section examines some of the issues involved in modeling loss severity, including approaches for linking loss severity rates to the stress benchmark.

Loss severity refers to the actual dollars lost on a defaulted loan and allows credit risk to be quantified in dollar terms. Severity is the extent to which the costs associated with default, foreclosure, and disposition exceed the revenues associated with these processes. The major costs are the loss of loan principal, transaction costs at both foreclosure and disposition, and carrying costs throughout the process. The major revenues are foreclosure sale price and mortgage insurance payments.

Loss severity, like default, depends on numerous factors. Some factors—original LTV ratio, LTV ratio at time of default, original loan size, occupancy status, type of structure, and presence or absence of mortgage insurance—are the factors that also influence the likelihood of default. Other factors—methods of disposition, state foreclosure laws, and home price movements after default—influence severity without affecting the likelihood of default.[26]

OFHEO is considering using a multivariate statistical model to estimate the separate effects of these factors on severity. OFHEO may develop a separate model for each of the cost and revenue components of loss severity since each component is affected by different factors. In the event that data on the individual revenue and cost components of loss severity are unavailable, an alternative approach would be to model overall loss severity directly.

Another less complex option is to estimate the individual components without multivariate statistical analysis. OFHEO could set fixed parameters for the components of severity—foreclosure costs might be x percent of unpaid principal balance (UPB), carrying costs equal to y percent of UPB and sales prices being z percent of UPB—while allowing severity to vary based on, for example, the presence or absence of private mortgage insurance or state foreclosure laws. The simplest possible option would be to assume that all defaulted loans face the same level of severity as a percentage of UPB.

There are a number of ways in which rates of loss severity may be related to the stress benchmark rates of default and the corresponding rates of default during the stress period. Given the impact of state foreclosure laws on loss severity, default rates and loss severity will be linked through the geographic location of the mortgages. For example, loss severities are likely to be lower in states where foreclosure laws are relatively more favorable to the lender.

The assumptions about changes in house prices in the stress benchmark and during the stress period will affect the determination of foreclosure sales prices and loss severity. Defaults are more likely to have occurred when borrowers' properties have appreciated much less than the average for their region. This implies that house price indexes used to model loss severity would best be based on properties that have experienced lower than average appreciation.

[26] See, for example, T. Clauretie and T.N. Herzog, ''How State Laws Affect Foreclosure Costs,'' Secondary Mortgage Markets, 6(Spring):25–28, 1989; T. Clauretie and T.N. Herzog, ''The Effect of State Foreclosure Laws on Loan Losses: Evidence from the Mortgage Insurance Industry,'' Journal of Money, Credit, and Banking, 22(2):221–233, 1990; E. Bruskin and M. Buono, ''A New Understanding of Loss Severity: Time is (of) the Essence,'' in Mortgage Securities Research, Goldman-Sachs, September 1994; and V. Lekkas, J. Quigley, and R. Van Order, ''Loan Loss Severity and Optimal Mortgage Default,'' AREUEA Journal, 21(4):353–371, 1993.

Question 21: What are the explanatory factors OFHEO should consider in modeling loss severity?

Question 22: Should OFHEO model the individual cost and revenue components of severity or should OFHEO model only overall severity?

Question 23: What is an appropriate house price index for real estate owned (REO) properties? In estimating foreclosure sales prices, should OFHEO use a house price index based on all properties or a house price index based only on REO properties?

