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)).