E. House Price Indexes

The Act requires that OFHEO use house price indexes to determine changes in the values of properties securing mortgages owned or guaranteed by the Enterprises and the corresponding changes in LTVs. Changes in property values are—

determined on an annual basis by region, in accordance with the Constant Quality Home Price Index published by the Secretary of Commerce (or any index of similar quality, authority, and public availability that is regularly used by the Federal Government).[27]

Since the second quarter of 1994, the Enterprises have published the quarterly Conforming Mortgage House Price Index (CMHPI) for the nine Census divisions. This represents a significant improvement over the annual four Census region Commerce Constant Quality Index (CCQI). The CMHPI is based on a weighted repeat sales (WRS) approach in which multiple transactions, *i.e.*, mortgage originations, for individual properties are matched by street address to obtain changes in sales prices or appraisal values. Observed property values and transactions dates are then combined in a multivariate statistical model to estimate an index of housing values.[28]

OFHEO believes that a WRS index based on Enterprise data offers a number of advantages for estimating the changing LTVs of the Enterprises' mortgage assets. Perhaps foremost among these is the direct correspondence between index data and the housing segment serviced by the Enterprises. This factor, along with others, should make the index more accurate for establishing the current market values of properties securing mortgages held or guaranteed by the Enterprises. In addition, a WRS index based on Enterprise data will allow OFHEO to estimate changes in housing values at lower levels of geographic and temporal aggregation, and with greater statistical precision, than the CCQI allows. In order to meet the requirements of the Act regarding the use of an alternative house price index, OFHEO will produce and publish a similar house price index or indexes using data on the historical mortgage transactions of the Enterprises.

Issues that have a bearing on the application of house price indexes to the risk-based capital test include the appropriate level of geographic aggregation, sample selection and appraisal bias, and the effect of index revisions as new data becomes available.[29]

Geographical Aggregation

Aggregation across housing markets with imperfectly correlated house price changes will result in biased estimates of the average levels of appreciation in individual markets. This bias can be characterized in terms of the smoothing of market-wide indexes, with a corresponding increase in the apparent volatility of individual house prices around the market index. Excessive disaggregation, however, may reduce the frequency at which indexes can be meaningfully computed and subject them to large revisions.

Question 24: What principles should OFHEO use in selecting the optimal level of geographic aggregation for the stress test?

Bias

As discussed below, potential sources of statistical bias include sample selection bias and appraisal bias.

Sample Selection Bias

Even within the total database of Enterprise mortgages, non-random sampling of individual properties with repeat transactions could result in an index that is biased for the larger population of Enterprise properties. For example, the conforming loan limit and year-to-year changes in the limit could result in sample selection bias in the estimated parameters of a repeat transactions index. A closely related form of sample selection bias can occur when the waiting time between repeat transactions is correlated with the change in house prices. For example, if more rapidly appreciating properties turn over within shorter time intervals, they will appear in the repeat sample more quickly. In this case, appreciation rates for repeat transactions near the end of the sample period will not be representative. Thus, sample selection bias would be greater near the end of the index.

Appraisal Bias

Approximately 85 percent of the repeat transactions used by the Enterprises to estimate WRS house price indexes involve a refinance transaction.[30] Appraisals provide useful information on house values in the absence of sales transactions. However, the use of appraisals in real estate valuation is thought to impart bias by smoothing the fluctuations in housing values. Appraisals are derived through comparisons with properties that have either been sold or listed for sale within the past several months and may fail to indicate more recent changes in housing values.

Question 25: Should house price indexes estimated using Enterprise data include adjustments for identifiable sources of statistical bias?

Question 26: What additional sources of statistical bias exist and what are possible corrective actions that may be taken to address them?

Question 27: What methods of accounting and correcting for sample selection bias should be used?

Question 28: Should a statistical adjustment to the WRS house price index be made to address the impact of appraisal bias?

Revision Volatility

As data on new transactions are obtained each quarter, new repeat transactions can be combined with transactions that occurred in the past. Thus, the quarterly index estimation process involves the revision of the entire index in light of new information.

[27] Section 1361(d)(1) (12 U.S.C. 4611(d)(1)).

[28] *See* W. Stephens, Y. Li, V. Lekkas, J. Abraham, C. Calhoun, and T. Kimner, ''Agency Repeat Transactions,'' revised August 1994, forthcoming in Journal of Housing Research (available from OFHEO).

[29] Methodological issues related to the estimation of repeat transaction house price indexes are discussed in the following papers: M.J. Bailey, R.F. Muth, and H.O. Nourse, ''A Regression Method of Real Estate Price Index Construction,'' Journal of the American Statistical Association, 58:933–942, December 1963; K.E. Case and R.J. Shiller, ''Prices of Single-Family Homes since 1970: New Indexes for Four Cities,'' New England Economic Review, 45–56, September/October 1987; K.E. Case and R.J. Shiller, ''The Efficiency of the Market for Single Family Homes,'' American Economic Review, 79:125–137, 1989; J.M. Abraham, J.M. and W.S. Schauman, ''New Evidence on Home Prices from Freddie Mac Repeat Sales,'' Journal of the American Real Estate and Urban Economics Association, 19:333–352, 1991; C.A. Calhoun, ''Estimating Changes in Housing Values from Repeat Transactions,'' Federal National Association International meetings (available from OFHEO); and C.A. Calhoun, P. Chinloy, and I.F. Megbolugbe, ''Temporal Aggregation and House Price Index Construction,'' Federal National Mortgage Association, forthcoming in Journal of Housing Research (available from OFHEO); and B. Case, H.O. Pollakowski, and S.M. Wachter, ''On Choosing Among House Price Index Methodologies,'' Journal of the American Real Estate and Urban Economics Association, 19(3):286–307, 1991.

[30] *See* Stephens, *et al., supra.*

Depending on the level of geographic aggregation, this can result in substantial changes in historical values of the index and the implied changes in the LTVs of Enterprise mortgages.

Question 29: Should changes in WRS indexes resulting from revision volatility be reflected in indexes used in a stress test? If so, what should be the frequency of such revisions?

F. Third Party Credit Issues

The Enterprises have credit exposure to institutions that provide mortgage credit enhancements or that serve as counterparties to derivative transactions. This exposure arises because the adverse economic environment of the ten-year stress period may cause some fraction of these institutions to fail and be unable to meet their financial obligations to the Enterprises.

Credit Enhancements

The Enterprises reduce their exposure to mortgage credit losses through a variety of credit enhancements that transfer some or all of the risk to other parties. These credit enhancements include lender recourse, mortgage insurance, and pool insurance.

The use of mortgage insurance illustrates how credit enhancements work to mitigate credit losses and highlights some of the issues OFHEO must address. Generally, the Enterprises may not purchase a conventional mortgage whose LTV ratio exceeds 80 percent unless the seller retains a participation interest or enters into a repurchase agreement, or unless the mortgage is insured by a qualified insurer.[31] If insured mortgages experience actual losses, the insurance fully or partially compensates the Enterprises for those losses.

Applying an approach used by credit rating agencies for private mortgage insurers, some insurers may be assumed to go out of business during the stress period.[32] To reflect this possibility, OFHEO's stress test might assume the failure of some fraction of the private mortgage insurers who would then be unable to entirely fulfill their contractual obligations to the Enterprises.

Question 30: How should OFHEO calculate loss mitigation due to credit enhancements?

Question 31: What should OFHEO assume about the scope of coverage provided by credit enhancements?

Question 32: What assumptions should OFHEO make regarding the failure of credit enhancements over the stress period?

Derivatives Counterparties

The Enterprises use non-mortgage derivatives—interest rate and foreign exchange rate contracts—to hedge interest rate and foreign exchange rate risk. Should a counterparty default on its obligation under a derivative contract, an Enterprise may have to pay a new counterparty to take on the remaining obligation.

Derivatives counterparties present some of the same issues as credit enhancements. Generally, during an economic downturn, as one counterparty's credit deteriorates, the other party to the transaction may increase collateral requirements until eventually the value of pledged collateral more than covers risk exposure. Therefore, with prudent counterparty risk management, losses are most likely to occur due to unexpected counterparty bankruptcies. Such losses may be more directly related to potential financial market disturbances than to general economic conditions.

Question 33: How, if at all, should OFHEO incorporate the effect of counterparty defaults in the risk-based capital test?

G. Non-Mortgage Investments

The Enterprises maintain non-mortgage investment portfolios that include Treasury securities, federal funds, time deposits, obligations of states and municipalities, auction rate preferred stock, medium-term notes, asset-backed securities, repurchase agreements, and other instruments. At the end of the third quarter in 1994, these investments totaled $11.5 billion at Freddie Mac and $35.1 billion at Fannie Mae. On average in recent quarters, these investment portfolios have ranged from two to five percent of assets plus MBS.

Many of these investments or their issuers are rated by the credit rating agencies. Even though these are very short-term and liquid investments, some of the issuers or the investments may be assumed to default during the stress period. To reflect this possibility, OFHEO's stress test might assume the failure of some fraction of the investments or issuers, based on their credit rating.

Question 34: How should OFHEO simulate the default behavior of investments or issuers of short-term, liquid investments?

Question 35: What assumptions should OFHEO make about the performance of rated investments or issuers over the stress period?

Question 36: What assumptions should OFHEO make about gains and losses on the sale of collateral for repurchase agreements?

II. Interest Rate Risk

Interest rate risk, associated primarily with the maintenance of a retained portfolio, caused the most serious losses ever experienced by the Enterprises. For a time during the early 1980's, Fannie Mae, which was then almost exclusively a portfolio institution, was insolvent on a mark-to-market basis.[33] (Freddie Mac focused much more completely on mortgage pass-through securities during that time period.) As did much of the thrift industry at the time, Fannie Mae funded long-term, low-yield, fixed-rate, single family mortgages with short-term liabilities; rising interest rates drove up funding costs, causing Fannie Mae to incur significant losses.

Since then, Fannie Mae and Freddie Mac (the latter has built a substantial retained portfolio over the past decade) have developed funding strategies that reduce their exposure to interest rate risk. To protect against rising rates, liabilities have been lengthened to match more closely the maturity of mortgage assets. When falling interest rates result in accelerated mortgage prepayments, callable debt structures now allow the Enterprises to retire some debt early or issue new debt to maintain more closely their desired net interest margin. Adjusting hedging strategies for adjustable-rate mortgage investments presents a more difficult problem.

The Enterprises have recently been building mortgage derivative portfolios that have an interest rate risk profile more complex than those of whole mortgages.

Interest rate risk also affects income from the Enterprises' securitization businesses. Float income—the return on invested mortgage principal and interest payments prior to the corresponding payment to investors—varies with the level of interest rates at which the Enterprises reinvest such funds. Interest rates affect prepayment rates, and changing prepayments affect float income at each Enterprise.

A number of issues related to the interest rate risk of the Enterprises are discussed below.

[31] Federal National Mortgage Association Charter Act, section 302(b)(2) and (5)(C) (12 U.S.C. 1717(b)(2) and (5)(C)), and Federal Home Loan Mortgage Corporation Act, section 305(a)(2) and (4)(C) (12 U.S.C. 1454(a)(2) and (4)(C)).

[32] ''S&P's Structured Finance Criteria,'' Standard & Poor's (1988).

[33] The market value of Fannie Mae's liabilities (primarily market-rate, short-term securities) exceeded the market value of its assets (primarily below market-rate residential mortgages).

A. Yield Curve Construction

The Act provides specific instructions concerning the ten-year CMT yield over the ten years of the stress test, but other points on the Treasury yield curve are important as well. The Treasury yield curve determines, directly or indirectly, the yields on adjustable-rate mortgages, the returns on non-mortgage investments and the costs of borrowing. The Act calls for Treasury yields of different maturities to be determined in a way that is ''reasonably related to historical experience and are judged reasonable by the Director.'' [34]

Question 37: How should OFHEO determine the remainder of the Treasury curve and apply the curve through the ten-year stress period?

Question 38: How should the other points on the yield curve change during the first year when the ten-year CMT yield is rising or falling?

Question 39: How, if at all, should those yields vary after the one-year period when the ten-year CMT yield has reached its maximum or minimum level?

B. Mortgage Prepayments—Interest Rate Risk

The financing of a mortgage portfolio presents one of the greatest challenges of asset/liability management. A portfolio manager can eliminate interest rate risk only if he or she issues liabilities with maturities, rate adjustments, and embedded options matching those of the mortgage assets. In a declining rate environment, should mortgages pay down more quickly than liabilities, new low-yield mortgages added to the portfolio will likely reduce the net interest margin; in a rising rate environment, if liabilities run off more quickly than the mortgage assets, the net interest margin will likely fall due to higher funding costs.

Since the Enterprises absorb the credit risk of MBS, MBS dealers and investors principally concern themselves with interest rate risk. The tremendous volume of MBS outstanding, and the great sensitivity of MBS value to interest rate movements and resulting prepayment rates, have resulted in a significant research emphasis on prepayments by Wall Street analysts. Although most Wall Street MBS pricing models focus on prepayments, these models are estimated based on mortgage termination data that do not distinguish prepayments from defaults. For the purpose of modeling interest rate risk, the distinction is irrelevant.

The section above titled ''Models of Default and Prepayment'' suggests an approach to the stress test that combines the simulation of defaults and prepayments in a joint multivariate model, making a termination model unnecessary. Use of a mortgage termination model for interest rate risk analysis runs the risk of generating implausible patterns of prepayments because, depending on the approach to default projections, defaults in some years of the stress period might approach or exceed total projected mortgage terminations.

Question 40: What are the relative merits of the alternative approaches, *e.g.*, a joint multivariate default/prepayment model versus a mortgage termination model, to modeling mortgage prepayments in the stress test?

C. Liabilities

The Enterprises' liabilities may take the form of bonds and notes with simple structures; so-called ''structured notes,'' possibly combined with interest rate swap, cap or floor contracts; and foreign currency denominated debt coupled with foreign exchange swap contracts. Many bonds and contracts incorporate call or cancellation options, respectively. Enterprise funding costs are affected by management decisions to retire debt or cancel derivative contracts prior to stated maturities, as well as decisions about the characteristics of debt issued and derivatives activities initiated during the stress period.

Even though the initial stress test involves a ''winddown'' of the Enterprises' businesses, decisions with respect to bond calls and derivatives contract cancellations must be simulated. The financing of mortgages purchased to fulfill contractual commitments may require the issuance of new liabilities and possibly the initiation of new derivatives contracts. The run-off of liabilities at a faster rate than assets may also require new issuances.

Question 41: What should be the decision rules that OFHEO applies in the stress test related to the exercise of bond calls and derivatives contract cancellations?

Question 42: What should be the characteristics of simulated liabilities issued by the Enterprises during the stress period, *e.g.*, maturities, option structure, and coupon structure?

Question 43: What are the implications for simulated liabilities of the pattern of interest rate movements modeled during the initial year of the stress period?

D. Yield Curve Volatility and Option Pricing

The Act states that the ten-year CMT yield will be held at a constant level for the last nine years of the stress period,[35] but remains silent on the volatility of the remainder of the Treasury yield curve. Theoretically, the historical volatility of the yield curve has some bearing on expectations of future volatility. Expectations of future volatility, in turn, are a determinant of the current value of a call option on debt.

Question 44: How does OFHEO implement the link between the volatility of the yield curve experienced during the stress test and the market's expectations of future volatility?

Question 45: What assumptions should OFHEO make about the speed with which the Enterprises adjust to changes in volatility during the stress period?

Question 46: If the actual volatility of yields experienced during the stress test reaches extraordinarily low levels, what assumptions should OFHEO make to ensure reasonable pricing and use of call options on new debt?

E. Enterprises' Costs of Borrowing

As any organization depletes its capital reserves, the organization's cost of borrowing increases due to its higher perceived risk. Spreads over Treasury securities might also be affected by other aspects of the stress period, including the sharp interest rate changes early in the period and the prolonged general economic weakness.

Question 47: What techniques should OFHEO use to project the Enterprises' borrowing costs? How should the stress test link capital levels and quality spreads (borrowing rates relative to Treasuries)?

Question 48: Should yields relative to Treasuries widen during the stress period in response to general interest rate changes or credit problems? If so, by how much should they widen?

F. Hedging Activities

Hedging activities associated with structured notes, which convert specific securities into a preferred debt structure, are addressed above under ''Liabilities.'' The Enterprises engage in other hedging activities to manage interest rate risk more generally. The Act provides that:

> Losses or gains on other activities, including interest rate and foreign exchange hedging activities, shall be determined by the Director, on the basis of available

[34] Section 1361(a)(2)(D) (12 U.S.C. 4611(a)(2)(D)).

[35] Section 1361(a)(2) (B) and (C) (12 U.S.C. 4611(a)(2) (B) and (C)).

information, to be consistent with the stress period.[36]

Question 49: How should OFHEO simulate gains and losses (other than those associated with counterparty failures) on derivative activities in the stress test?

G. Investment of Excess Cash

Under certain circumstances, simulation of the stress scenarios may require decision rules concerning the investment of excess cash. For example, in the stress test scenario where the ten year CMT yield falls, mortgage prepayments will increase. The proceeds from prepayments of mortgages in the retained portfolio may exceed the cost of retiring associated debt. Likewise, in the rising rate stress test scenario, mortgages will prepay more slowly than in other scenarios. Slower prepayments may lead to the receipt of more guarantee fee income than initially anticipated on the Enterprises sold portfolio because the mortgages remain outstanding longer than originally anticipated.

Since the Act does not permit the simulation of new business in the initial stress test model, any excess cash generated during the stress test period must be assumed to either be retained as cash or reinvested in an interest-bearing asset.

Question 50: What decision rules should govern the investment of excess cash during the stress period?

Question 51: What rate of interest should excess cash be assumed to earn?

Question 52: Should excess cash be assumed to earn a single rate or a weighted average rate, representing a range of possible investment choices?

H. Other Indexes and Yields

Values must be created for other indexes and yields, *e.g.*, the Federal Home Loan Bank Eleventh District Cost of Funds Index and the London Interbank Offer Rate, over the stress period in order to reasonably project liability costs, as well as amortization, prepayment, and default rates on affected adjustable rate mortgages. One reasonable approach might be for OFHEO to create equations that project these indexes based on their relationship to points on the Treasury yield curve and assumed market conditions consistent with the circumstances of the stress test.

Question 53: What techniques should be used to simulate the behavior of these indexes and yields?

[36] Section 1361(a)(4) (12 U.S.C. 4611(a)(4)).

III. New Business and Other Considerations

OFHEO's risk-based capital test must incorporate a number of decision rules to reflect management actions that would significantly affect the financial performance of the Enterprises during the stress period. Initially, the Act requires that OFHEO's stress test incorporate no new business for the Enterprises during the stress period other than the fulfillment of contractual commitments to purchase mortgages or issue securities.[37] The Act specifically states that:

> The characteristics of resulting mortgage purchases [and] securities issued * * * will be consistent with the contractual terms of such commitments, recent experience, and the economic characteristics of the stress period.[38]

The Act also requires that characteristics of the stress period other than those discussed above in the ''Credit Risk'' and ''Interest Rate Risk'' sections (such as, for example, dividend policies and operating expenses) be determined by the Director, on the basis of available information, to be most consistent with the stress period.[39]

A. Commitments

At this time, the only ''new business'' OFHEO can assume during the stress period is the fulfillment of contractual commitments to purchase mortgages or issue new securities. As a regular business practice, the Enterprises enter into commitments to purchase mortgages for periods that may extend from a few weeks up to a year. The commitments specify underwriting and pricing criteria for the mortgages to be delivered. If the Enterprise intends to securitize the mortgages listed in the commitment, then the Enterprise will hedge the commitment at the time it is executed by selling the mortgages forward.

Often the seller/servicer that has agreed to sell to an Enterprise under a commitment has not yet originated the mortgages at the time the commitment is executed. When the seller/servicer actually delivers mortgages, their characteristics may differ from those specified in the original commitment.

Question 54: How should OFHEO define the term ''commitments''?

Question 55: On what basis, if any, should OFHEO simulate the fulfillment of outstanding commitments?

Question 56: What mix of product types and underwriting qualities should be assumed?

[37] Section 1361(a)(3) (12 U.S.C. 4611(a)(3)).

[38] *Id.*

[39] Section 1361(b)(2) (12 U.S.C. 4611(b)(2)).

Question 57: What delivery timing should be assumed?

Question 58: What assumptions should be made with regard to securitization versus retention in portfolio?

B. Dividend Policies

During the stress period, net income will fall, reducing cash available for distribution to shareholders. In such circumstances, Enterprise management might be expected to suspend dividends or reduce the dividend rate. However, Enterprise management may be reluctant to take such actions, because dividend reductions send a negative signal to investors and would be expected to depress the market price of Enterprise shares.

Question 59: Should OFHEO assume continuation of the present dividend policies of each Enterprise for the entire stress period?

Question 60: If OFHEO simulates a reduction in the dividend payout rate, at what point in the scenario should it take place?

Question 61: By how much should dividends be reduced if they are reduced?

C. Operating Expenses

The Act is silent on how operating expenses should be treated in the stress test, but OFHEO interprets the Act to require that OFHEO model operating expenses in a manner most consistent with the stress period. Operating expenses lower the Enterprises' earnings or increase their losses, and thereby reduce their capital. The major portion of operating expenses at each of the Enterprises consists of costs related to personnel, occupancy, and equipment. Each Enterprise is divided by business function, such as purchase of mortgages, credit analysis, and investment management. Each Enterprise has regional offices. The cessation of additional business at the commencement of the stress period (beyond the fulfillment of contractual obligations) creates conditions that would quickly eliminate some operations and gradually reduce others.

Question 63: How should OFHEO appropriately model operating expenses in the stress test?

Question 64: To what extent, if any, should operating expenses be disaggregated and treated in distinct categories?

Question 65: How, if at all, should the stress test distinguish between the Enterprises in their management of operating expenses during the stress period?

Conclusion

OFHEO has identified and highlighted many of the significant issues that must be addressed in connection with development of the stress test and the associated risk-based capital regulation. OFHEO seeks comment on these and any additional issues that may be identified.

The development of the stress test and the risk-based capital regulation is one of the critical statutory responsibilities of OFHEO. In carrying out this responsibility, OFHEO is committed to a regulatory process that will provide the broadest possible range of opinions from the widest array of information sources for consideration during the regulatory process. The development of the stress test and the implementation of the risk-based capital regulation will provide regulatory and analytical standards and tools that will safeguard the financial safety and soundness of the Enterprises and in turn will ensure that the Enterprises continue to accomplish their public missions. Given the significance of this undertaking, OFHEO encourages all interested parties to analyze the issues raised in this ANPR and submit comments on the specific questions. OFHEO will thoroughly analyze and carefully consider all comments during the course of the development of the stress test and risk-based capital regulation.

Dated: February 2, 1995.

Aida Alvarez,

Director, Office of Federal Housing, Enterprise, Oversight.

[FR Doc. 95–3076 Filed 2–7–95; 8:45 am]

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DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 25

[Docket No. ANM–106; Notice No. SC–95–2–NM]

Special Conditions: Raytheon Corporate Jets, Inc., Model Hawker 800 Airplanes, High-Intensity Radiated Fields

AGENCY: Federal Aviation Administration, DOT.

ACTION: Notice of proposed special conditions.

SUMMARY: This notice proposes special conditions for the Raytheon Corporate Jets, Inc., Model Hawker 800 airplanes equipped with modifications that install Garrett TFE731–5BR–1H engines and a mach trim system. The configuration of these airplanes will utilize new and revised electronic systems that perform functions critical to the safety of the airplane. The applicable regulations do not contain adequate or appropriate safety standards for the protection of these systems from the effects of high-intensity radiated fields. These proposed special conditions contain the additional safety standards that the Administrator considers necessary to establish a level of safety equivalent to that established by the existing airworthiness standards.

DATES: Comments must be received on or before March 27, 1995.

ADDRESSES: Comments on this proposal may be mailed in duplicate to: Federal Aviation Administration, Transport Airplane Directorate (ANM–100), Attn: Docket No. NM–106, 1601 Lind Avenue SW., Renton, Washington, 98055–4056; or delivered in duplicate to the Transport Airplane Directorate at the above address. Comments must be marked: Docket No. NM–106. Comments may be inspected in the Rules Docket weekdays, except Federal holidays, between 7:30 a.m. and 4:00 p.m.

FOR FURTHER INFORMATION CONTACT: William Schroeder, FAA, Standardization Branch, ANM–113, Transport Airplane Directorate, Aircraft Certification Service, 1601 Lind Avenue SW., Renton, Washington, 98055–4056.

SUPPLEMENTARY INFORMATION:

Comments Invited

Interested persons are invited to participate in the making of these proposed special conditions by submitting such written data, views, or arguments as they may desire. Communications should identify the regulatory docket or notice number and be submitted in duplicate to the address specified above. All communications received on or before the closing date for comments will be considered by the Administrator before further rulemaking action is taken on these proposals. The proposals contained in this notice may be changed in light of comments received. All comments submitted will be available in the Rules Docket for examination by interested persons, both before and after the closing date for comments. A report summarizing each substantive public contact with FAA personnel concerning this rulemaking will be filed in the docket. Persons wishing the FAA to acknowledge receipt of their comments submitted in response to this notice must submit with those comments a self-addressed, stamped postcard on which the following statement is made: ''Comments to Docket No. NM–106.'' The postcard will be date stamped and returned to the commenter.

Background

On February 7, 1994, Raytheon Corporate Jets, Inc., 3 Bishop Square, St. Albans Road West, Hatfield, Hertfordshire AL10 9NE, England, applied for a revision to type certificate number A3EU to add new engines and a mach trim system to the model Hawker 800 series airplanes currently included on that TC. This revised model Hawker 800 is a crusifix tail, low wing, 15 passenger business jet powered by two Garrett TFE 731–5BR–1H turbofan engines mounted on pylons extending from the aft fuselage. The engines will be capable of delivering 4,634 lbs. of max continuous thrust each and 4750 pounds of thrust on the operating engine for up to 5 minutes at automatic power reserve (APR) power.

Type Certification Basis

Under the provisions of § 21.29 of the FAR, Raytheon must show, except as provided in § 25.2, that the revised Model Hawker 800 complies with the certification basis of record shown on TC Data Sheet A3EU for model Hawker 800 airplanes plus, for the engine and mach trim system installations, § 25.1316 as amended by Amendment 25–80, § 25.933 as amended by Amendment 25–40, § 25.934 as amended through Amendment 25–23, § 25.1309 as amended through Amendment 25–23, parts 34 and 36 of the FAR as amended through the latest amendment in effect at the time of certification of this revision to the TC and any additional equivalent safety findings made for this revision of the TC. The special conditions that may be developed as a result of this notice will form an additional part of the type certification basis.

If the Administrator finds that the applicable airworthiness regulations (i.e., part 25, as amended) do not contain adequate or appropriate safety standards for the model Hawker 800 because of a novel or unusual design feature, special conditions are prescribed under the provisions of § 21.16 to establish a level of safety equivalent to that established in the regulations.

Special conditions, as appropriate, are issued in accordance with § 11.49 of the FAR after public notice, as required by §§ 11.28 and 11.29, and become part of the type certification basis in accordance with § 21.29(a)(1)(ii) and § 21.17(a)(2).

Special conditions are initially applicable to the model for which they